SECOND QUARTER 2020 GROUNDWATER ASSESSMENT MONITORING REPORT
JUNE 2020 MONITORING EVENT

FORMER ENVIRONMENTAL WASTE SOLUTIONS (EWS)
CAMDEN CLASS II LANDFILL

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

Prepared for:
THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

FORMER ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL

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CEC PROJECT 181-364

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EXECUTIVE SUMMARY

This report documents the second quarter 2020 assessment-monitoring event, which was performed at the former Environmental Waste Solutions, LLC (EWS) Camden Class II Landfill on June 2, 2020.

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

Beginning in 2008, the site entered into the Groundwater Detection-Monitoring Program, and groundwater samples were collected from site monitoring wells on a semi-annual basis. EWS entered the Assessment Monitoring Program because of chloride concentrations reported above the 250 mg/l EPA secondary drinking water standard (2DWS) at monitoring well MW-3 during the November 2015 semi-annual detection-monitoring event. As a result, additional groundwater quality assessment activities were completed which included the installation of a new permanent groundwater monitoring well (MW-5), the installation of three (3) temporary monitoring wells (TMW-1, TMW-2, TMW-3), and completion of a private water-use survey. In addition, the semi-annual detection monitoring frequency was increased from semi-annual to quarterly assessment monitoring. The observed chloride concentration at MW-3 during this June 2020 event (23.9 mg/l) was well below the 2DWS.

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.

The 2nd Quarter 2020 sampling event at the facility included the following sampling activities:

Groundwater samples were collected by CEC on June 2, 2020 from MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3. A leachate sample was also collected by CEC on June 2, 2020 from the "Industrial Waste Cell (IWC)" during this event. No sample was collected from the "Aluminum Processing Waste Cell (APWC)" during this sampling event since leachate was not being pumped from the APWC. The amount of leachate produced from the IWC and APWC have been minimal since the landfill was capped, and the leachate being pumped from the IWC and APWC cells have been intermittent.

Pace Analytical (Pace) is the laboratory sub-contracted to perform the chemical analyses. Laboratory reports for the 2nd quarter 2020 groundwater analyses were prepared by Pace and reported to CEC on June 12, 2020 for the groundwater samples and the leachate samples.

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). Where primary or secondary standards were not available (i.e., cobalt), concentrations were reviewed and compared against their EPA Regional Screening Levels (RSLs). 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. The results of the analyses during this assessment-monitoring event are summarized in the following paragraphs.

Total cadmium was detected below the MCL (0.005 mg/l) at MW-3 (0.00278 mg/l) during this June 2, 2020 monitoring event and was similar in concentration compared to the previous February 27, 2020 event (0.00214 mg/l). In a duplicate sample collected from MW-3 during the June 2, 2020 monitoring event the total cadmium concentration (0.00261 mg/l) was similar to the concentration in the original sample from MW-3. The cadmium detections at MW-3 during this event were the only cadmium detections above the Practical Quantification Limit (PQL) at any of the groundwater monitoring locations. Based on the Mann-Kendall trend test, no distinct statistically significant trend was identified for total cadmium concentrations at MW-3 when considering data from the past 16 sampling events since November 2016. Total cadmium was first detected above the PQL during the November 10, 2016 event (0.00177 mg/l) and 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 cadmium levels observed in MW-3 have improved significantly since closure activities have been completed. The total cadmium concentration reported at MW-3 during this event was below the MCL for the third consecutive sampling event and was lower than the 12 consecutive sampling events completed from June 6, 2017 to September 5, 2019.

Ten SSIs were identified over background during this event. SSIs included chloride (MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3), total cadmium (MW-3), fluoride (MW-3), sulfate (MW-3), and zinc (MW-3). The total cadmium, chloride, fluoride, sulfate, and zinc detections observed in the site monitoring wells were all below their associated MCLs or 2DWS.

Glossary of Terms

Appendix I	Refers to the required regulatory sample list of groundwater parameters
CEC	Civil & Environmental Consultants, Inc.
Class I Landfill	Municipal Solid Waste Landfill
Class II Landfill	Industrial Waste Landfill
Class IV Landfill	Construction/Demolition Waste Landfill
Class III/IV Landfill	Landscaping and Construction/Demolition Waste Landfill
DML	Construction Demolition Landfill
US EPA	United States Environmental Protection Agency
Pace	Pace Analytical
EWS	Environmental Waste Solutions
GW	Groundwater
HDPE	High Density Polyethylene
HI	Hydrogeologic Investigation
MCL	Maximum Contaminant Level
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 EWS 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 landfill cap construction and closure activities have been completed by TDEC. Continued post-closure activities at the facility are being implemented to protect the environment and human health. These activities include leachate pre-treatment, leachate hauling and disposal, storm water management activities, and groundwater monitoring activities.

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 recharge 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 was 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 Plane 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 21.69 feet below the top of casing at the up-gradient monitor well MW-1 to approximately 11.05 feet below the top of casing at monitor well MW-4. The potentiometric gradient calculated from groundwater elevation data collected on June 2, 2020 is approximately 1.28%.

The potentiometric gradient is calculated according to the following formula:

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

$$\frac{(394.78') - (370.42')}{1{,}910'} * 100 = 1.28\%$$

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 June 2, 2020 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) two-hundred fifty (250) ml HDPE container preserved with nitric acid (HNO_3); alkalinity – one (1) one-hundred (100) ml unpreserved amber glass container; 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).

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.

3.4 LEACHATE SAMPLING PROCEDURES

A leachate sample was also collected by CEC on June 2, 2020 from the "Industrial Waste Cell (IWC)" during this event. No sample was collected from the "Aluminum Processing Waste Cell (APWC)" during this sampling event since leachate was not being pumped from the APWC. The amount of leachate produced from the IWC and APWC have been minimal since the landfill was capped, and the leachate being pumped from the IWC and APWC cells have been intermittent. 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 analyses were prepared by Pace and reported to CEC on June 12, 2020. The approximate APWC and IWC leachate sample locations are shown on **Figure 2 – Potentiometric Surface Map located in Appendix A**.

3.5 QUALITY ASSURANCE AND QUALITY CONTROL

3.5.1 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 near 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 June 12, 2020. Laboratory analytical testing of the field blank presented in the analytical report showed no indications of any constituents above the laboratory PQL. The results for the duplicate sample collected from MW-3 were similar to the original MW-3 sample results.

3.5.2 Laboratory Quality Assurance and Quality Control

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

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

The groundwater analytical report from the June 2020 event indicated that the Relative Percent Difference (RPD) value for nitrate at MW-3 was not applicable for sample concentrations less than 5 times the reporting limit as indicated by laboratory qualifier "P1". As indicated by laboratory qualifier "Q", the nitrate sample from the duplicate sample was prepared and/or analyzed past holding time as defined by the method and the nitrate concentration at the duplicate sample location should be considered a minimum value. The internal laboratory IQA and IQC results are included in the laboratory analytical reports located in **Appendix C – Laboratory Analytical Reports & Field Information Logs**.

3.6 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 June 2020 sampling event. The CEC SOP 07-01-01 for maintaining sample Chain of Custody is presented in **Appendix D – CEC Standard Operating Procedures**.

4.0 LABORATORY ANALYTICAL PROCEDURES

4.1 ANALYTICAL METHODS

All laboratory analyses for the second quarter 2020 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)
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 130.1	Hardness (colorimetric) as $CaCO_3$
Method 350.1	Ammonia Nitrogen
Method 410.4	Chemical Oxygen Demand (COD)

4.2 LABORATORY ANALYTICAL RESULTS

Second quarter 2020 groundwater samples were collected by CEC on June 2, 2020. Pace performed the groundwater analysis and reported the results on June 12, 2020. A leachate sample was also collected by CEC on June 2, 2020 from the "Industrial Waste Cell (IWC)" during this event. No sample was collected from the "Aluminum Processing Waste Cell (APWC)" during this sampling event since leachate was not being pumped from the APWC.

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**. Copies of the laboratory reports are located in **Appendix C – Laboratory Analytical Report & Field Information Logs**.

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

Total Arsenic was detected above the MCL (0.01 mg/l) at up-gradient MW-1 (0.0174 mg/l) during this 2nd Quarter 2020 event, which was more than the arsenic concentration reported at MW-1 (0.00807 mg/l) during the previous 1st Quarter 2020 event, which did not exceed the MCL. Arsenic has consistently been detected at similar concentrations that exceed the MCL only at up-gradient well MW-1. Arsenic was not detected above the laboratory PQL (<0.002 mg/l) in any of the down-gradient monitoring wells during this 2nd quarter 2020 event, which is consistent with previous sampling events. For this site, the presence of arsenic 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 Cadmium was **not** detected above the MCL (0.005 mg/l) at MW-3 during this June 2, 2020 monitoring event (total cadmium at MW-3 = 0.00278 mg/l). In addition, total cadmium was detected below the MCL in the duplicate sample collected from MW-3 during the June 2, 2020 monitoring event (total cadmium at duplicate MW-3 = 0.00261 mg/l). A summary of cadmium concentrations (total cadmium and dissolved cadmium) and turbidity values observed at MW-3 during each sampling event since May 9, 2016 is referenced in the table and graph below:

MW-3
Summary of Cadmium Concentrations and Turbidity Measurements

Date	Total Cadmium (mg/l)	Cadmium, Dissolved (mg/l)	Turbidity (NTU)
6/2/2020	**0.00278**	NA	**5.38**
2/27/2020	**0.00214**	NA	**7.63**
11/20/2019	**0.00157**	NA	**2.11**
9/6/2019	**0.0088**	NA	**2.98**
6/4/2019	**0.0292**	**0.0297**	**2.98**
3/5/2019	**0.0117**	**0.0133**	**6.27**
12/4/2018	**0.144**	**0.139**	**4.77**
9/27/2018	**0.204**	**0.204**	**1.05**
9/12/2018	**0.297**	**0.320**	**1.12**
6/19/2018	**0.0312**	**0.0292**	**4.90**
3/22/2018	**0.00671**	**0.00637**	**24.3**
12/14/2017	**0.00659**	**0.00733**	**23.0**
9/28/2017	**0.00926**	**0.0102**	**18.9**
8/8/2017	**0.0113**	NA	**16.6**
6/8/2017	**0.0286**	NA	**34.8**
11/10/2016	**0.00177**	NA	**64.5**
5/9/2016	<0.001	NA	**8.39**

NA-Not Analyzed

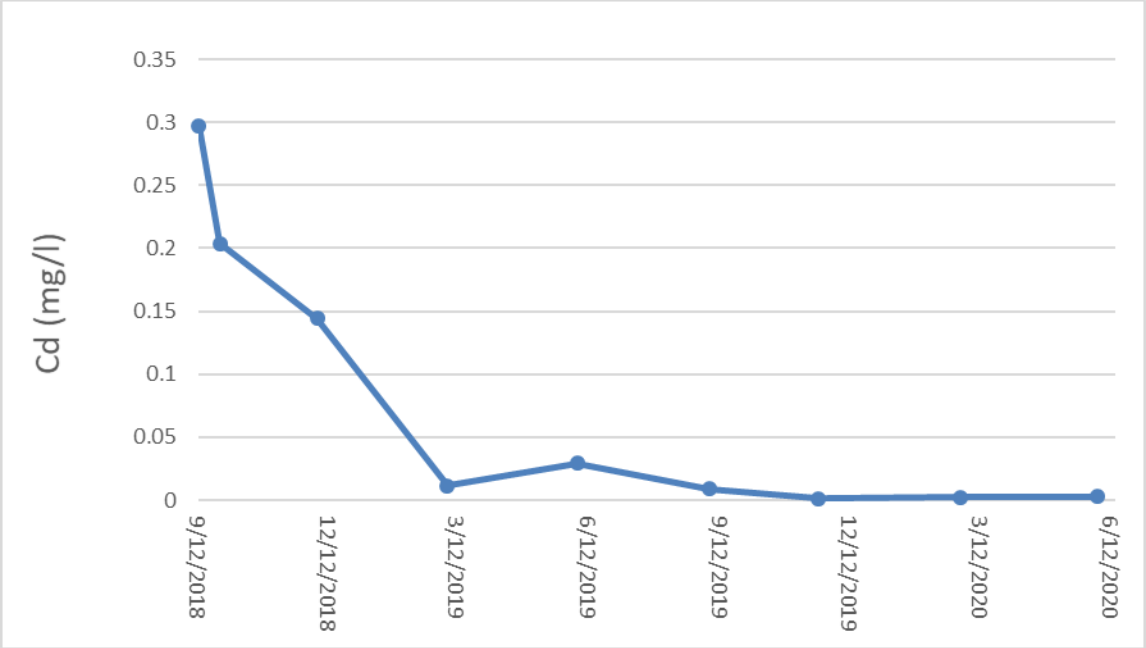


Figure – Cadmium concentrations in MW-3

Since the fall of 2018, cadmium in MW-3 has continued to decrease in concentration. In addition, the turbidity result for MW-3 on June 2, 2020 (5.38 NTUs) was within the recommended goal of <10 NTUs and is consistent with recent monitoring events.

Total cadmium was first detected at a level above the laboratory PQL, but at a level below the MCL (<0.005 mg/l), in MW-3 during the 4th quarter 2016 sampling event completed on November 10, 2016. Total cadmium was first detected above the MCL of 0.005 mg/l at MW-3 during the June 8, 2017 event. Although there have been elevated detections of total cadmium in MW-3 in the past, there have been no detections, as of this date, from groundwater samples collected from any other monitoring wells at the site including monitoring wells TMW-1, TMW-2, and TMW-3, which are down-gradient from MW-3.

Total Cobalt was detected in up-gradient well MW-1 (0.0432 mg/l) and down-gradient wells MW-3 (0.00401 mg/l) and MW-5 (0.00204 mg/l) during this June 2020 event. Cobalt does not have an MCL; however, the TDEC-DSWM uses the EPA regional screening level (RSL) of 0.006 mg/l as the groundwater protection standard for this constituent. The reported cobalt detection at up-gradient well MW-1 was above the RSL for cobalt during this June 2020 event. However, the reported cobalt concentrations in down-gradient monitoring wells MW-3 and MW-5 were below the RSL for cobalt concentrations during this June 2020 event. Cobalt has historically been detected at concentrations that exceed the RSL at MW-1 prior to the disposal of waste in the landfill, and total cobalt was detected in MW-1 at similar concentrations during previous events. For this site, the presence of cobalt in the local groundwater is considered to be naturally occurring, originating from deposits in the soil overburden, since there is no development immediately up-gradient of MW-1.

Total Chromium was detected in MW-4 (0.00208 mg/l) and MW-5 (0.00608 mg/l). These reported values were not above the MCL of 0.1 mg/l for chromium in any of the wells during this June 2020 event.

Total Mercury was detected in up-gradient well MW-1 (0.000888 mg/l) during this June 2020 monitoring event, which was below the MCL of 0.002 mg/l for mercury concentrations, and also similar in concentration than the previous February 2020 event (total mercury = 0.000797 mg/l) at MW-1. Total mercury was not detected above the laboratory PQL (0.000200 mg/l) at any of the down-gradient wells during this June 2020 event. 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 development immediately 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 during the 2nd quarter 2020 sampling event from the former EWS Class II Landfill groundwater monitoring well network indicated that three 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 **aluminum** in down-gradient well TMW-2; **iron** in up-gradient well MW-1 and down-gradient wells MW-3, MW-5, and TMW-2; and **manganese** in up-gradient well MW-1 and down-gradient wells MW-3 and MW-5. **Chloride, sulfate,** and **nickel** detections were below the 2DWS during this event. The observed concentrations for the constituents given below are discussed relative to the 2DWS.

The **Total Aluminum** concentration observed in TMW-2 (0.410 mg/l) during this June 2020 sampling event was above the 2DWS (0.2 mg/l). Total aluminum was not detected at TMW-3 during this event, while in the previous February 2020 event aluminum was detected above the 2DWS at well TMW-3 (0.602 mg/l). In addition, the total aluminum at TMW-2 during this event was lower in concentration than the previous February 2020 sampling event at TMW-2 (0.439 mg/l). Total aluminum was detected in MW-3 (0.101 mg/l) and MW-5 (0.171 mg/l) during this event, which were below the 2DWS for aluminum. Aluminum was not detected above the PQL (<0.1 mg/l) at MW-1, MW-4, TMW-1, or TMW-3 during this June 2020 event.

The **Chloride** concentrations reported at MW-1 (2.27 mg/l), MW-3 (23.9 mg/l), MW-4 (8.75 mg/l), MW-5 (83.2 mg/l), TMW-1 (21.1 mg/l), TMW-2 (34.6 mg/l), and TMW-3 (62.7 mg/l) during this June 2020 event were below the 2DWS for chloride concentrations (250 mg/l). The current chloride concentrations for this June 2020 event are slightly higher than the February 2020 event at wells MW-1 (1.95 mg/l), MW-3 (17.8 mg/l), MW-4 (7.87 mg/l), MW-5 (80.4 mg/l), TMW-1 (19.7 mg/l), TMW-2 (31.9 mg/l), and TMW-3 (62.0 mg/l). However, the chloride

concentration at MW-3 during this event continues to be significantly lower in concentration compared to the previous events in December 2018 (65 mg/l), September 2018 (222 mg/l), November 2015 (458 mg/l), and the supplemental re-sampling in December 2015 (360 mg/l). Chloride concentrations at MW-3 have remained below the 250 mg/l 2DWS for chloride during this June 2020 event, the previous February 2020 event, and each of the quarterly 2019 sample events (March 2019, June 2019, September 2019, and November 2019). In addition, the chloride concentration at MW-3 during this June 2020 event was lower than the twenty-two monitoring events from July 16, 2010 to December 4, 2018. Although the chloride concentrations reported at MW-5 have remained below the 2DWS for chloride concentrations, the chloride concentrations at MW-5 appeared to be increasing slightly from November 2016 to September 2019, based on the time-series graphs. However, the chloride concentrations at MW-5 during each event since September 2019 do not appear to be increasing and have been similar in concentration. The chloride concentrations at MW-3 and MW-5 will continue to be evaluated.

Fluoride was detected at MW-3 (0.218 mg/l) and the duplicate sample collected from MW-3 (0.221 mg/l) during this June 2020 monitoring event, which were well below the MCL (4.0 mg/l) for fluoride. In addition, the observed fluoride concentrations at MW-3 and the duplicate sample collected at MW-3 were well below the 2DWS (2.0 mg/l) for fluoride.

Total Iron was detected above the 2DWS (0.3 mg/l) in up-gradient well MW-1 (13.6 mg/l) and down-gradient wells MW-3 (0.302 mg/l), MW-5 (0.483 mg/l), and TMW-2 (0.317 mg/l) during this June 2020 monitoring event. Iron was detected above the PQLs of the laboratory (0.1 mg/l) but below the 2DWS (0.3 mg/l) during this June 2020 event at wells MW-4 (0.162 mg/l) and TMW-1 (0.145 mg/l). 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 up-gradient well MW-1.

Total Manganese detections were observed above the 2DWS (0.05 mg/l) in up-gradient MW-1 (0.856 mg/l) and down-gradient wells MW-3 (0.636 mg/l) and MW-5 (0.224 mg/l) during the June 2020 monitoring event. Total Manganese has been consistently detected at concentrations above the 2DWS (0.05 mg/l) in up-gradient well MW-1. 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 (0.0063 mg/l) and down-gradient wells MW-3 (0.00564 mg/l), and MW-5 (0.00651 mg/l) during the June 2020 sampling event, and these values 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 **Sulfate** concentration reported at MW-3 (28.9 mg/l) during this June 2020 sampling event was below the 2DWS for sulfate (250 mg/l). In addition, the sulfate concentrations at MW-3 have been consistently decreasing each event since September 2018. Sulfate concentrations in MW-3 since that time include: the previous February 2020 event (62.0 mg/l), November 2019 event (111 mg/l), the September 2019 event (154 mg/l), the June 2019 event (219 mg/l), the December 2018 event (324 mg/l), and the September 2018 event (484 mg/l). The September 2018 event 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 was 34 mg/l in November 2016, 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 (9.29 mg/l) during this June 2020 event and was below the 2DWS. Sulfate was not detected above the PQL of 5.00 mg/l in any of the other monitoring wells across the site.

Total Magnesium does not currently have an established MCL, 2DWS, EPA RSL, or an approved alternate groundwater protection standard (GWPS). The total magnesium concentration at MW-3 during this June 2020 sample event (6.2 mg/l) was lower than the previous February 2020 event (6.73 mg/l), November 2019 (10.3 mg/l), September 2019 (13 mg/l), June 2019 (20.8 mg/l), March 2019 (7.83 mg/l), December 2018 (36.4 mg/l), and September 2018 (64 mg/l) respective event concentrations. 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 have remained below 31.9 mg/l at MW-3 in recent groundwater events from December 2018 to February 2020.

Magnesium was also detected above the laboratory PQL (1.00 mg/l) during the June 2020 sample event in MW-1 (2.56 mg/l), MW-4 (2.59 mg/l), MW-5 (12 mg/l), TMW-1 (2.87 mg/l), TMW-2 (4.26 mg/l), and TMW-3 (6.45 mg/l).

4.3 QUALITY CONTROL QUALIFIER CODES

The EPA Contract Laboratory Program states that sample and result qualifiers should be utilized as part of a total quality-control process. Pace complies with this directive and reports all qualifiers along with explanations of QC qualifier codes. Three QC qualifier codes (J6, P1, and Q) were indicated during the laboratory analysis of samples collected in June 2020. Two qualifier codes (P1 and Q) were indicated during the laboratory analysis of groundwater samples. One QC qualifier code (J6) was indicated during the laboratory analysis of the IWC leachate sample. Specific information concerning each laboratory QC qualifier code can be found in the Laboratory

Analytical Reports in **Appendix C** (Page 50 of 53 in the Groundwater Analytical Report, Page 24 of 26 in the Leachate Analytical Report).

5.0 STATISTICAL ANALYSIS

5.1 APPLICABLE METHODS

The Rules of the Tennessee Department of Environment and Conservation, Division of Solid Waste Management Chapter 0400-11-01-.04(7) 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.

After the non-representative background sample data were removed, the distribution of the data was evaluated for normality. The test for normality was conducted using the Shapiro-Wilks method if N <50 or Shapiro-Francia method if N>50. The normality test was performed for both raw and log-transformed data, with replacement of non-detects to half of the corresponding laboratory PQL. Data determined to be normally distributed were evaluated using parametric prediction limit (PPL) analysis. 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 changes in background water quality data in up-gradient monitoring well MW-1. The arsenic data at MW-1 were normally distributed using the Shapiro-Wilks test for normality. The cobalt data at MW-1 were normally distributed using the Shapiro-Wilks test for normality when the data were log-transformed and non-detects were replaced by half of the corresponding PQL. Therefore, intra-well PPL analysis was performed for the data sets

that passed normality testing. However, all other data sets (barium, chloride, nickel, sulfate, and mercury data) for MW-1 were not normally distributed and were evaluated using intra-well non-parametric statistical methods.

Inter-well analyses compared the concentrations observed at the down-gradient monitoring locations (MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3) to the concentrations observed at the up-gradient monitoring location (MW-1) during this monitoring event. Chloride data distribution tests from all up-gradient and down-gradient monitoring wells indicated normality when the data were log-transformed and non-detects were replaced by half of the corresponding PQL. Therefore, the chloride data at MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3 were evaluated using PPL inter-well analysis. All other data sets (aluminum, barium, total cadmium, chromium, cobalt, 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 at least 50% non-detects existed for the given parameter, non-parametric inter-well prediction limit analysis was conducted on the data. For this site, the total % non-detects for aluminum (37.80% non-detects) and barium (0% non-detects) were less than 50%, and Shewart-CUSUM control charts were utilized for aluminum and barium analysis. Based on the high amount of left-censored data (>/=50% of non-detects) for total cadmium, chromium, cobalt, fluoride, nickel, zinc, and sulfate, non-parametric inter-well prediction limit analysis was conducted for the background 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 v.6.4 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 intra-well increases (SSIs) were identified in up-gradient well MW-1 during this event.

SSIs over background identified for the current monitoring event include chloride at MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3, total cadmium at MW-3, fluoride at MW-3, sulfate at MW-3, and zinc at MW-3. When considering data since the November 10, 2016, statistically significant trends in data were observed using the Mann-Kendall trend analyses at the 95%

confidence level. Trend analyses revealed a statistically significant upward trend in barium at MW-5 and TMW-3; chloride at MW-4, MW-5, TMW-1, TMW-2, and TMW-3; chromium at MW-5; and sulfate at MW-5. Trend analysis revealed a downward trend in aluminum concentrations at TMW-2; barium concentrations at MW-3, and chloride concentrations at MW-3. There were no distinct statistically significant trends in concentrations for any of the other detected constituents.

The total cadmium concentration observed at MW-3 indicated an SSI in reported concentrations using inter-well non-parametric prediction limits by using cadmium concentrations observed at the up-gradient monitoring location (MW-1) as background for comparison. However, the total cadmium concentration at MW-3 (0.00278 mg/l) was just above the laboratory PQL and was less than the MCL (0.005 mg/l) for the third consecutive sampling event. The November 2019 event (total cadmium at MW-3=0.00157 mg/l) was the first time the total cadmium concentration had been below the MCL since November 10, 2016 (total cadmium at MW-3=0.00177 mg/l). No distinct statistically significant trend was identified by Mann-Kendall for total cadmium concentrations at MW-3 when considering data from the past 16 sampling events since November 10, 2016.

The chloride concentrations observed at MW-3 (23.9 mg/l), MW-4 (8.75 mg/l), MW-5 (83.2 mg/l), TMW-1 (21.1 mg/l), TMW-2 (34.6 mg/l), and TMW-3 (62.7 mg/l) produced SSIs 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 data from the past 14 sampling events since November 2016, the data showed a downward trend in chloride concentrations at MW-3 and an upward trend in chloride concentrations at MW-4, MW-5, TMW-1, TMW-2, and TMW-3 using the Mann-Kendall trend analyses at the 95% confidence level.

The chromium concentrations observed at MW-4 (0.00208 mg/l) and MW-5 (0.00608 mg/l) were less than the MCL (0.1 mg/l), and did not produce a SSI in reported concentrations during this event. When considering chromium data from MW-4 and MW-5 since November 2016, the data showed an upward trend in the chromium concentrations at MW-5, and no trend in chromium concentrations at MW-4 using the Mann-Kendall trend analysis at the 95% confidence level.

The cobalt concentrations observed at MW-3 (0.00401 mg/l) and MW-5 (0.00204 mg/l) were less than the GWPS value referenced from the EPA Regional Screening Levels for cobalt (0.006 mg/l), and did not produce a SSI in reported concentrations during this event. When considering cobalt data from MW-3 and MW-5 since November 2016, the data did not show an upward or downward trend in cobalt concentrations at MW-3 or MW-5 using the Mann-Kendall trend analysis at the 95% confidence level.

The copper concentrations observed at MW-4 (0.00536 mg/l) and MW-5 (0.00528 mg/l) were less than the MCL for copper (1.3 mg/l), and did not produce a SSI in reported concentrations during this event. No distinct statistically significant trend was identified for copper concentrations at

MW-4 or MW-5 when considering data from the past 14 sampling events since November 10, 2016.

A SSI in reported fluoride concentrations was identified during this sampling event. The fluoride concentration at MW-3 (0.218 mg/l) was less than the MCL (4.0 mg/l) during this event and was similar to the previous February 2020 event (0.197 mg/l). However, no distinct statistically significant trend was identified by Mann-Kendall for fluoride concentrations at MW-3 when considering data from the past 14 sampling events since November 10, 2016.

A SSI in reported sulfate concentrations at MW-3 was identified during this sampling event. However, when considering all data accumulated from MW-3 since November 10, 2016, the data did not show an upward or downward trend in sulfate concentrations at MW-3 using the Mann-Kendall trend analysis at the 95% confidence level. The sulfate concentration reported during this sampling event (28.9 mg/l) was lower than the previous February 2020 event (62.0 mg/l), November 2019 event (111 mg/l), September 2019 event (154 mg/l), June 2019 event (219 mg/l), and March 2019 event (85.8 mg/l). Regardless, the concentration remains below the 2DWS of 250 mg/l. Sulfate was also detected in MW-5 (9.29 mg/l) during this May 2020 event, which was well below the 2DWS of 250 mg /l. While there was an upward trend in sulfate concentrations identified in MW-5 during this event, there was no reported SSI. Sulfate was not detected above the PQL in any of the other monitoring wells across the site.

The zinc concentration observed at MW-3 (0.0295 mg/l) was just above the laboratory PQL, but was less than the MCL value obtained from the EPA 2DWS (5 mg/l), and produced a SSI in reported concentrations during this event. Zinc was not detected above the PQL during the previous February 2020 event (<0.0250 mg/l), and zinc was detected just above the PQL during the November 2019 event ((0.0251 mg/l). The zinc concentration at MW-3 during this event was lower than the previous events in September 2019 (0.0324 mg/l), June 2019 (0.197 mg/l), March 2019 (0.0994 mg/l), December 2018 (1.34 mg/l), September 12, 2018 (1.68 mg/l), and September 27, 2018 (1.58 mg/l). When considering zinc data from MW-3 since November 2016, the data did not show an upward or downward trend in zinc concentrations at MW-3 using the Mann-Kendall trend analysis at the 95% confidence level.

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 second quarter assessment-monitoring event of 2020 are summarized as follows:

- SSIs over background identified for the current monitoring event include chloride at MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3, total cadmium at MW-3, fluoride at MW-3, sulfate at MW-3, and zinc at MW-3.
- Trend analyses revealed a statistically significant upward trend in barium at MW-5 and TMW-3; chloride at MW-4, MW-5, TMW-1, TMW-2, and TMW-3; chromium at MW-5; and sulfate at MW-5. Trend analysis revealed a downward trend in aluminum concentrations at TMW-2; barium concentrations at MW-3, and chloride concentrations at MW-3. There were no distinct statistically significant trends in concentrations for any of the other detected constituents during this event.
- The total cadmium levels at MW-3 have improved significantly since closure activities have been completed. The total cadmium detections at MW-3 have been below the MCL during the three most recent monitoring events since closure activities have been completed, and the total cadmium concentration reported at MW-3 during this event was lower than the 12 consecutive sampling events from June 8, 2017 to September 5, 2019. In addition, there have been no cadmium detections from groundwater samples obtained from temporary monitoring wells TMW-2 and TMW-3 that are immediately down-gradient of MW-3.
- The arsenic concentration at up-gradient MW-1 has previously exceeded the MCL. However, arsenic was not detected above the MCL at MW-1 during this event, and did not indicate a SSI. Arsenic was not detected above the laboratory PQL in any of the down-gradient monitoring locations during the 2nd Quarter 2020 event.
- A SSI was identified for the reported sulfate concentration at MW-3. However, the sulfate concentrations at MW-3 did not exhibit a statistically significant increasing or decreasing trend when considering data from MW-3 since November 10, 2016. Also, the sulfate concentrations reported at MW-3 during recent events in 2019 and 2020 have been below the 2DWS for sulfate and appear to be decreasing in concentration.
- Based on the review of the time-series graphs, it appears that the concentrations of total aluminum, cadmium, calcium, fluoride, magnesium, manganese, nickel, potassium, zinc, chloride, zinc, and sulfate at MW-3 have decreased in concentration during recent quarterly events.
- The chloride concentrations at MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3 are still well below the 250 mg/l 2DWS.
- Although the zinc concentration reported at MW-3 was indicated as an SSI using all available data since 2008, the levels appear to be decreasing in concentration since September 2018 and are still below the 2DWS of 5 mg/l. In addition, the zinc concentrations at MW-3 did not exhibit a statistically significant increasing or decreasing trend when considering data from MW-3 since November 10, 2016.

- No VOCs were detected above their respective laboratory PQL in any of the groundwater monitoring wells during the monitoring event.

The third quarter 2020 assessment-monitoring event is tentatively scheduled for August 2020 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. As mentioned previously, the amount of leachate produced from the IWC and APWC have been minimal since the landfill was capped, and the leachate being pumped from the IWC and APWC cells have been intermittent. If possible, leachate samples will also be collected from the APWC and IWC during the third quarter 2020 assessment-monitoring event.

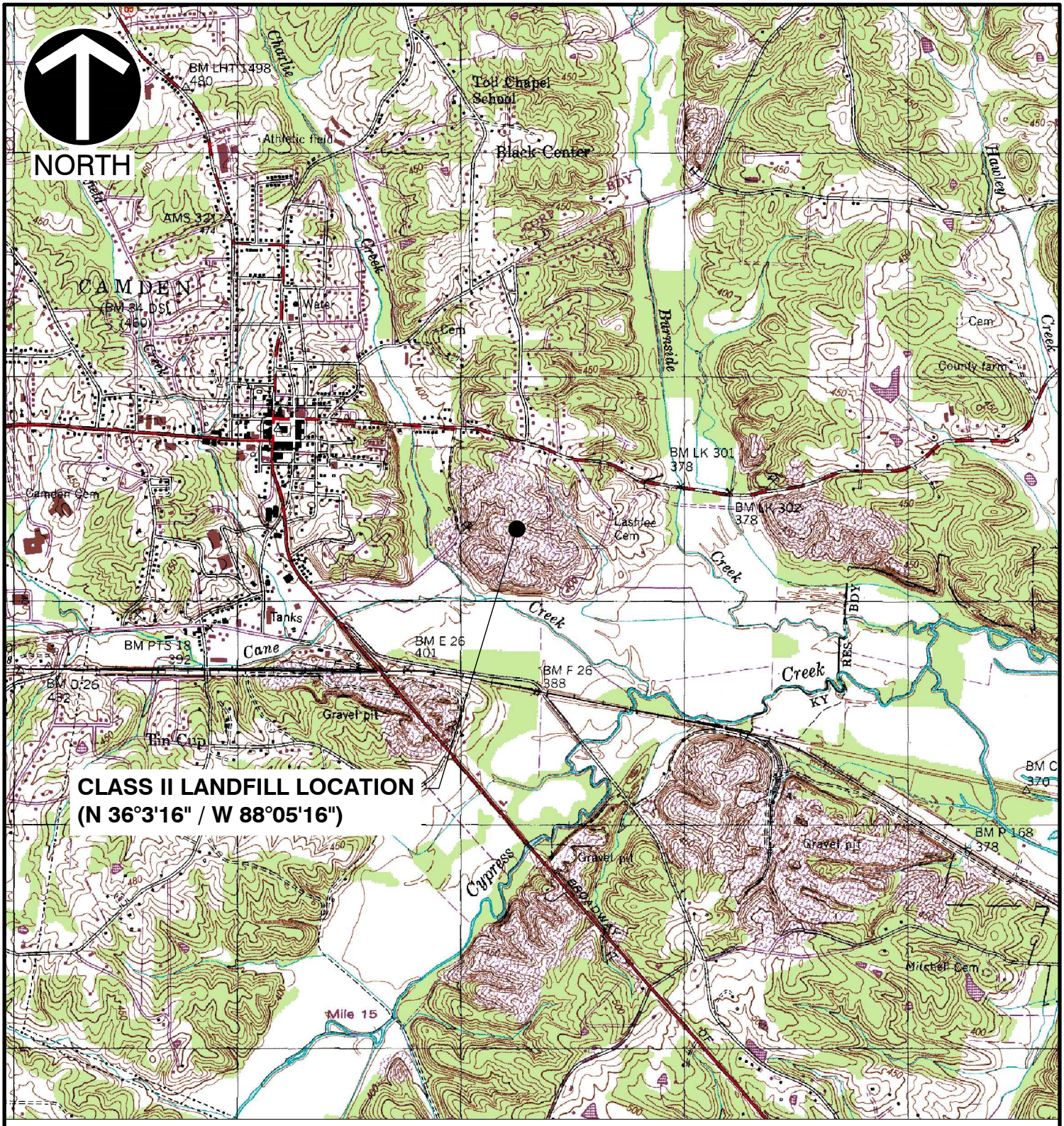
Since the former EWS Class II Landfill site remains in assessment monitoring, a private water use survey update is required annually. The previous annual water use survey for the former EWS Class II Landfill site was completed in November 2019, and no new wells or springs were identified within the required search radius for the site during the November 2019 update. Therefore, an updated water use survey will be completed in November 2020 and will be documented and submitted in a separate report.

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.
2. If certain groundwater samples have turbidities that are elevated, samples will be collected for dissolved metals analysis (in addition to total metals analysis).

APPENDIX A
MAPS & TABLES



REFERENCE

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

SCALE IN FEET

0 2000' 4000'

* HAND SIGNATURE ON FILE

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FORMER EWS SITE
CLASS II CAMDEN LANDFILL
CAMDEN, TENNESSEE

SITE LOCATION MAP

DRAWN BY:	AAB	CHECKED BY:	PC	APPROVED BY:	KBW*	FIGURE NO.:	1
DATE:	JULY 2020	DWG SCALE:	1"=2000'	PROJECT NO:	181-364		

P:\2018\181-364\-CADD\Dwg\181-364_ SITE LOCATION MAP.dwg{LAYOUT1} LS:(4/7/2020 - dbaugh) - LP: 7/1/2020 12:42 PM

NORTH

LEGEND

MW1 394.78	GROUND WATER MONITORING WELL GROUND WATER ELEVATION (FMSL)
TMW-1 375.15	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.

$$i = \frac{394.78' \text{ (MW−1)} - 370.42' \text{ (MW−4)}}{1{,}910'} = 0.0128 \text{ ft/ft}$$

GROUNDWATER CONDITIONS

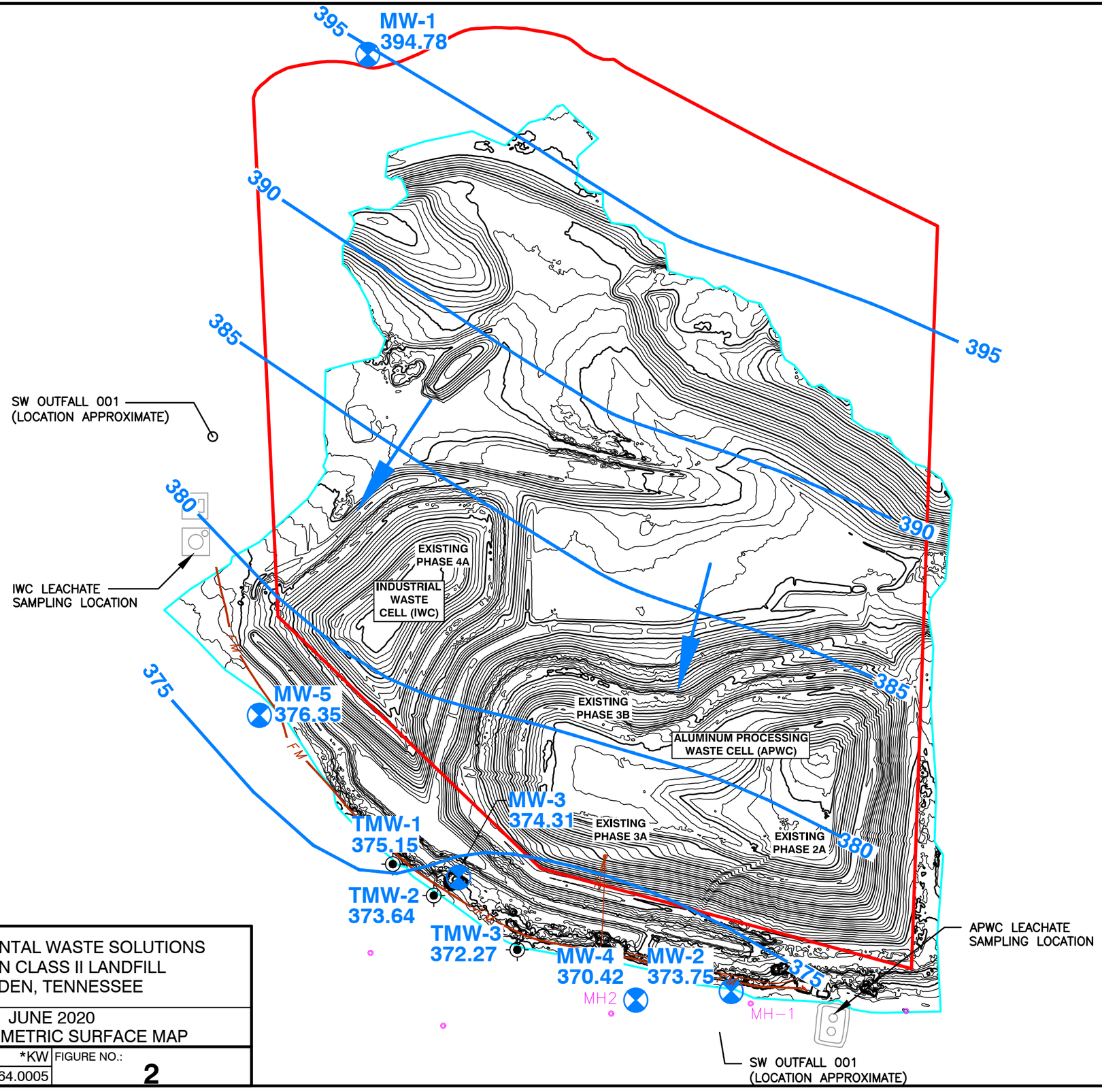
THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME.

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

JUNE 2020
POTENTIOMETRIC SURFACE MAP

DRAWN BY:	AAB	CHECKED BY:	PC	APPROVED BY:	*KW	FIGURE NO.:	2
DATE:	JULY 2020	DWG SCALE:	1"=200'	PROJECT NO:	181-364.0005		

P:\2018\181-364\-CADD\DWG\181-364_ GROUNDWATER MAP JUNE 2020.DWG{FIG 2 (2)}LS:{PCAMPBELL - 7/29/2020} - LP: 7/29/2020_5:53:06_PM

Table 1

Former Environmental Waste Solutions Camden Class II Landfill

Field Parameters and Potentiometric Data - June 2020

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)	Temp. (˚C)	Conductivity (µS/cm)	Specific Conductivity (µS/cm)	pH (SU)	Dissolved Oxygen (mg/l)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
MW-1	6/2/2020	11:00	416.47	385.97	0.17	1.5	21.69	394.78	15.7	85.0	103.4	5.13	0.84	36.4	9.04
MW-2*	6/2/2020	15:00	380.35	367.70	0.17	1.0	6.60	373.75	17.6	303.8	353.2	5.87	1.87	252.4	NA
MW-3	6/2/2020	16:00	392.90	365.10	0.17	1.6	18.59	374.31	16.7	198.5	236.0	5.80	0.24	116.7	5.38
MW-4	6/2/2020	14:50	381.47	358.37	0.17	2.0	11.05	370.42	15.9	61.1	74.0	5.31	2.51	235.7	4.93
MW-5	6/2/2020	13:50	385.25	351.40	0.17	4.2	8.90	376.35	17.6	306.2	356.9	4.86	0.67	255.9	16.8
TMW-1	6/2/2020	13:10	381.19	348.99	0.085	1.1	6.04	375.15	18.3	112.4	129.0	5.44	3.87	143.9	5.07
TMW-2	6/2/2020	15:00	384.27	356.77	0.085	0.7	10.63	373.64	17.6	138.7	161.5	5.45	4.50	144.6	9.80
TMW-3	6/2/2020	16:10	381.37	353.37	0.085	0.8	9.10	372.27	16.9	254.1	302.4	5.09	1.07	164.5	6.08
**Leachate (IWC-L)	6/2/2020	13:15	NA	NA	NA	NA	NA	NA	NS	NS	NS	NS	NS	NS	NS
**Leachate (APWC-L)	6/2/2020	NS	NA	NA	NA	NA	NA	NA	NS	NS	NS	NS	NS	NS	NS

[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 February 27, 2020.

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

**Leachate (IWC-L) was collected from the lift station access. Leachate (APWC-L) was not producing leachate and was not sampled.

NS= Not Sampled

NA= Not Applicable.

Table 2
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Groundwater and Leachate Analytical Data - June 2020

		MW-1	Qualifier	MW-3	Qualifier	Duplicate (MW-3)	Qualifier	MW-4	Qualifier	MW-5	Qualifier	TMW-1	Qualifier	TMW-2	Qualifier	TMW-3	Qualifier	Field Blank	Qualifier	IWC-Leachate	Qualifier	APWC-Leachate	Qualifier
		6/2/2020		6/2/2020		6/2/2020		6/2/2020		6/2/2020		6/2/2020		6/2/2020		6/2/2020		6/2/2020		6/2/2020			
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	-	**19**		**71.7**		**73.5**		**22.6**		**92.1**		**38.4**		**47.7**		**77.8**		<2.50		**1270**		NS	
Alkalinity	-	**48.7**		**40.8**		**42.0**		**21.5**		<20.0		<20.0		<20.0		<20.0		<20.0		**36.6**		NS	
Ammonia Nitrogen	-	<0.250		<0.250		<0.250		<0.250		<0.250		<0.250		<0.250		<0.250		<0.250		**41**		NS	
COD	-	<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		**171**		NS	
Boron	-	<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		NS	
																						NS	
Bromide	-	<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		**1.42**		NS	
Chloride	250 [2]	**2.27**		**23.9**		**24.2**		**8.75**		**83.2**		**21.1**		**34.6**		**62.7**		<1.00		**2340**		NS	
Fluoride	2 [2]	<0.150		**0.218**		**0.221**		<0.150		<0.150		<0.150		<0.150		<0.150		<0.150		<0.150		NS	
Nitrate	10 [1]	<0.100		**0.34**	P1	**0.384**	Q	**0.301**		**1.31**		**1.22**		**0.573**		**4.57**		<0.100		<0.100		NS	
Sulfate	250 [2]	<5.00		**28.9**		**29.7**		<5.00		**9.29**		<5.00		<5.00		<5.00		<5.00		**131**		NS	
																						NS	
Aluminum	0.2 [2]	<0.100		**0.101**		**0.110**		<0.100		**0.171**		<0.100		**0.410**		<0.100		<0.100		**5.17**		NS	
Antimony	0.006	<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		NS	
Arsenic	0.01	**0.0174**		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.0100		NS	
Barium	2	<0.0200		**0.0816**		**0.0815**		<0.0200		**0.0589**		<0.0200		**0.033**		**0.0431**		<0.0200		**0.0932**		NS	
Beryllium	0.004	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS	
Cadmium	0.005	<0.00100		**0.00278**		**0.00261**		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		**0.764**		NS	
Calcium	-	**3.40**		**18.5**		**18.9**		**4.79**		**17.1**		**10.7**		**12.1**		**20.5**		<1.00		**421**		NS	
Chromium	0.1	<0.00200		<0.00200		**0.00281**		**0.00208**		**0.00608**		<0.00200		<0.00200		<0.00200		<0.00200		**0.0969**		NS	
Cobalt	0.006 [3]	**0.0432**		**0.00401**		**0.00421**		<0.00200		**0.00204**		<0.00200		<0.00200		<0.00200		<0.00200		**0.0159**		NS	
Copper	1.3	<0.00500		<0.00500		**0.00523**		**0.00536**		**0.00528**		<0.00500		<0.00500		<0.00500		<0.00500		**0.0712**		NS	
Iron	0.3 [2]	**13.6**		**0.302**		**0.305**		**0.162**		**0.483**		**0.145**		**0.317**		<0.100		<0.100		**7.95**		NS	
Lead	0.015	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		**0.0159**		NS	
Magnesium	-	**2.56**		**6.20**		**6.39**		**2.59**		**12**		**2.87**		**4.26**		**6.45**		<1.00		**51.7**		NS	
Manganese	0.05 [2]	**0.856**		**0.636**		**0.641**		**0.0215**		**0.224**		**0.0112**		**0.00576**		**0.00869**		<0.00500		**3.28**		NS	
Nickel	0.10 [1]	**0.0063**		**0.00564**		**0.00638**		<0.00200		**0.00651**		<0.00200		<0.00200		<0.00200		<0.00200		**0.0978**		NS	
Potassium	-	<2.00		**4.57**		**4.63**		<2.00		<2.00		<2.00		<2.00		<2.00		<2.00		**331**		NS	
Selenium	0.05	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.00447**		NS	
Silver	0.10 [2]	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS	
Sodium	-	**2.62**		**7.38**		**7.34**		**3.24**		**18.7**		**3.25**		**4.31**		**12.1**		<2.00		**556**		NS	
Thallium	0.002	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS	
Vanadium	-	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.0250		NS	
Zinc	5 [2]	<0.0250		**0.0295**		**0.029**		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		**11.5**		NS	
Mercury	0.002	**0.000888**		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		NS	
																						NS	
Carbon Disulfide	-	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		**4.07**		NS	

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
Qualifiers:
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.
Q Sample was prepared and/or analyzed past holding time as defined in the method. Concentrations should be considered minimum values.

Table 3
Intra-Well and Inter-Well Statistical Summary
Environmental Waste Solutions Camden Class II Landfill IDL 03-0212 (Terminated)
Inorganic Analytical Data - February 2020

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	non-parametric	Pass	--	Pass	--	No
Chloride	MW-1	0.00	non-parametric	Pass	--	Pass	--	No
Cobalt	MW-1	0.00	log-normal	--	Pass	--	--	No
Nickel	MW-1	37.93	non-parametric	Pass	--	Pass	--	No
Mercury	MW-1	31.03	non-parametric	Pass	--	Pass	--	No

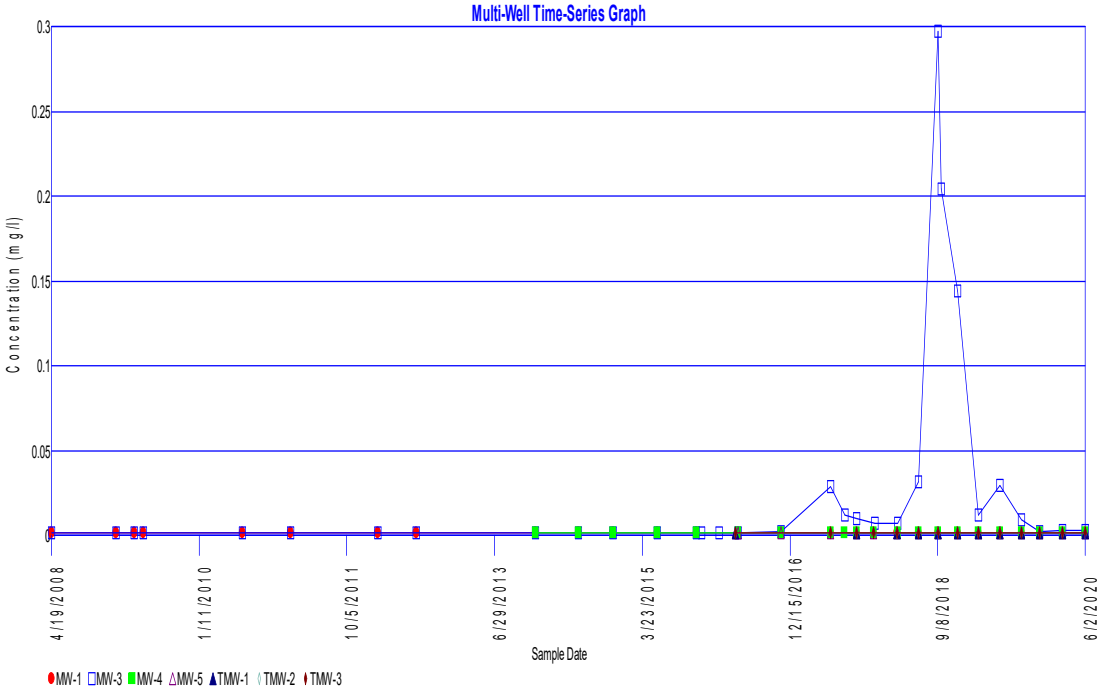
Inter-Well Statistical Summary (Downgradient Compliance Wells)									
Constituent	Well	Total % Non Detects	Normality	Inter-well NPPL	Inter-well PPL	Shewhart-Cusum	Wilcoxon Rank Sum	SSI	Mann-Kendall Trend Analysis[1]
Aluminum	MW-3	38.81	non-parametric	--	--	Pass	--	No	No Trend
	MW-5		non-parametric	--	--	Pass	--	No	No Trend
	TMW-2		non-parametric	--	--	Pass	--	No	**Downward Trend**
Barium	MW-3	2.22	non-parametric	--	--	Pass	--	No	**Downward Trend**
	MW-4		non-parametric	--	--	Pass	--	No	No Trend
	MW-5		non-parametric	--	--	Pass	--	No	**Upward Trend**
	TMW-1		non-parametric	--	--	Pass	--	No	No Trend
	TMW-2		non-parametric	--	--	Pass	--	No	No Trend
	TMW-3		non-parametric	--	--	Pass	--	No	**Upward Trend**
Total Cadmium	MW-3	88.15	non-parametric	**Fail**	--	--	**Fail**	**Yes**	No Trend
Chloride	MW-3	0.00	log-normal	--	**Fail**	--	--	**Yes**	**Downward Trend**
	MW-4		log-normal	--	**Fail**	--	--	**Yes**	**Upward Trend**
	MW-5		log-normal	--	**Fail**	--	--	**Yes**	**Upward Trend**
	TMW-1		log-normal	--	**Fail**	--	--	**Yes**	**Upward Trend**
	TMW-2		log-normal	--	**Fail**	--	--	**Yes**	**Upward Trend**
	TMW-3		log-normal	--	**Fail**	--	--	**Yes**	**Upward Trend**
Chromium	MW-4	73.13	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	**Upward Trend**
Cobalt	MW-3	58.96	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Copper	MW-4	84.21	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Fluoride	MW-3	85.71	non-parametric	**Fail**	--	--	**Fail**	**Yes**	No Trend
Nickel	MW-3	60.29	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Sulfate	MW-3	63.97	non-parametric	**Fail**	--	--	**Fail**	**Yes**	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	**Upward Trend**
Zinc	MW-3	67.65	non-parametric	**Fail**	--	--	**Fail**	**Yes**	No Trend

[1] **Mann-Kendall Trend Analysis was completed using recent data since the November 10, 2016 sampling event.**

APPENDIX B
STATISTICAL EVALUATIONS & TIME SERIES PLOTS

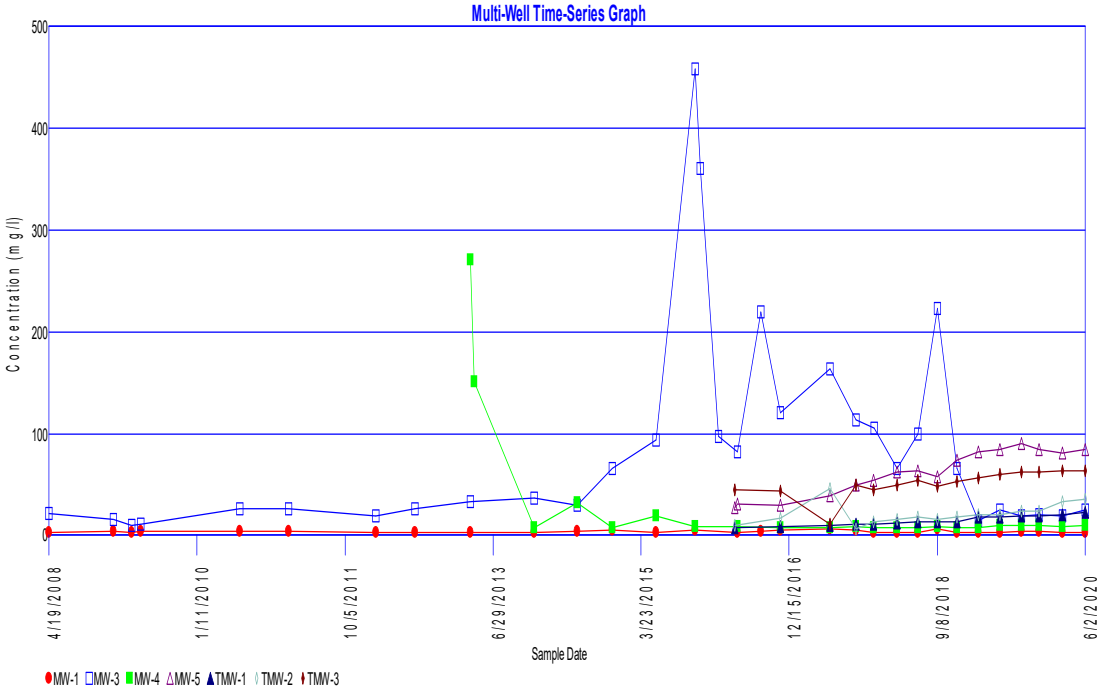
Total Cadmium

Multi-Well Time-Series Graph



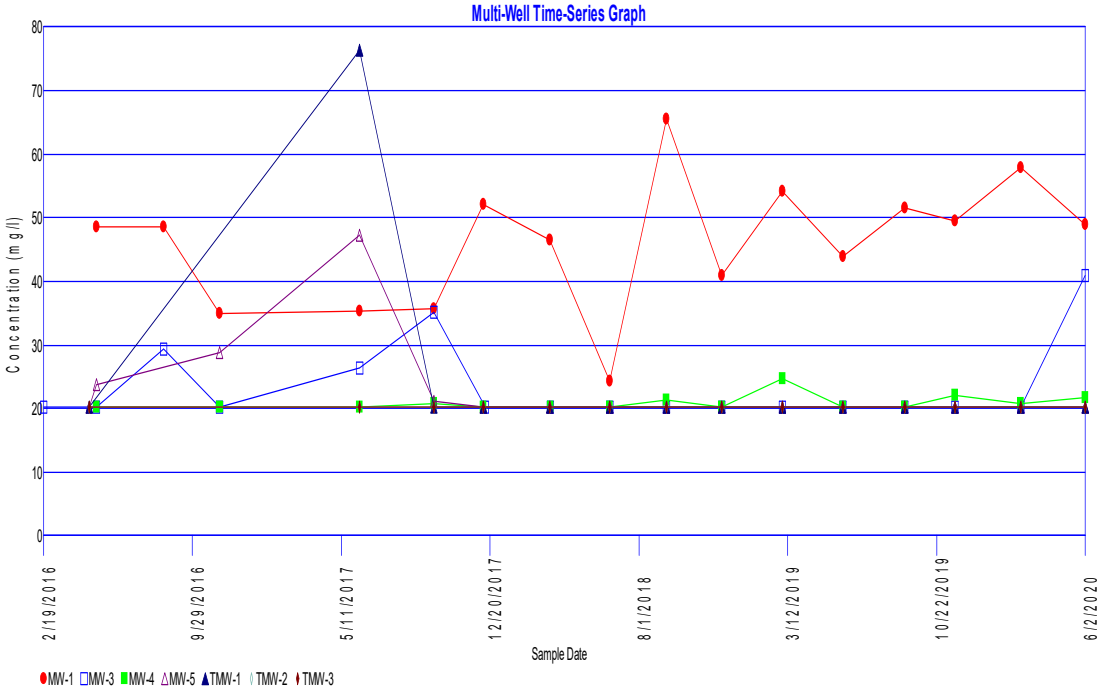
Chloride

Multi-Well Time-Series Graph



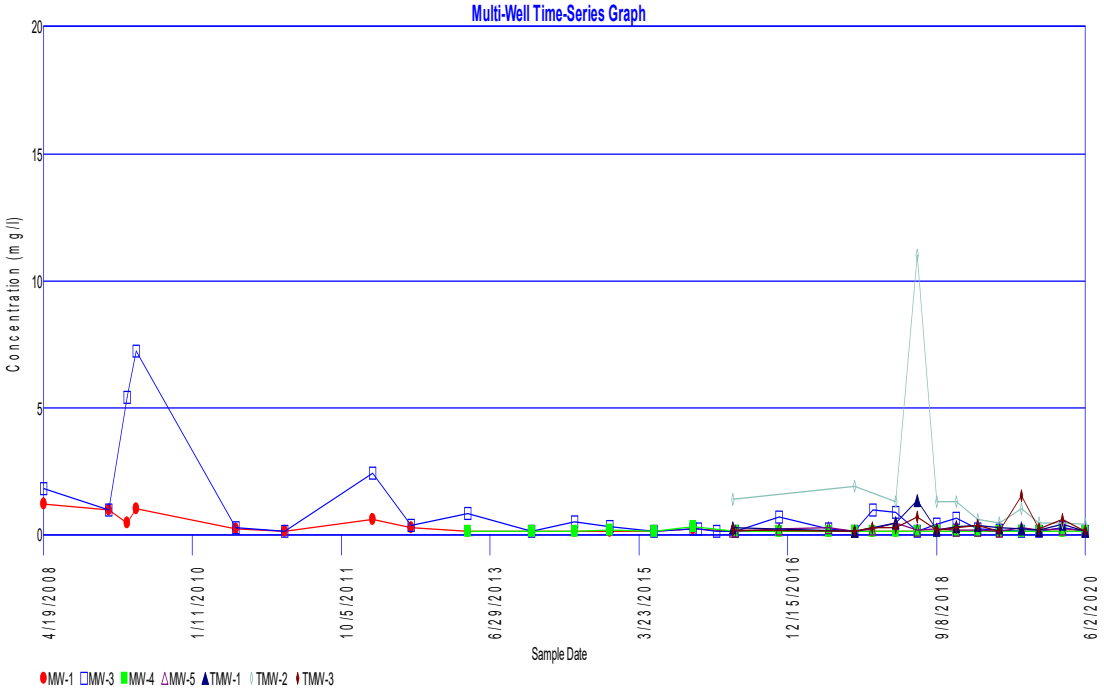
Alkalinity

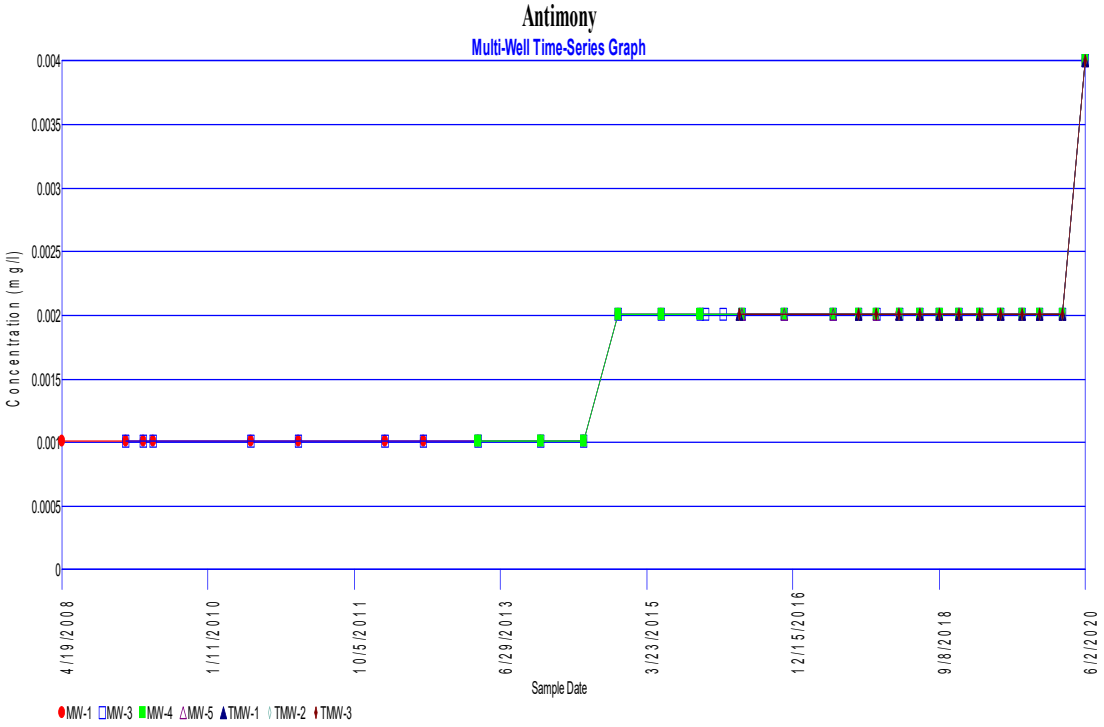
Multi-Well Time-Series Graph

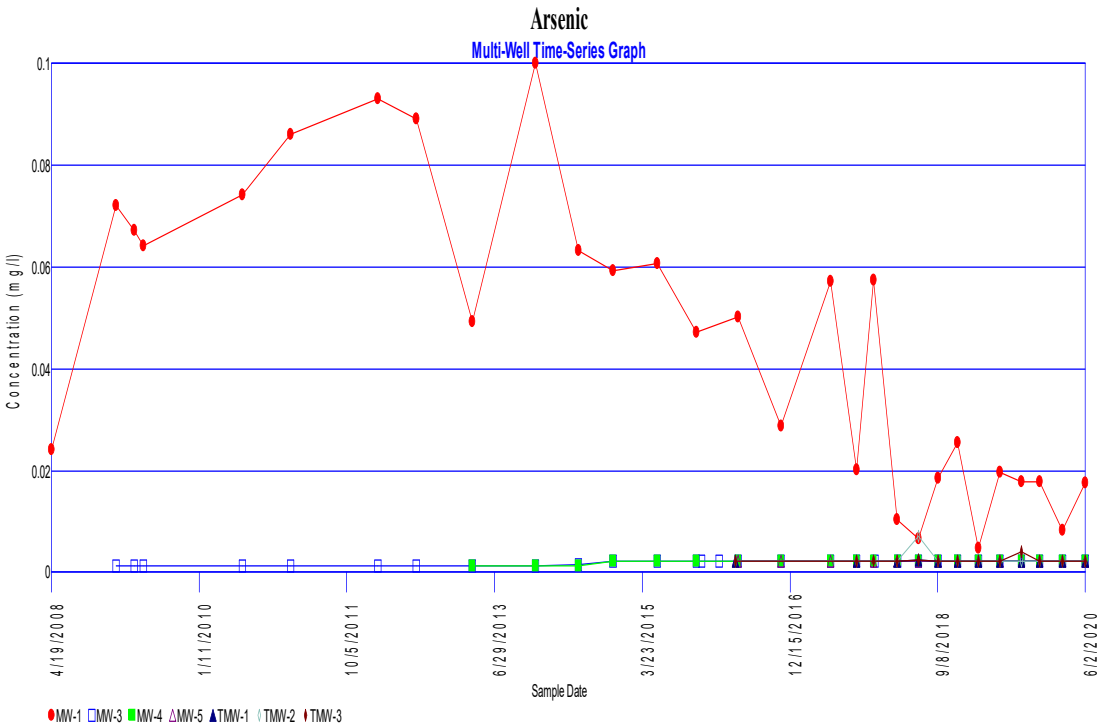


Aluminum

Multi-Well Time-Series Graph

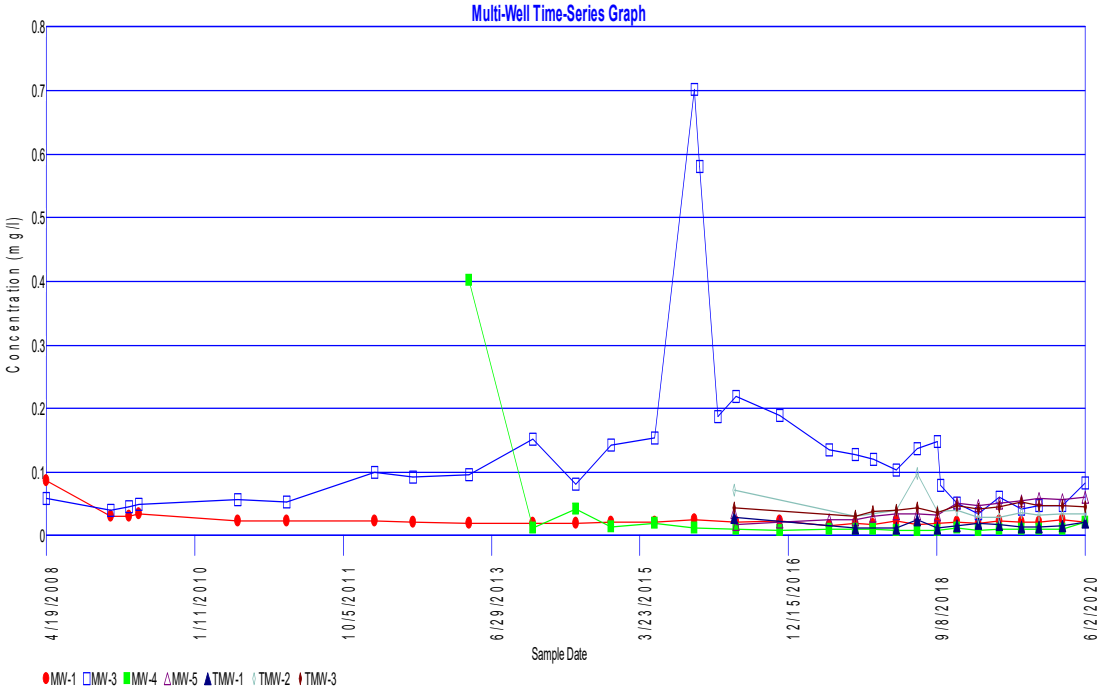



Antimony
Multi-Well Time-Series Graph
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Arsenic
Multi-Well Time-Series Graph
0.1
0.08
0.06
0.04
0.02
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

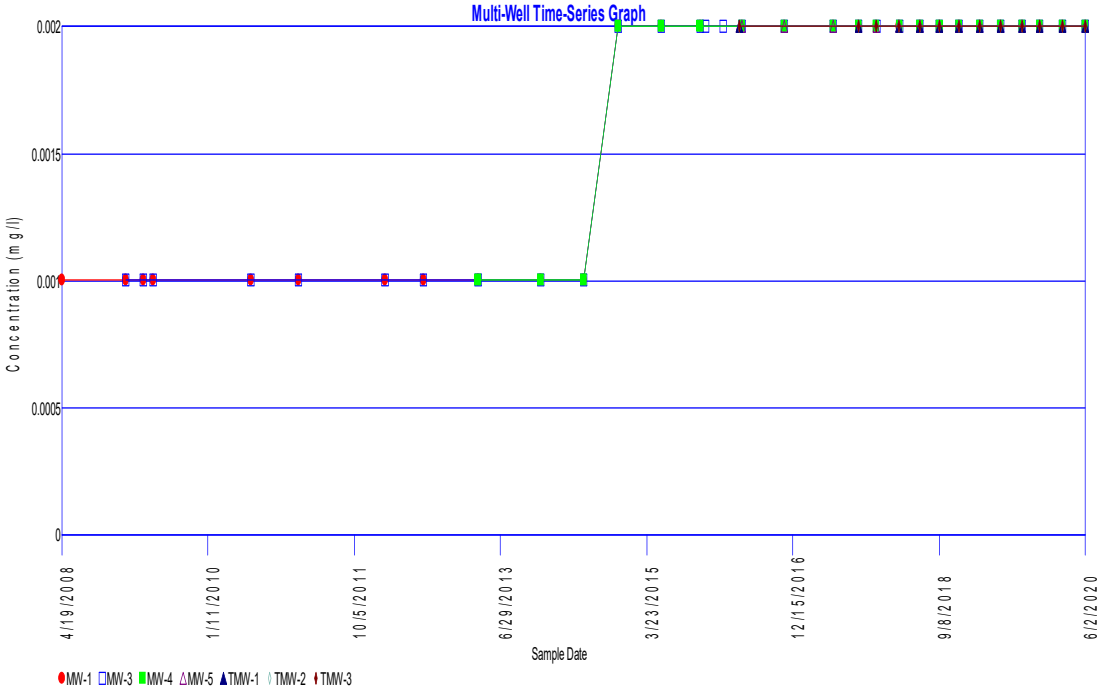
Barium

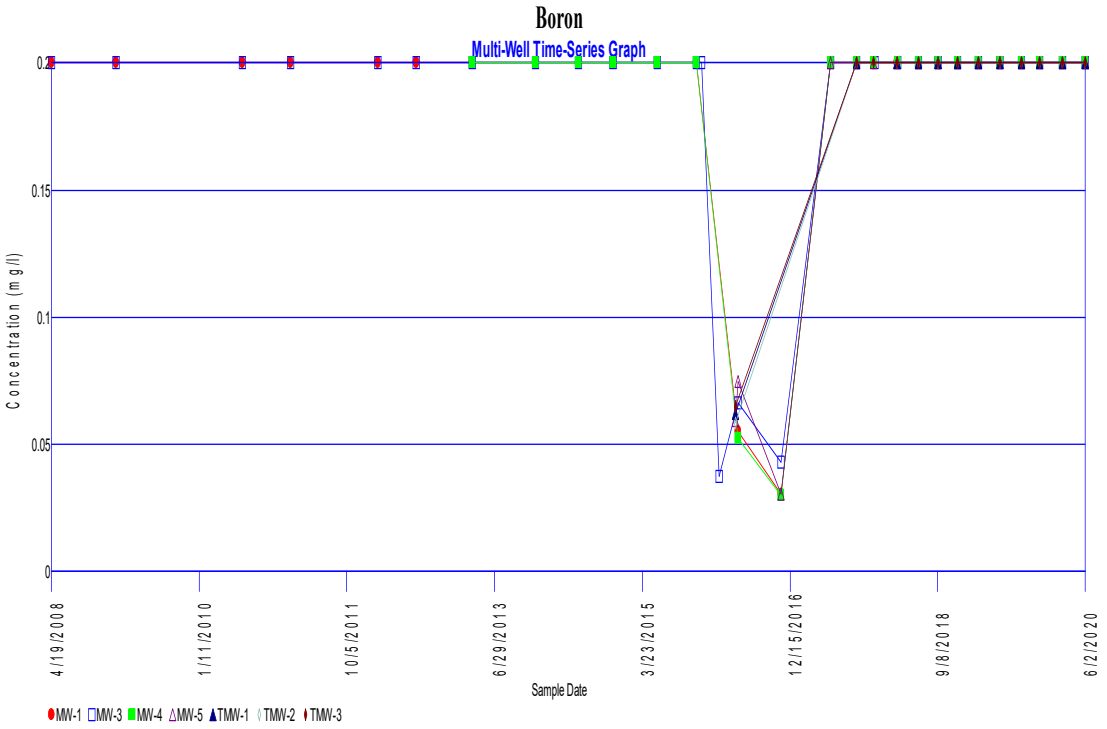
Multi-Well Time-Series Graph

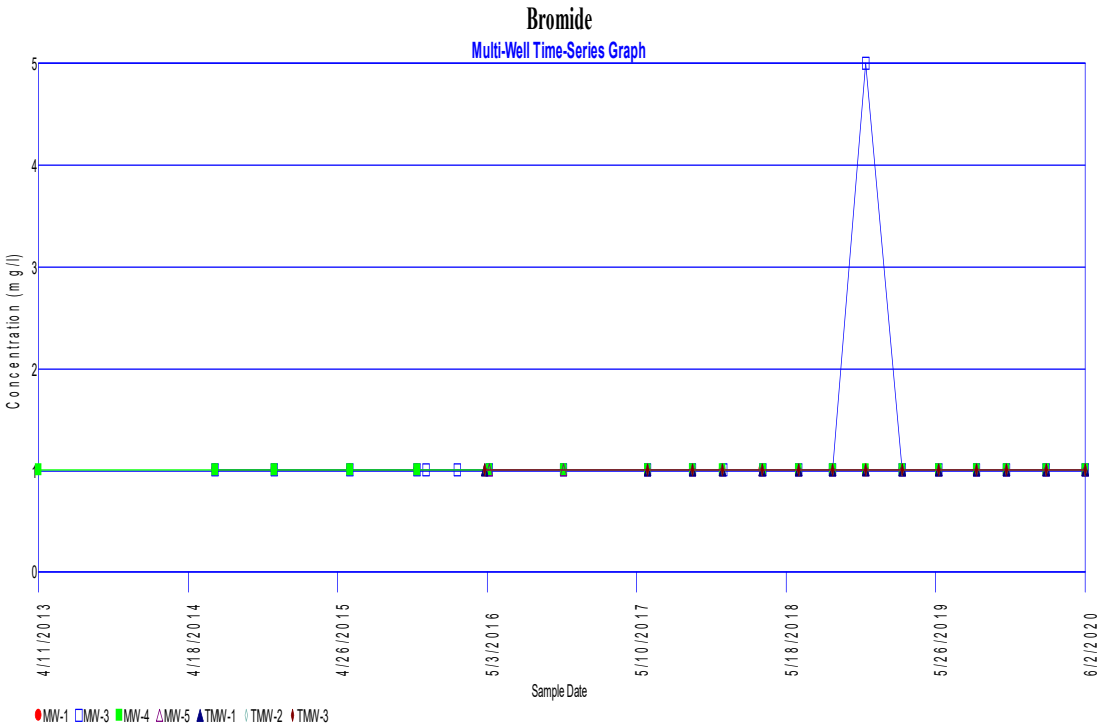


Beryllium

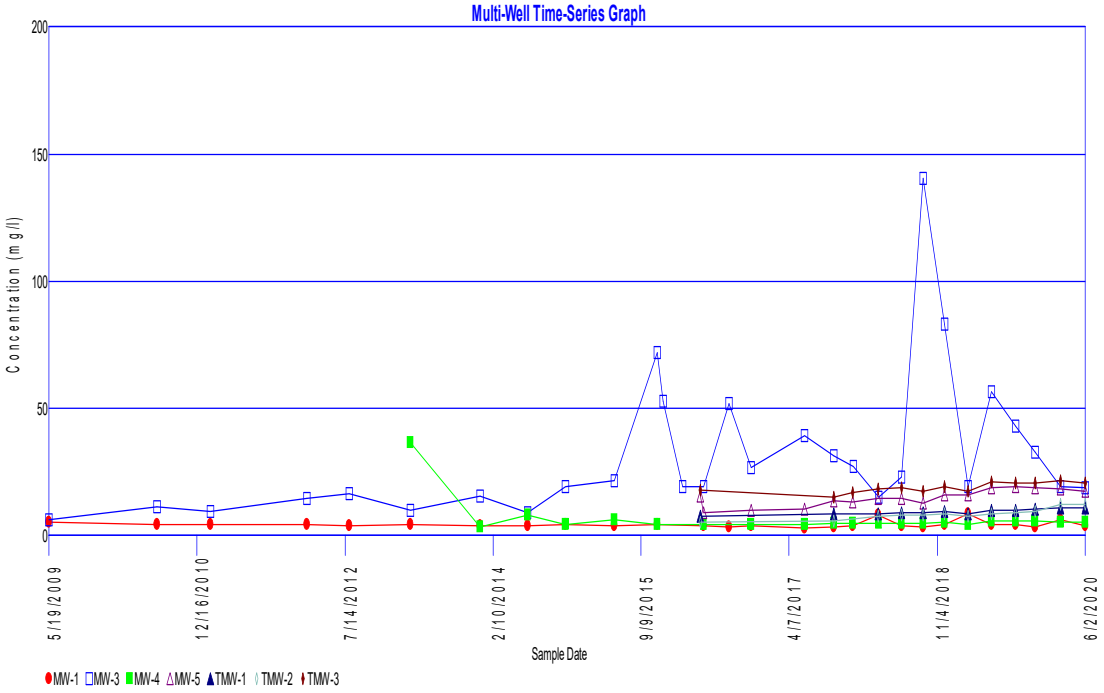
Multi-Well Time-Series Graph



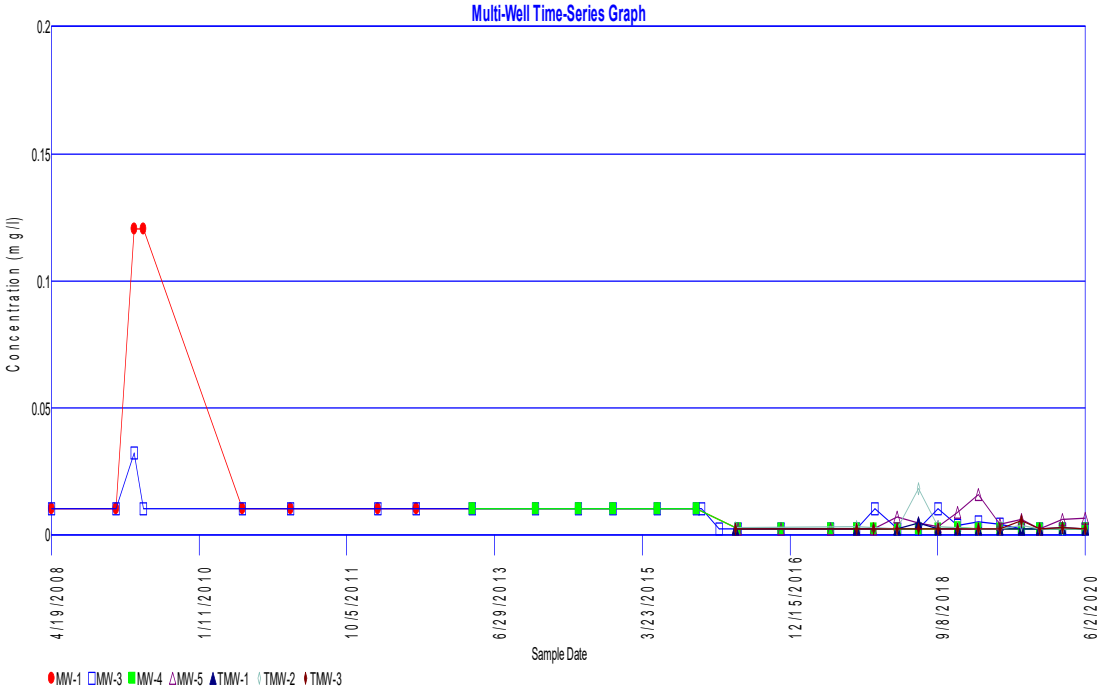

Boron
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Bromide
Multi-Well Time-Series Graph
5
4
3
2
1
0
Concentration (mg/l)
4/11/2013
4/18/2014
4/26/2015
5/3/2016
5/10/2017
5/18/2018
5/26/2019
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

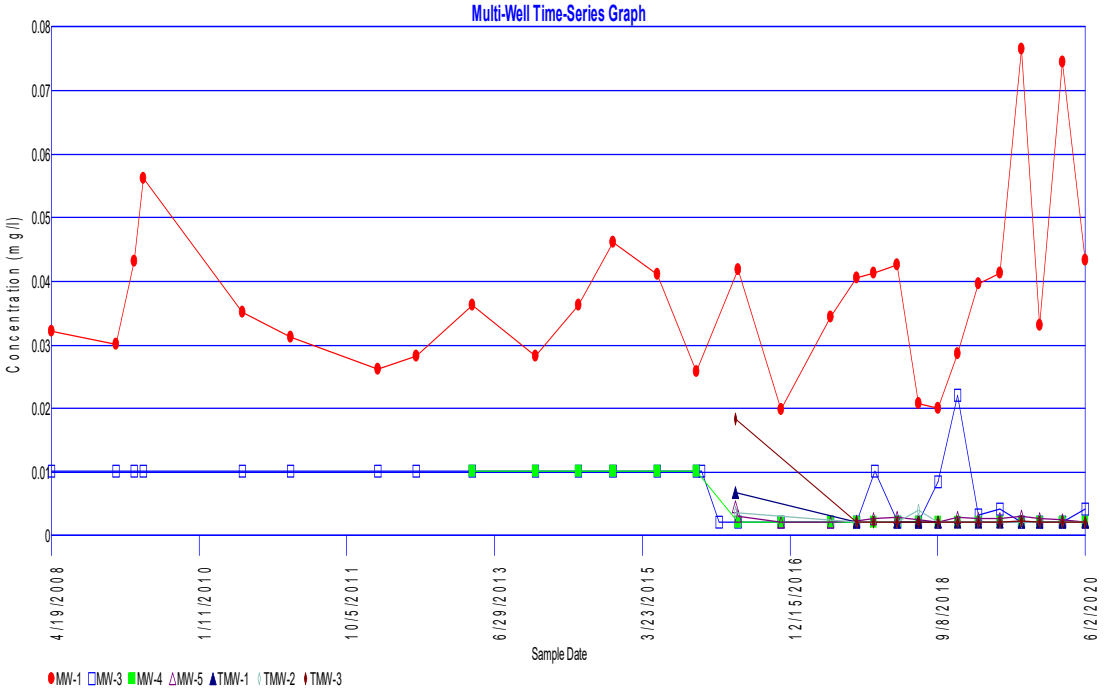
Calcium



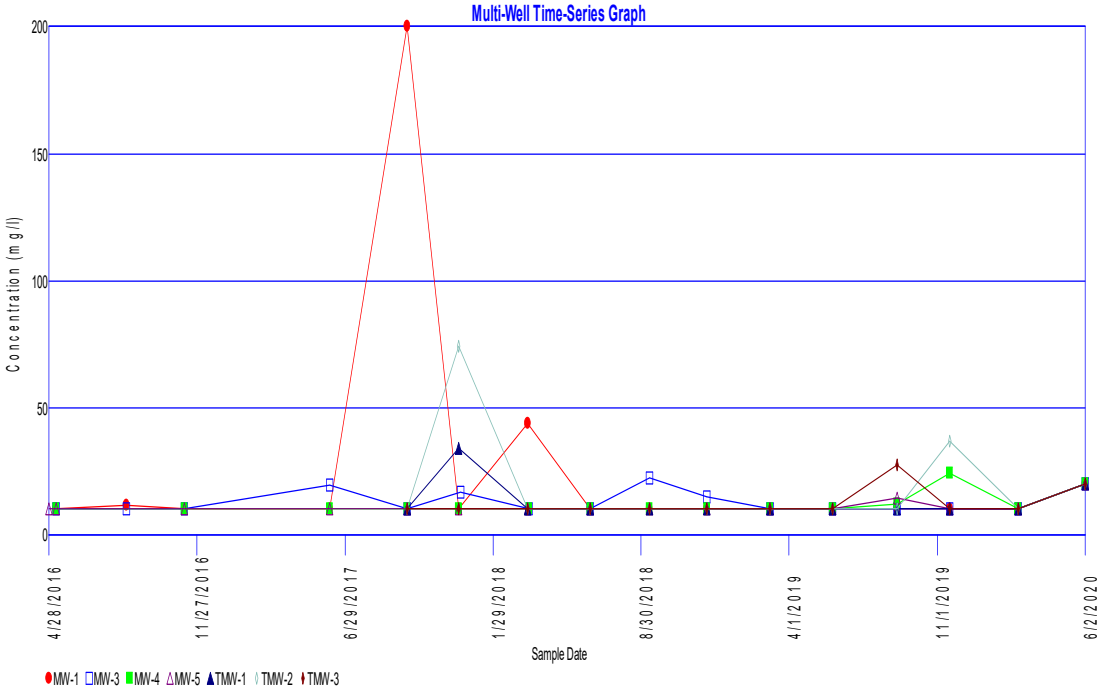
Chromium



Cobalt

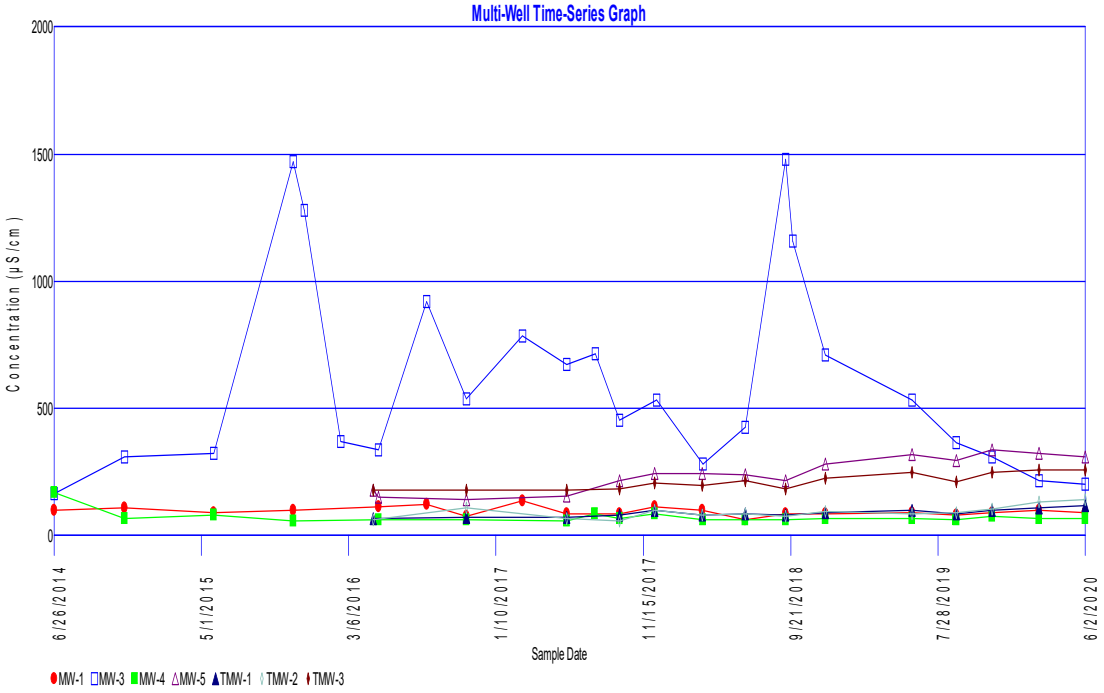

Multi-Well Time-Series Graph
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

COD


Multi-Well Time-Series Graph
200
150
100
50
0
Concentration (mg/l)
4/28/2016
11/27/2016
6/29/2017
1/29/2018
8/30/2018
4/1/2019
11/1/2019
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

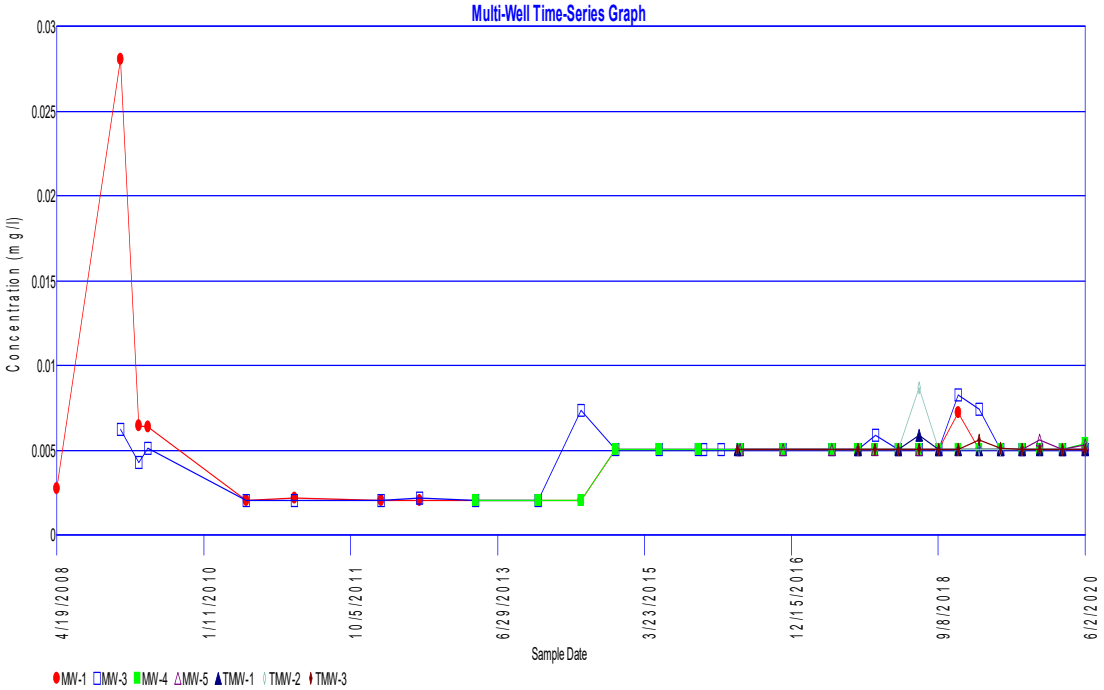
Conductivity

Multi-Well Time-Series Graph



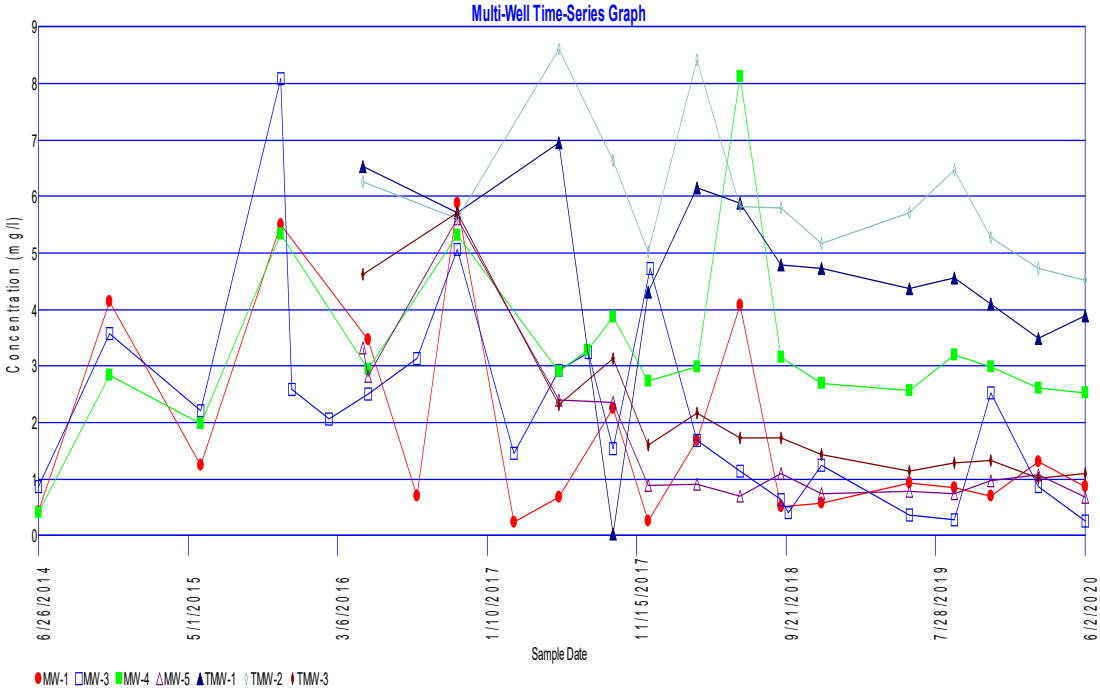
Copper

Multi-Well Time-Series Graph



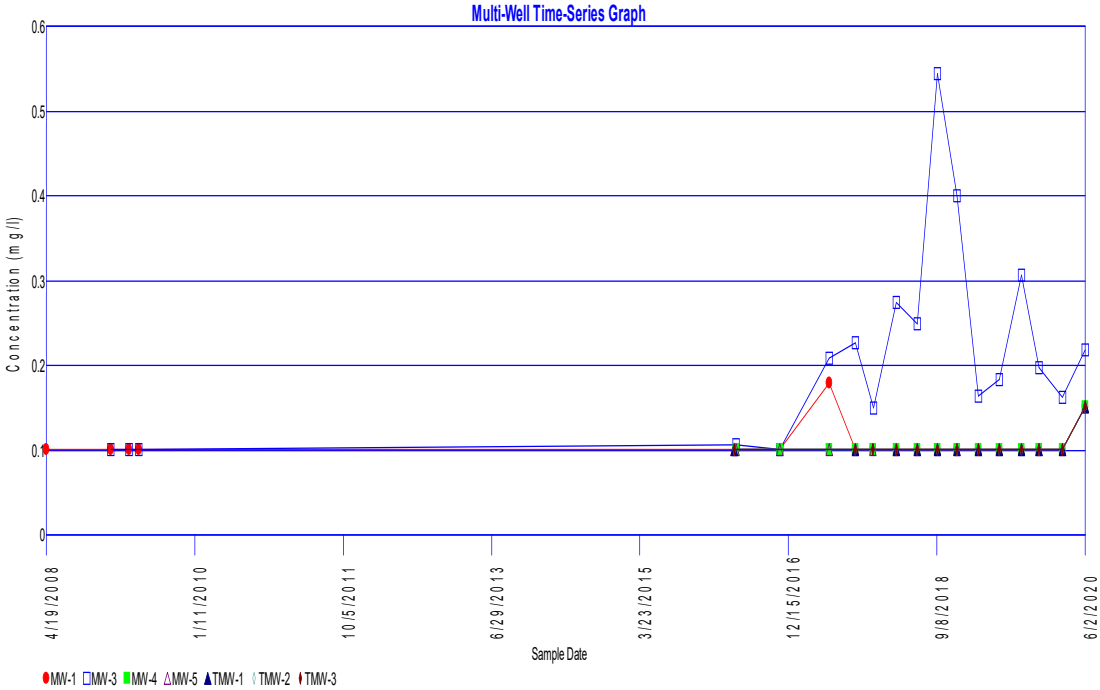
Dissolved Oxygen

Multi-Well Time-Series Graph

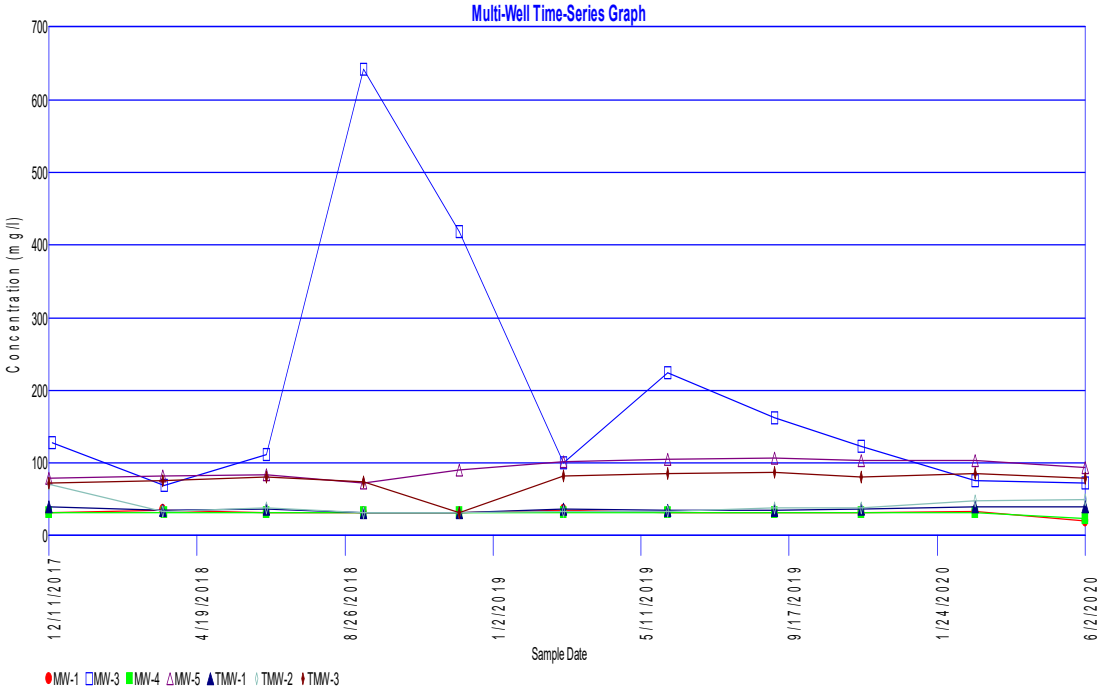


Fluoride

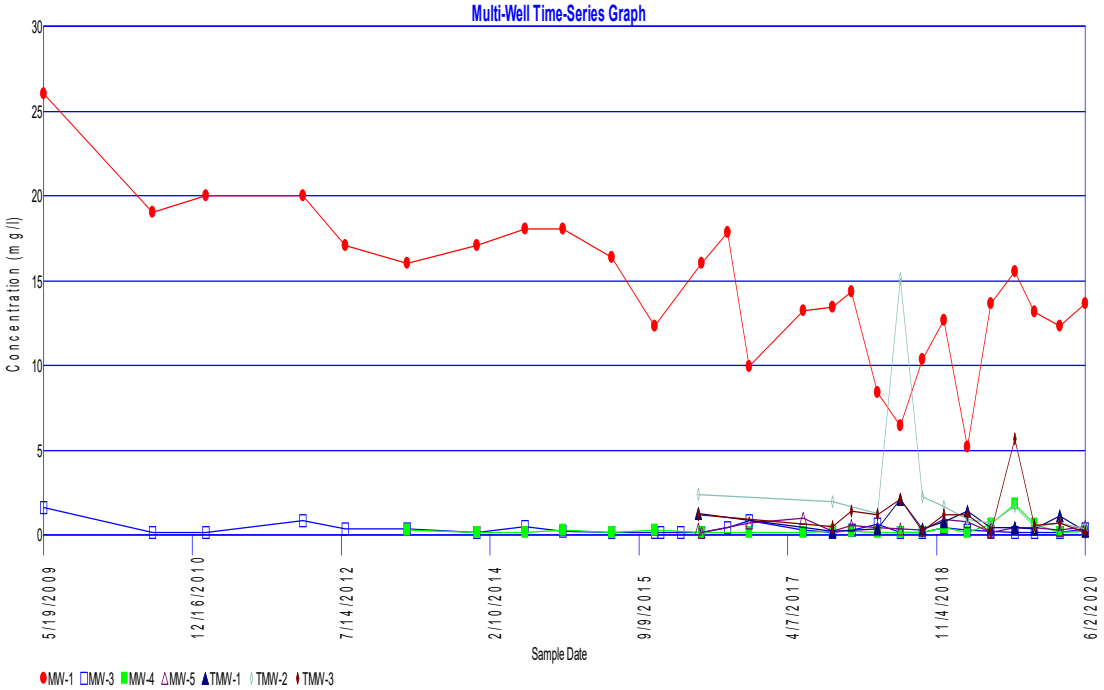
Multi-Well Time-Series Graph



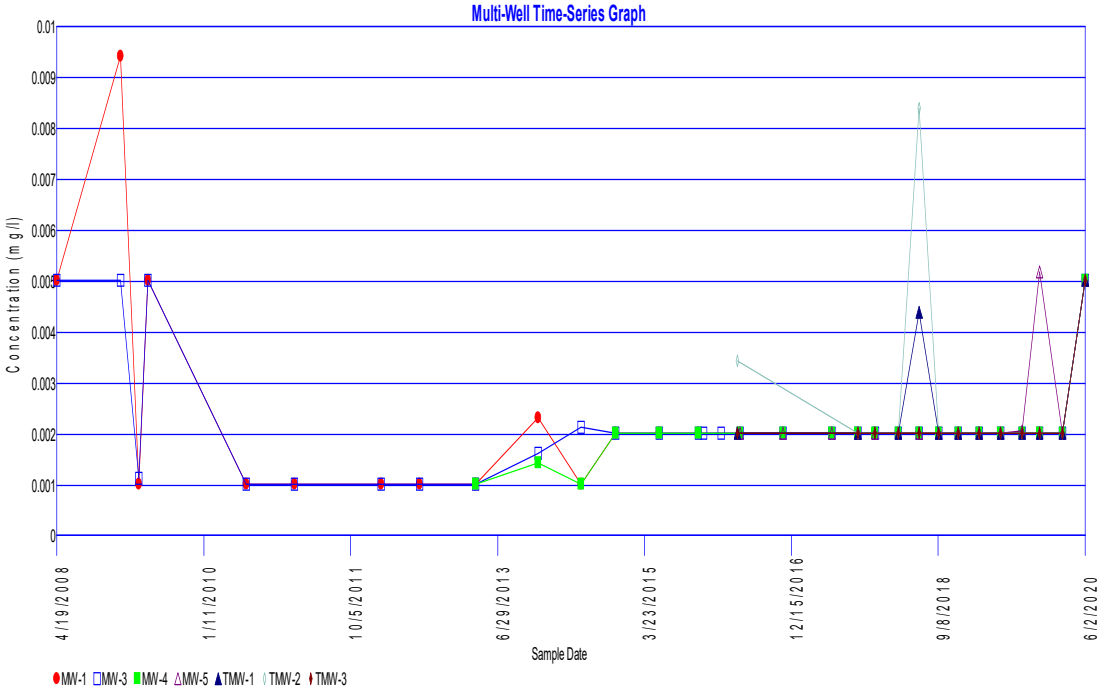
Hardness



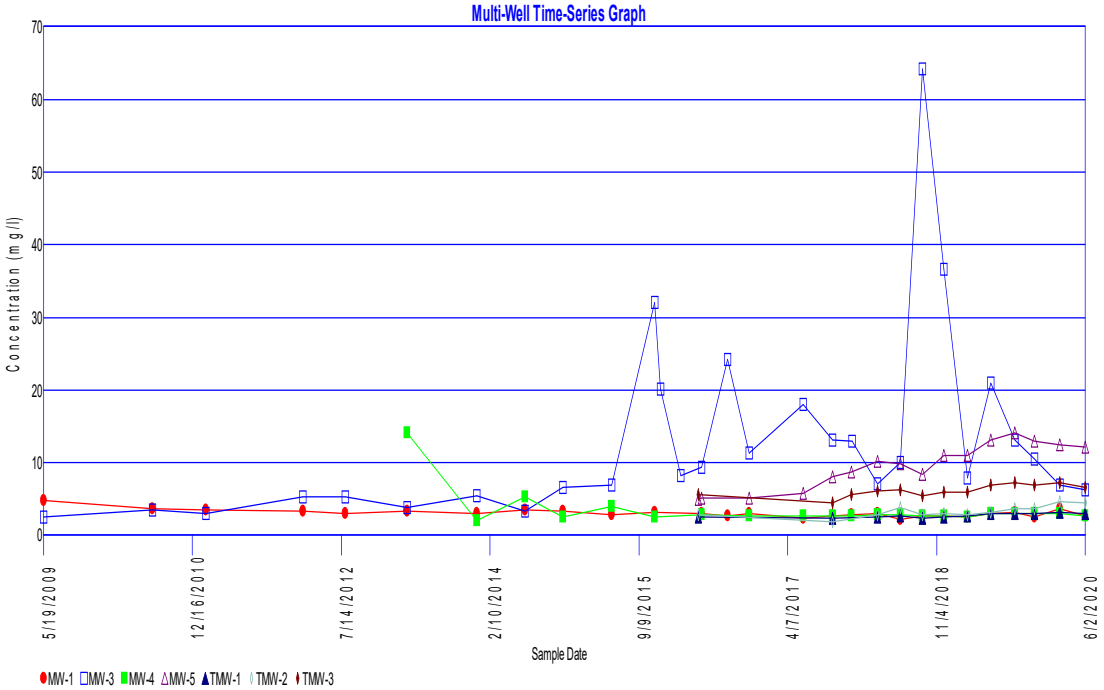
Iron



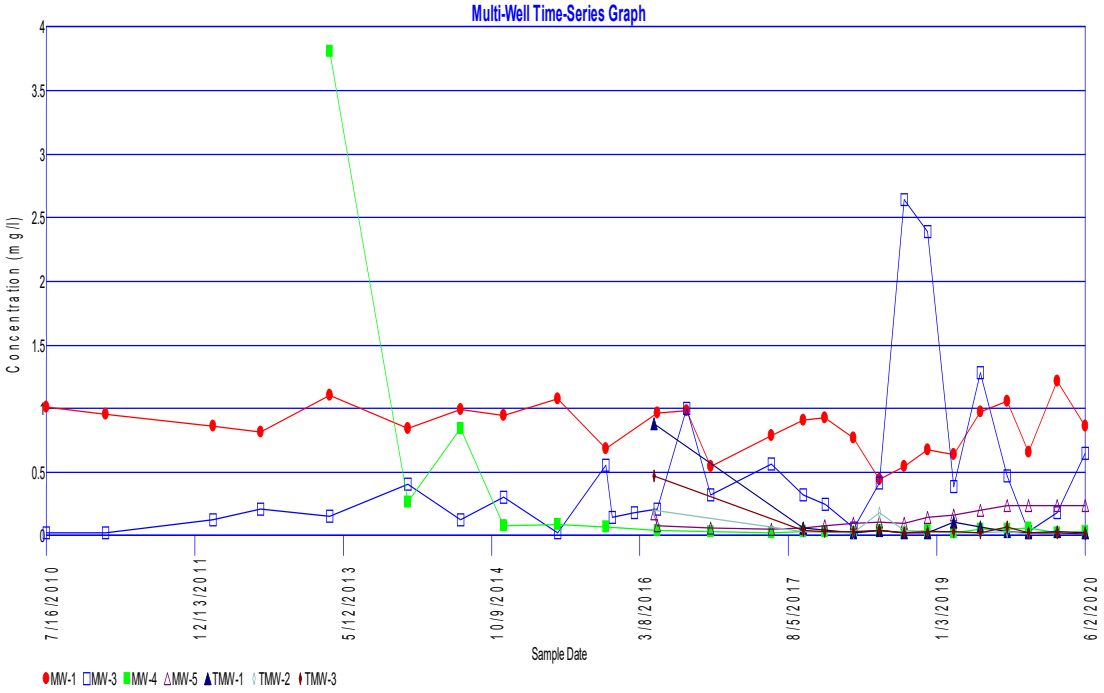
Lead



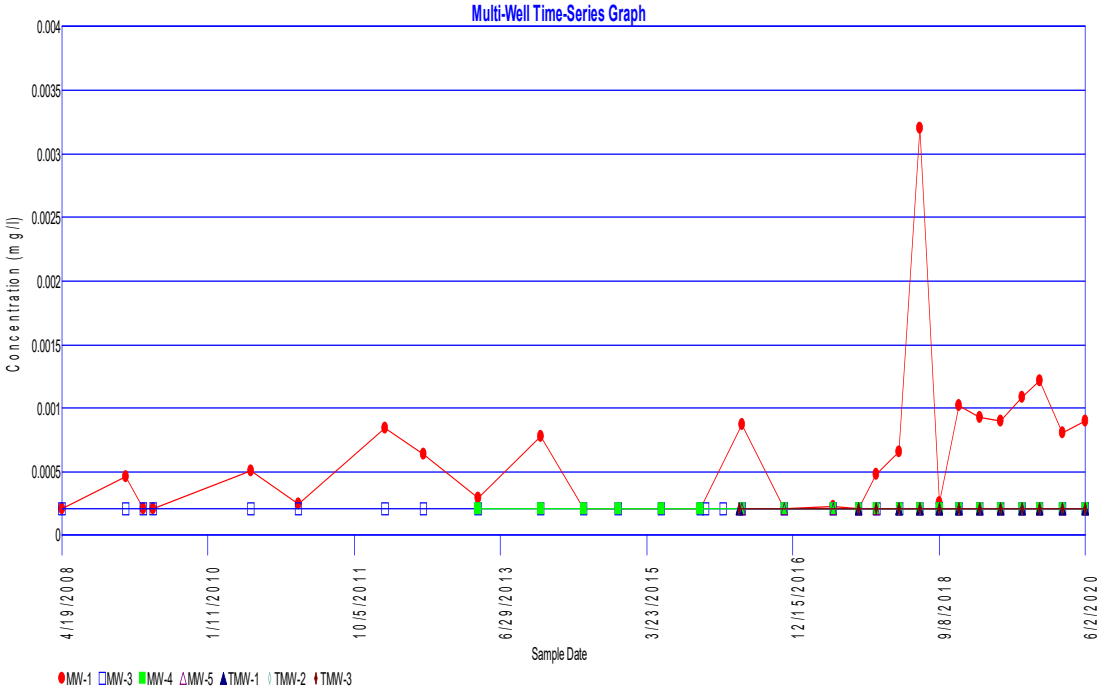
Magnesium



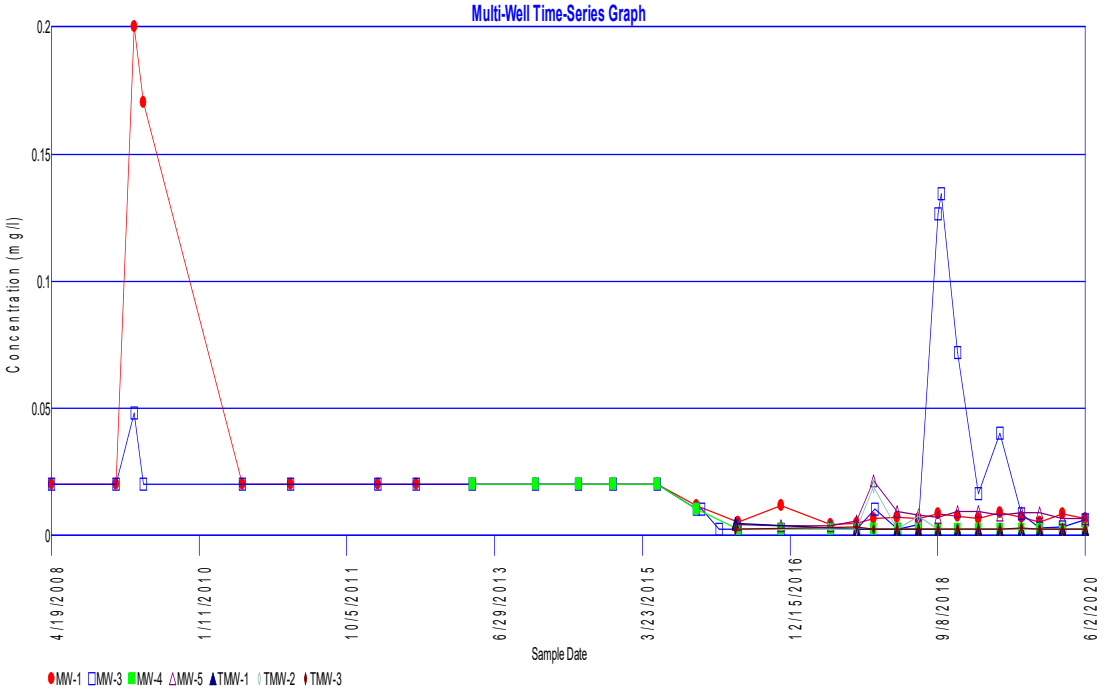
Manganese



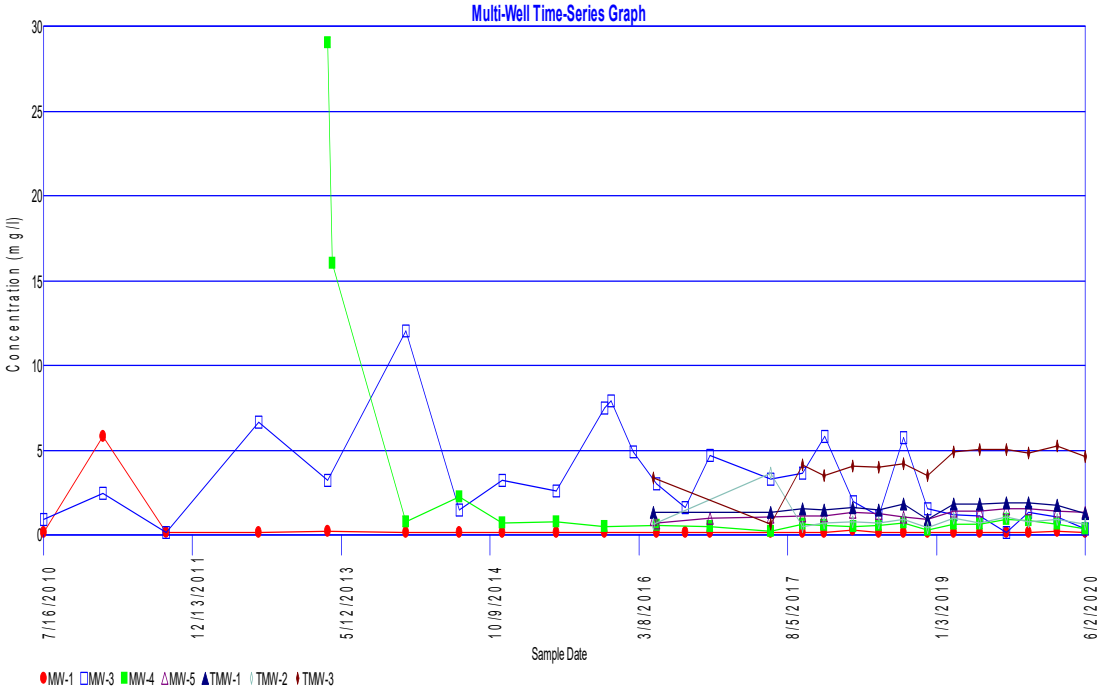
Mercury

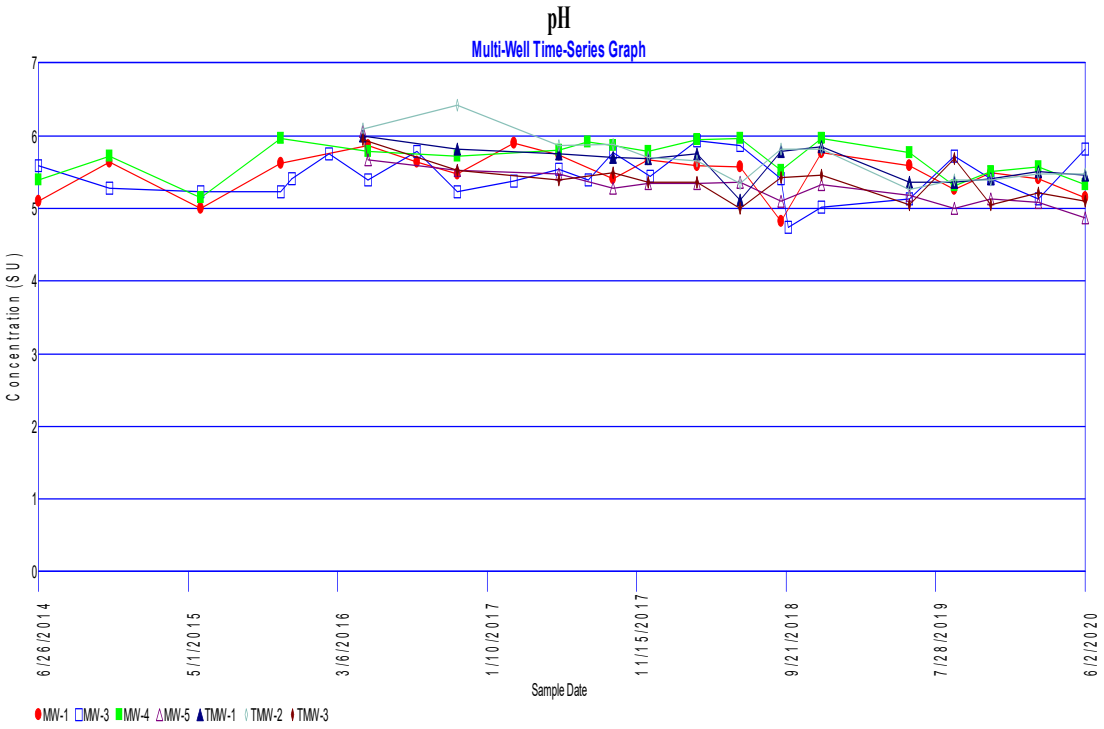


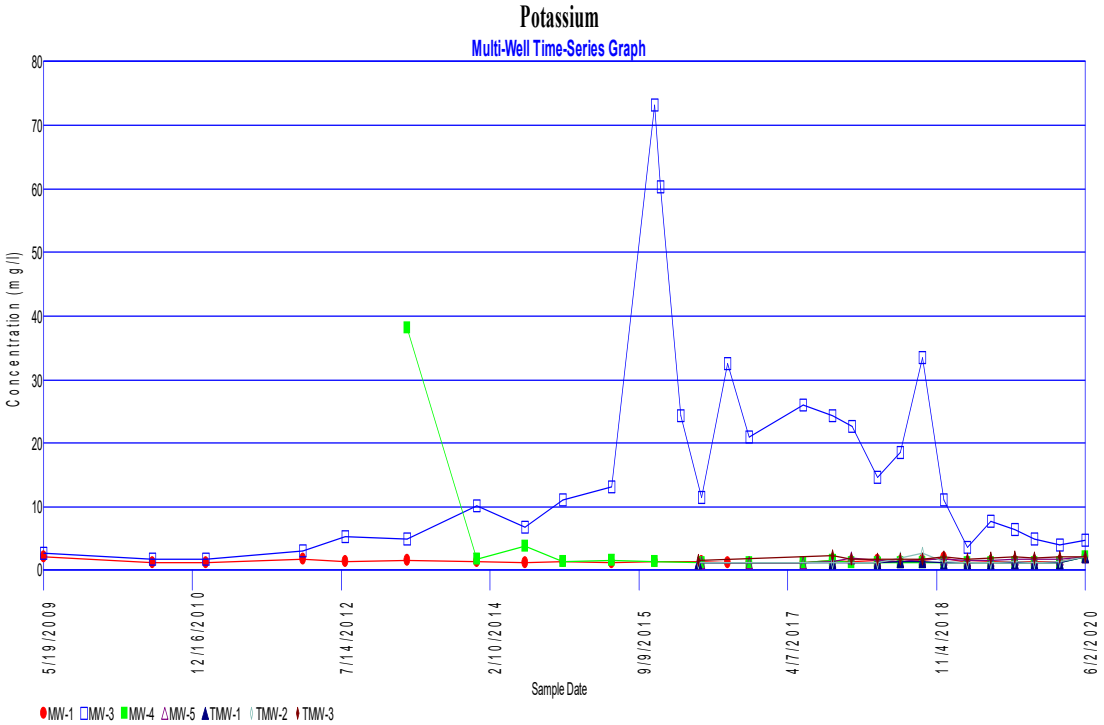
Nickel

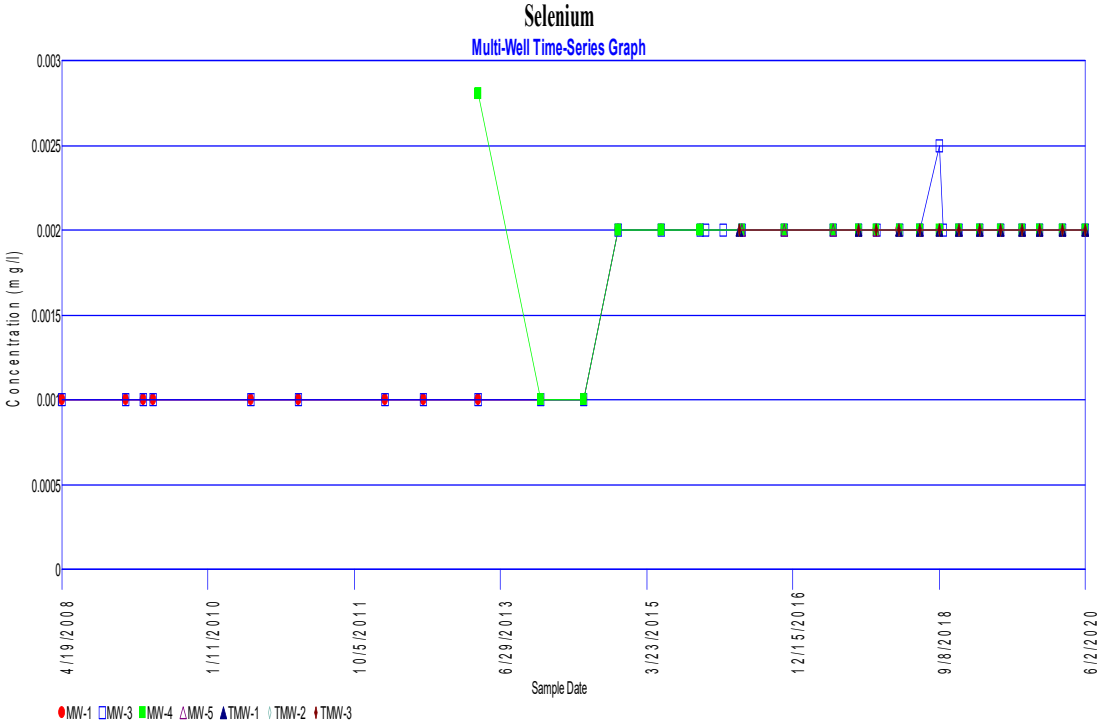


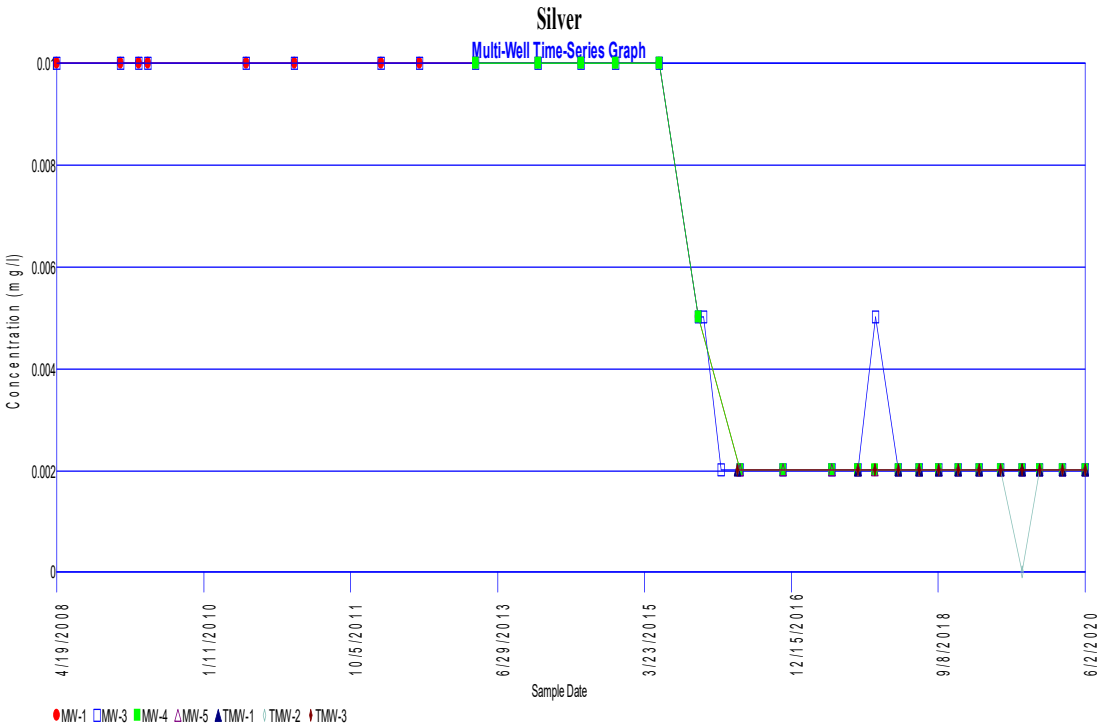
Nitrate



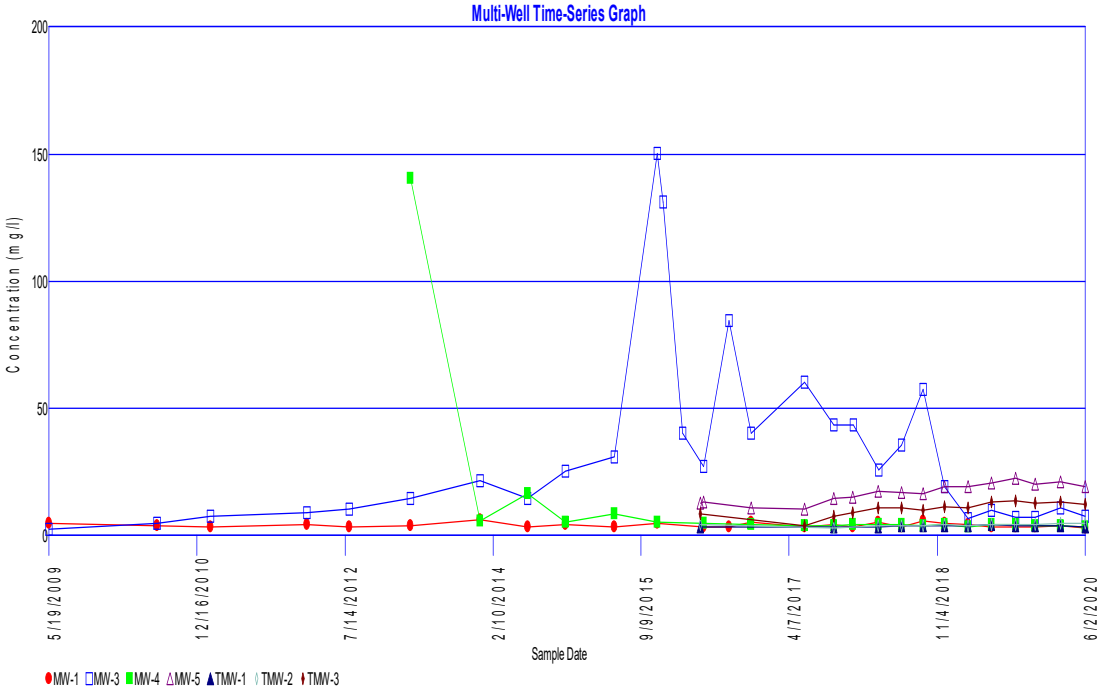

pH
Multi-Well Time-Series Graph
Concentration (SU)
7
6
5
4
3
2
1
0
6/26/2014
5/11/2015
3/6/2016
1/10/2017
11/15/2017
9/21/2018
7/28/2019
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Potassium
Multi-Well Time-Series Graph
Concentration (mg/l)
80
70
60
50
40
30
20
10
0
5/19/2009
12/16/2010
7/14/2012
2/10/2014
9/9/2015
4/7/2017
11/4/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

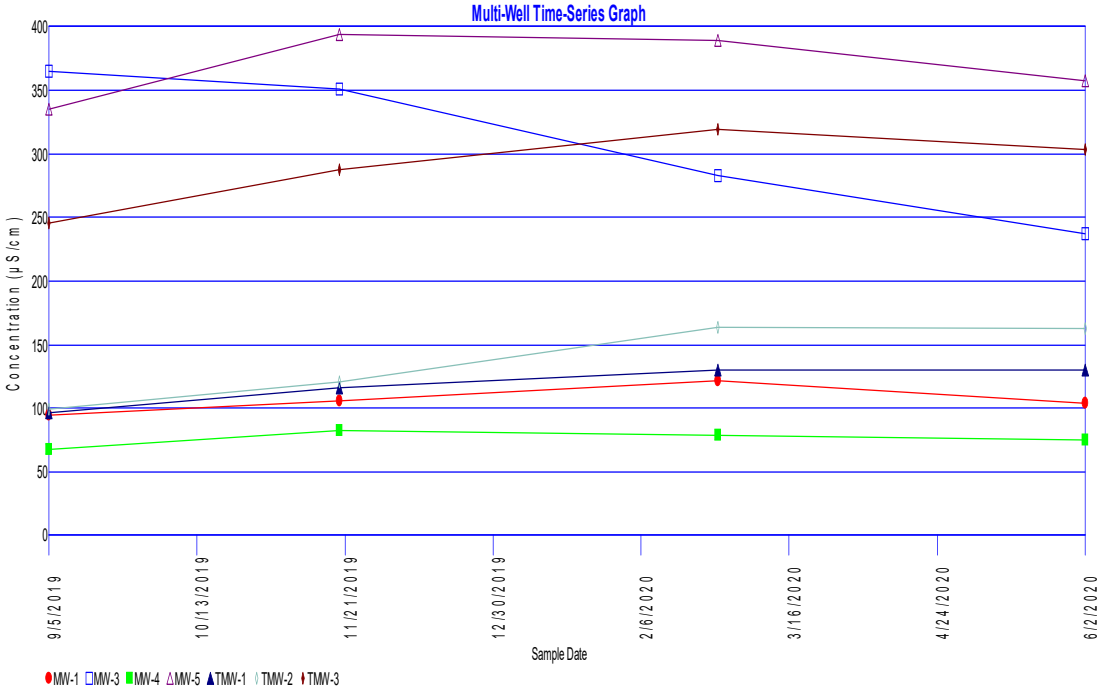

Selenium
Multi-Well Time-Series Graph
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Silver
Multi-Well Time-Series Graph
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

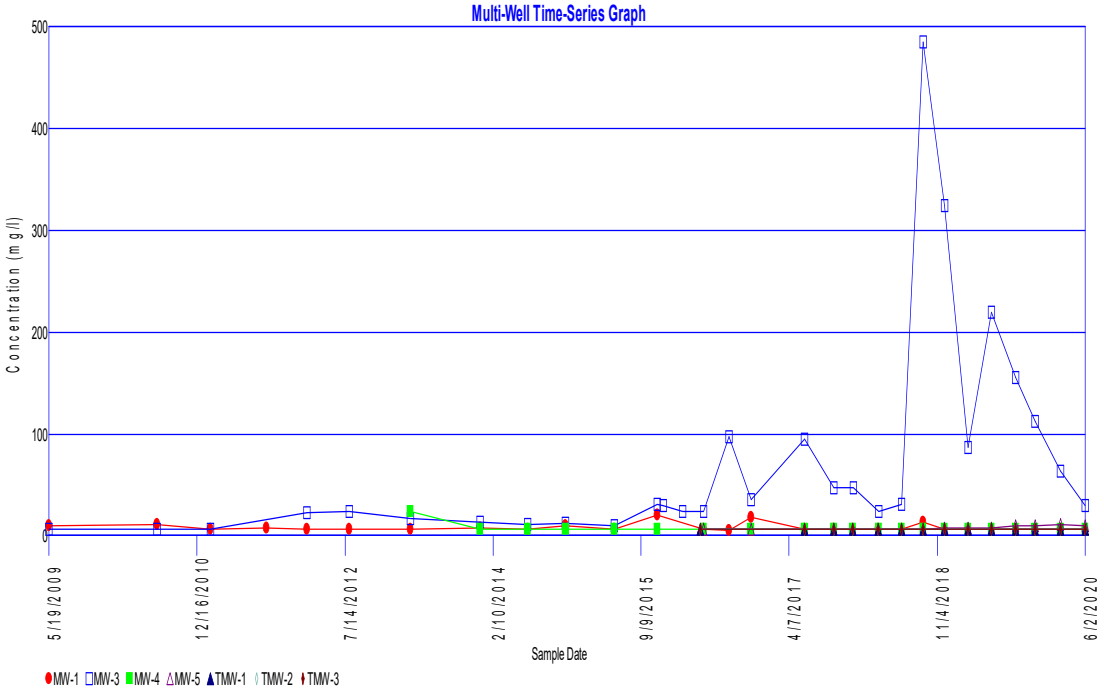
Sodium



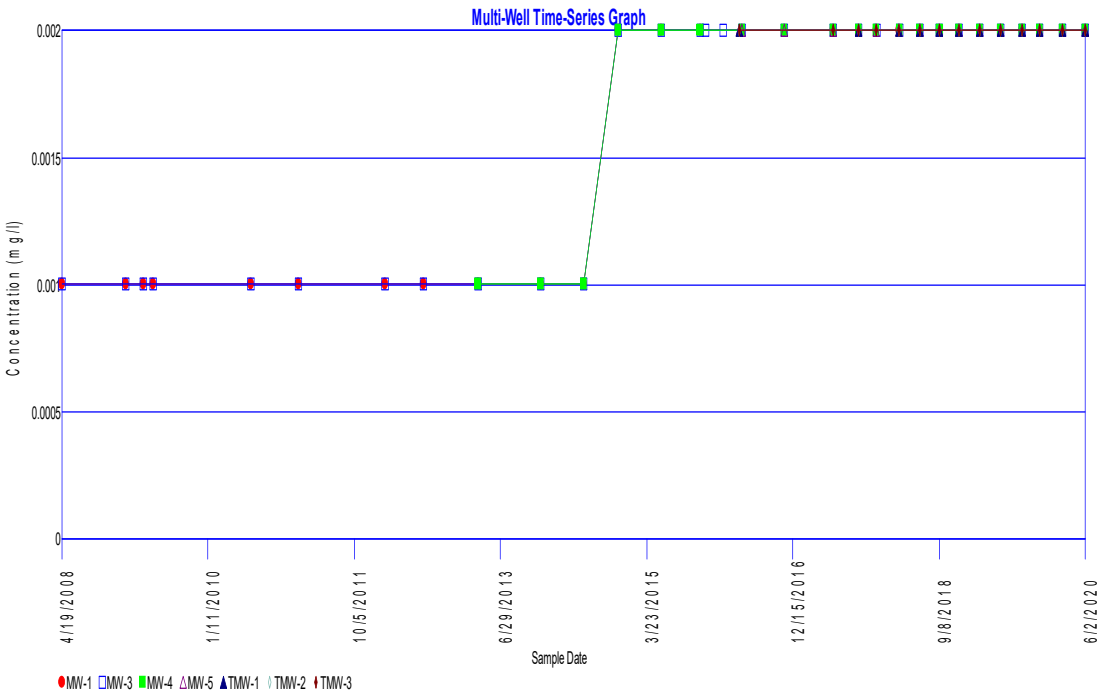
Specific Conductivity

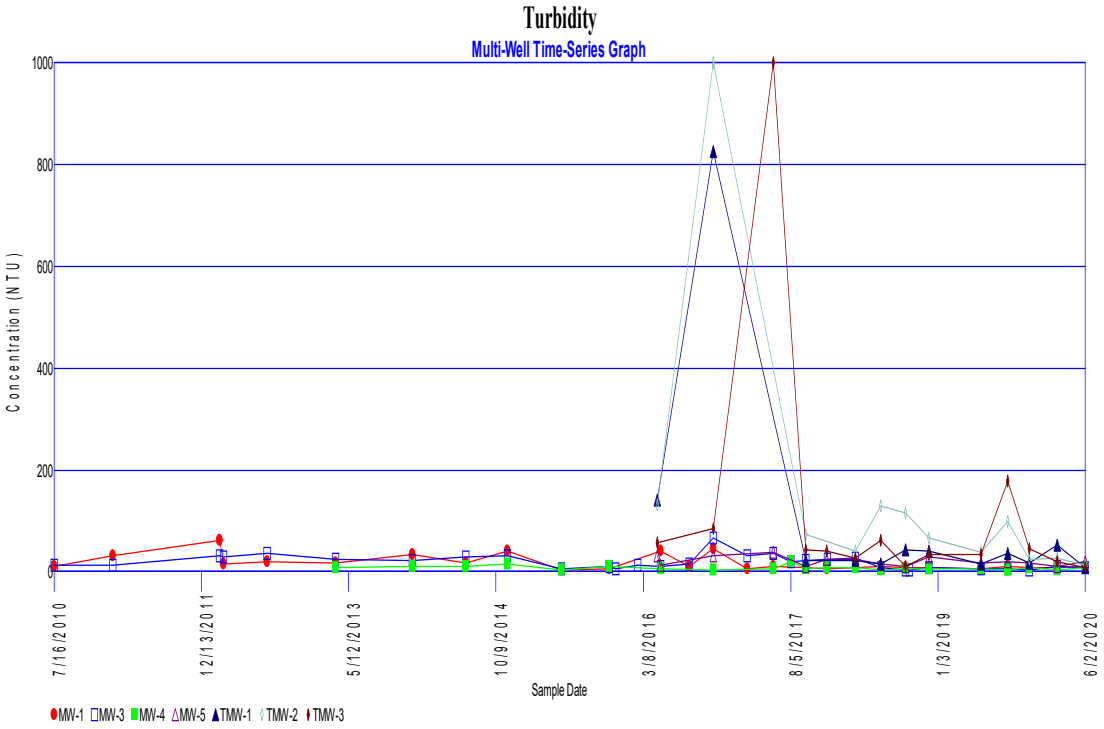


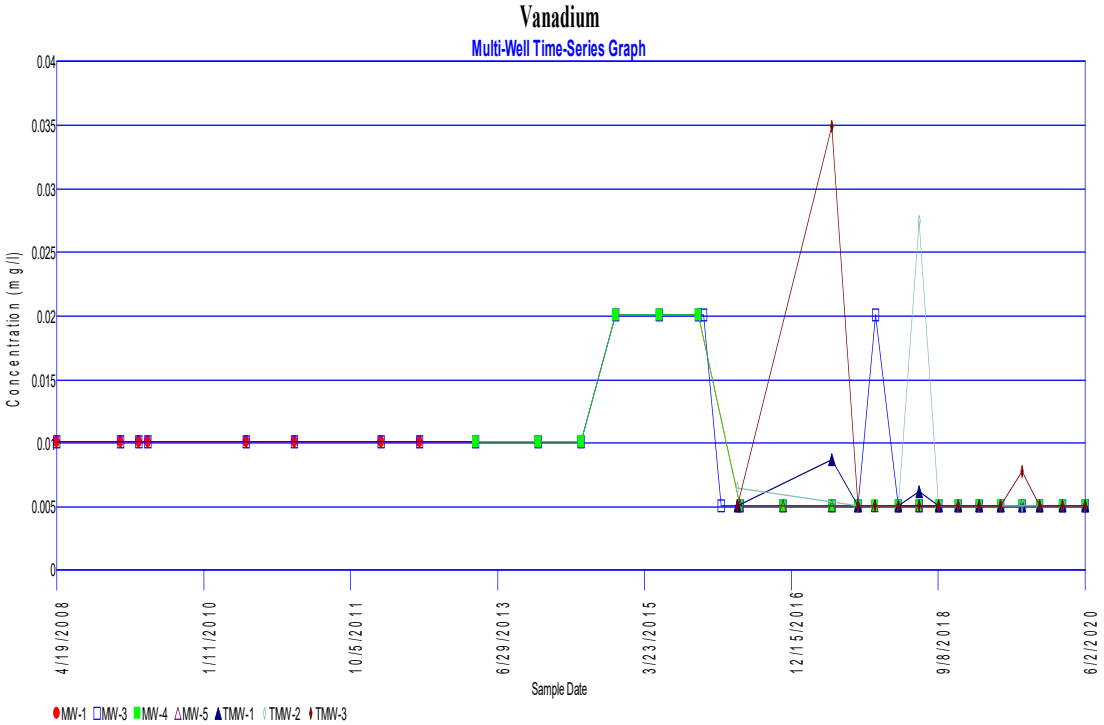
Sulfate



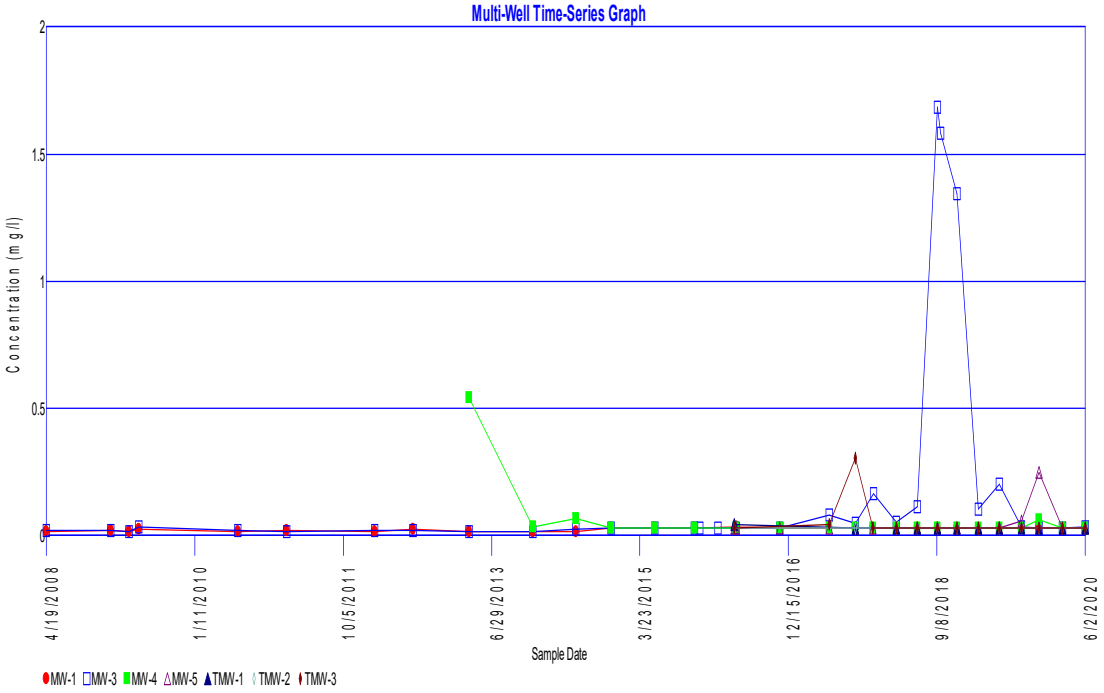
Thallium




Turbidity
Multi-Well Time-Series Graph
1000
800
600
400
200
0
Concentration (NTU)
7/16/2010
12/13/2011
5/12/2013
10/9/2014
3/8/2016
8/5/2017
1/3/2019
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Vanadium
Multi-Well Time-Series Graph
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

Zinc


Multi-Well Time-Series Graph
2
1.5
1
0.5
0
Concentration (mg/l)
4/19/2008
1/11/2010
10/5/2011
6/29/2013
3/23/2015
12/15/2016
9/8/2018
6/2/2020
Sample Date
MW-1
MW-3
MW-4
MW-5
TMW-1
TMW-2
TMW-3

Shapiro-Wilks Test of Normality

Parameter: Arsenic

Location: MW-1

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 14 for 29 measurements

Sum of b values = 0.147402
Sample Standard Deviation = 0.0289898
W Statistic = 0.923332

5% Critical value of 0.926 exceeds 0.923332
Evidence of non-normality at 95% level of significance

1% Critical value of 0.898 is less than 0.923332
Data is normally distributed 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 = 15 for 30 measurements

Sum of b values = 5.04417
Sample Standard Deviation = 1.02962
W Statistic = 0.827613

5% Critical value of 0.927 exceeds 0.827613
Evidence of non-normality at 95% level of significance

1% Critical value of 0.9 exceeds 0.827613
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 = 14 for 29 measurements

Sum of b values = 0.0660251
Sample Standard Deviation = 0.0134365
W Statistic = 0.862354

5% Critical value of 0.926 exceeds 0.862354
Evidence of non-normality at 95% level of significance

1% Critical value of 0.898 exceeds 0.862354
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 = 14 for 29 measurements

Sum of b values = 0.152681
Sample Standard Deviation = 0.0451744
W Statistic = 0.407971

5% Critical value of 0.926 exceeds 0.407971
Evidence of non-normality at 95% level of significance

1% Critical value of 0.898 exceeds 0.407971
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 = 14 for 29 measurements

Sum of b values = 0.00257358
Sample Standard Deviation = 0.000595207
W Statistic = 0.667703

5% Critical value of 0.926 exceeds 0.667703
Evidence of non-normality at 95% level of significance

1% Critical value of 0.898 exceeds 0.667703
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

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

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 14 for 29 measurements

Sum of b values = 4.35375
Sample Standard Deviation = 0.864885
W Statistic = 0.905008

5% Critical value of 0.926 exceeds 0.905008
Evidence of non-normality at 95% level of significance

1% Critical value of 0.898 is less than 0.905008
Data is normally distributed 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 = 15 for 30 measurements

Sum of b values = 1.70939
Sample Standard Deviation = 0.331504
W Statistic = 0.916868

5% Critical value of 0.927 exceeds 0.916868
Evidence of non-normality at 95% level of significance

1% Critical value of 0.9 is less than 0.916868
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

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

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 14 for 29 measurements

Sum of b values = 1.70444
Sample Standard Deviation = 0.330012
W Statistic = 0.952685

5% Critical value of 0.926 is less than 0.952685
Data is normally distributed at 95% level of significance

1% Critical value of 0.898 is less than 0.952685
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel

Location: MW-1

Normality Test of Parameter Concentrations

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 14 for 29 measurements

Sum of b values = 3.5104
Sample Standard Deviation = 0.86112
W Statistic = 0.593509

5% Critical value of 0.926 exceeds 0.593509
Evidence of non-normality at 95% level of significance

1% Critical value of 0.898 exceeds 0.593509
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 = 14 for 29 measurements

Sum of b values = 5.11344
Sample Standard Deviation = 1.03417
W Statistic = 0.873146

5% Critical value of 0.926 exceeds 0.873146
Evidence of non-normality at 95% level of significance

1% Critical value of 0.898 exceeds 0.873146
Evidence of non-normality at 99% level of significance

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1

Parameter: Cobalt

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

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

Baseline Samples	Date	Result
	4/19/2008	-3.44202
	1/21/2009	-3.50656
	4/9/2009	-3.14656
	5/19/2009	-2.8824
	7/16/2010	-3.35241
	2/8/2011	-3.47377
	2/17/2012	-3.64966
	7/31/2012	-3.57555
	3/27/2013	-3.32424
	12/23/2013	-3.57555
	6/26/2014	-3.32424
	11/21/2014	-3.07911
	5/28/2015	-3.19418
	11/11/2015	-3.66126
	5/9/2016	-3.17725
	11/10/2016	-3.93223
	6/8/2017	-3.37553
	9/28/2017	-3.2114
	12/11/2017	-3.19175
	3/21/2018	-3.15825
	6/19/2018	-3.88246
	9/12/2018	-3.92207
	12/4/2018	-3.56137
	3/5/2019	-3.23145
	6/4/2019	-3.19175
	9/5/2019	-2.57308
	11/20/2019	-3.41428
	2/27/2020	-2.59964

From 28 baseline samples
Baseline mean = -3.34322
Baseline std Dev = 0.333904

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 = 28 (background observations) - 1
t(0.95, 28) = 1.70329

Date	Samples	Mean	Interval	Significant
6/2/2020	1	-3.14191	[0, -2.76441]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Arsenic

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

Total Percent Non-Detects = 0%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 28
Maximum Baseline Concentration = 0.1
Confidence Level = 96.6%
False Positive Rate = 3.4%

Baseline Measurem	Date	Value
	4/19/2008	0.024
	1/21/2009	0.072
	4/9/2009	0.067
	5/19/2009	0.064
	7/16/2010	0.074
	2/8/2011	0.086
	2/17/2012	0.093
	7/31/2012	0.089
	3/27/2013	0.049
	12/23/2013	0.1
	6/26/2014	0.063
	11/21/2014	0.059
	5/28/2015	0.0604
	11/11/2015	0.0469
	5/9/2016	0.05
	11/10/2016	0.0286
	6/8/2017	0.0571
	9/28/2017	0.0199
	12/11/2017	0.0573
	3/21/2018	0.0101
	6/19/2018	0.0063
	9/12/2018	0.0184
	12/4/2018	0.0254
	3/5/2019	0.00449
	6/4/2019	0.0194
	9/5/2019	0.0176
	11/20/2019	0.0176
	2/27/2020	0.00807

Date	Count	Mean	Significant
6/2/2020	1	0.0174	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Chloride

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

Total Percent Non-Detects = 0%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 28
Maximum Baseline Concentration = 5.68
Confidence Level = 96.6%
False Positive Rate = 3.4%

Baseline Measurem	Date	Value
	4/19/2008	2
	1/21/2009	2.9
	4/9/2009	1.9
	5/19/2009	2.8
	7/16/2010	2.8
	2/8/2011	2.6
	2/17/2012	2.1
	7/31/2012	2.2
	3/27/2013	1.8
	12/23/2013	1.5
	6/26/2014	2.9
	11/21/2014	3.9
	5/28/2015	2.01
	11/11/2015	3.97
	5/9/2016	2.12
	8/18/2016	2.4
	11/10/2016	4.59
	6/8/2017	5.68
	9/28/2017	4.11
	12/11/2017	2.31
	3/21/2018	2.1
	6/19/2018	2.24
	9/12/2018	4.94
	12/4/2018	1.67
	3/5/2019	2.11
	6/4/2019	2.15
	9/5/2019	2.84
	11/20/2019	2.52

Date	Count	Mean	Significant
6/2/2020	1	2.27	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 = 39.2857%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 28
Maximum Baseline Concentration = 0.2
Confidence Level = 96.6%
False Positive Rate = 3.4%

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
	12/4/2018	0.00744
	3/5/2019	0.00638
	6/4/2019	0.0088
	9/5/2019	0.00686
	11/20/2019	0.00468
	2/27/2020	0.00803

Date	Count	Mean	Significant
6/2/2020	1	0.0063	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Mercury

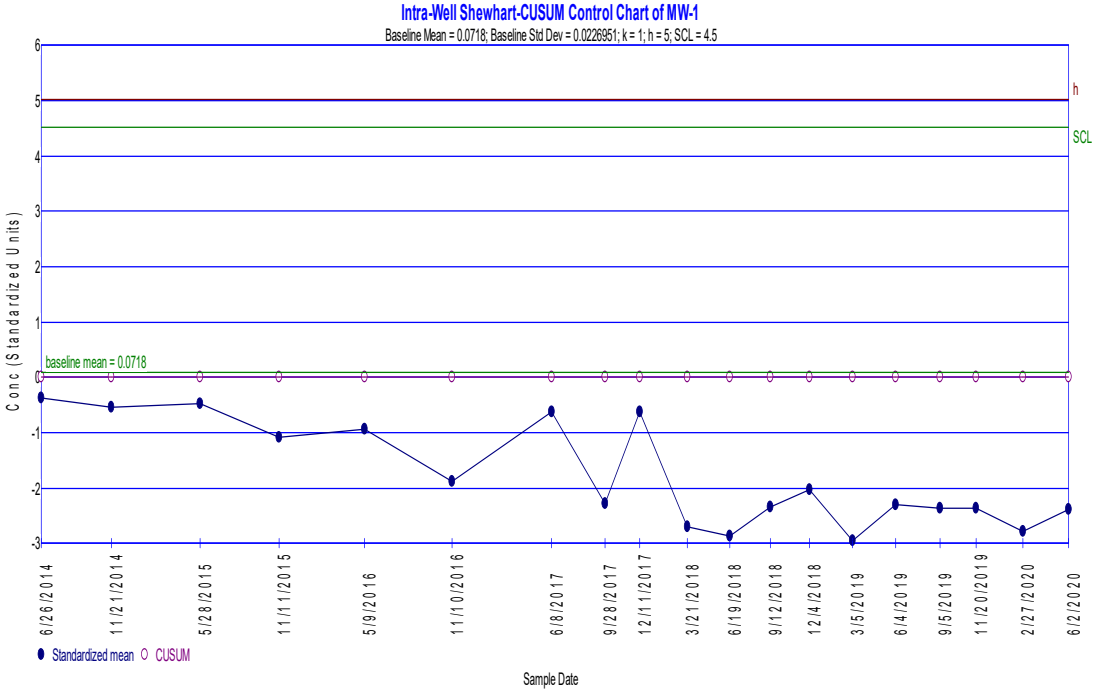
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 32.1429%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 28
Maximum Baseline Concentration = 0.00319
Confidence Level = 96.6%
False Positive Rate = 3.4%

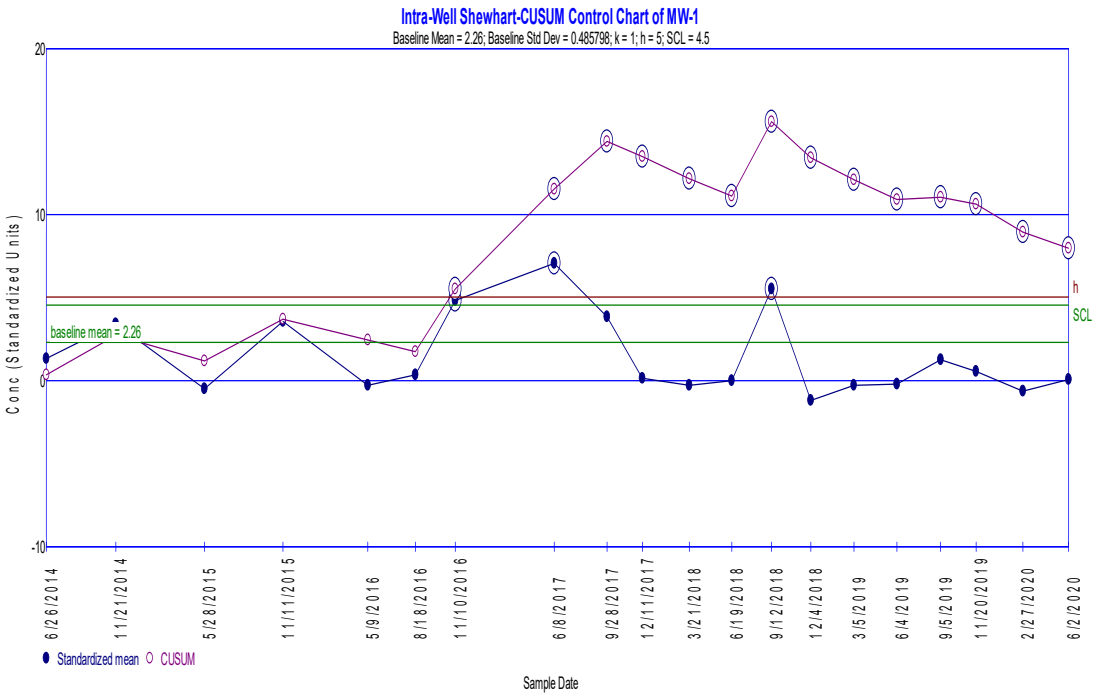
Baseline Measurem	Date	Value
	4/19/2008	ND<0.0002
	1/21/2009	0.00045
	4/9/2009	ND<0.0002
	5/19/2009	ND<0.0002
	7/16/2010	0.0005
	2/8/2011	0.00024
	2/17/2012	0.00083
	7/31/2012	0.00063
	3/27/2013	0.00028
	12/23/2013	0.00077
	6/26/2014	ND<0.0002
	11/21/2014	ND<0.0002
	5/28/2015	ND<0.0002
	11/11/2015	ND<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
	12/4/2018	0.00101
	3/5/2019	0.000922
	6/4/2019	0.000889
	9/5/2019	0.00108
	11/20/2019	0.00121
	2/27/2020	0.000796

Date	Count	Mean	Significant
6/2/2020	1	0.000888	FALSE

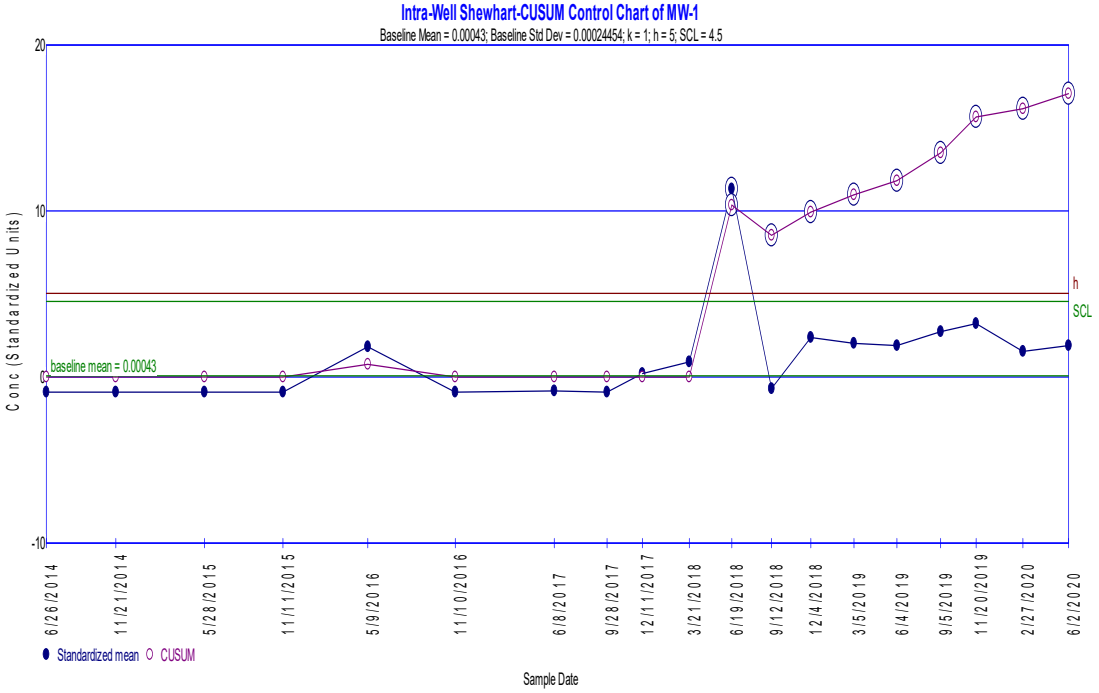
Arsenic



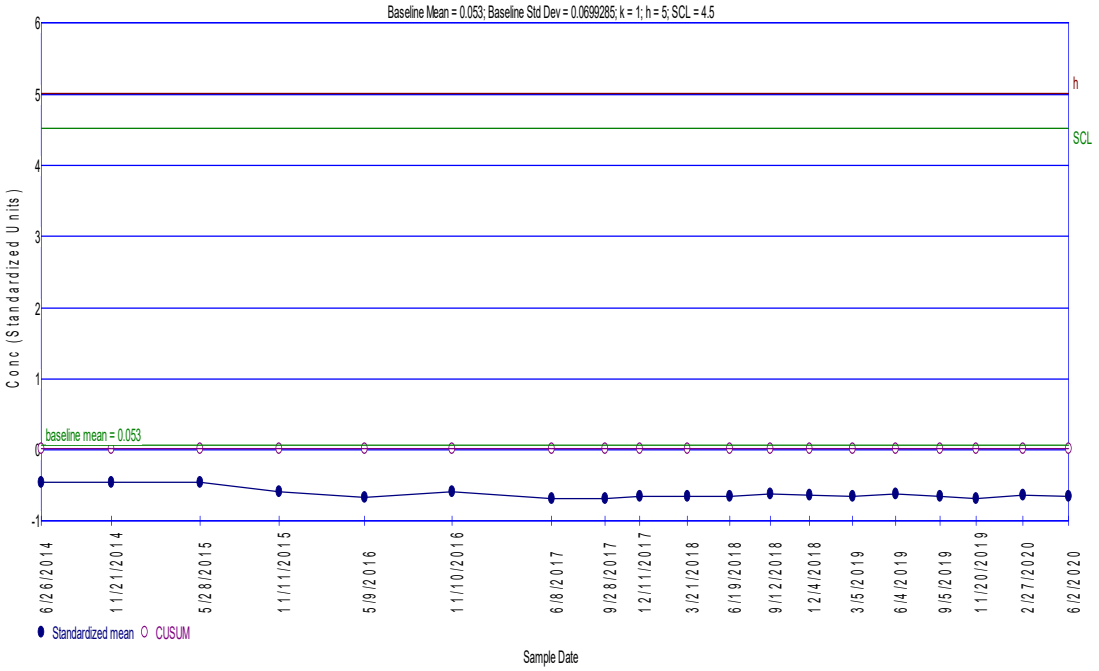
Chloride



Mercury



Nickel



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 = 134

Data Set Standard Deviation = 1.24164
Numerator = 8059.88
Denominator = 25970.4
W Statistic = 0.310349 = 8059.88 / 25970.4

5% Critical value of 0.976 exceeds 0.310349
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.310349
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 = 135

Data Set Standard Deviation = 0.0884753
Numerator = 58.4234
Denominator = 133.828
W Statistic = 0.436555 = 58.4234 / 133.828

5% Critical value of 0.976 exceeds 0.436555
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.436555
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 = 135

Data Set Standard Deviation = 0.0331942
Numerator = 2.87276
Denominator = 18.8377
W Statistic = 0.152501 = 2.87276 / 18.8377

5% Critical value of 0.976 exceeds 0.152501
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.152501
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 = 145

Data Set Standard Deviation = 62.1028
Numerator = 4.25306e+007
Denominator = 7.65801e+007
W Statistic = 0.555375 = 4.25306e+007 / 7.65801e+007

5% Critical value of 0.976 exceeds 0.555375
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.555375
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 = 134

Data Set Standard Deviation = 0.0146902
Numerator = 0.925068
Denominator = 3.63533
W Statistic = 0.254466 = 0.925068 / 3.63533

5% Critical value of 0.976 exceeds 0.254466
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.254466
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 = 134

Data Set Standard Deviation = 0.0154662
Numerator = 2.69464
Denominator = 4.02955
W Statistic = 0.668721 = 2.69464 / 4.02955

5% Critical value of 0.976 exceeds 0.668721
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.668721
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 = 133

Data Set Standard Deviation = 0.00234216
Numerator = 0.0307013
Denominator = 0.0910814
W Statistic = 0.337075 = 0.0307013 / 0.0910814

5% Critical value of 0.976 exceeds 0.337075
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.337075
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 = 105

Data Set Standard Deviation = 0.0633085
Numerator = 16.0365
Denominator = 40.8081
W Statistic = 0.392973 = 16.0365 / 40.8081

5% Critical value of 0.976 exceeds 0.392973
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.392973
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 = 136

Data Set Standard Deviation = 0.0275428
Numerator = 5.01569
Denominator = 13.1775
W Statistic = 0.380625 = 5.01569 / 13.1775

5% Critical value of 0.976 exceeds 0.380625
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.380625
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 = 136

Data Set Standard Deviation = 55.5197
Numerator = 1.42775e+007
Denominator = 5.3544e+007
W Statistic = 0.26665 = 1.42775e+007 / 5.3544e+007

5% Critical value of 0.976 exceeds 0.26665
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.26665
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 = 136

Data Set Standard Deviation = 0.229019
Numerator = 180.355
Denominator = 911.084
W Statistic = 0.197956 = 180.355 / 911.084

5% Critical value of 0.976 exceeds 0.197956
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.197956
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 = 134

Data Set Standard Deviation = 1.2583
Numerator = 23611.8
Denominator = 26672
W Statistic = 0.885267 = 23611.8 / 26672

5% Critical value of 0.976 exceeds 0.885267
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.885267
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 = 135

Data Set Standard Deviation = 0.93814
Numerator = 14538.3
Denominator = 15046.7
W Statistic = 0.966212 = 14538.3 / 15046.7

5% Critical value of 0.976 exceeds 0.966212
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.966212
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 = 135

Data Set Standard Deviation = 1.20893
Numerator = 9048.09
Denominator = 24986.6
W Statistic = 0.362118 = 9048.09 / 24986.6

5% Critical value of 0.976 exceeds 0.362118
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.362118
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 = 145

Data Set Standard Deviation = 1.33296
Numerator = 34616.2
Denominator = 35280.2
W Statistic = 0.98118 = 34616.2 / 35280.2

5% Critical value of 0.976 is less than 0.98118
Data is normally distributed at 95% level of significance

1% Critical value of 0.967 is less than 0.98118
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 = 134

Data Set Standard Deviation = 0.958845
Numerator = 11888
Denominator = 15487.7
W Statistic = 0.767575 = 11888 / 15487.7

5% Critical value of 0.976 exceeds 0.767575
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.767575
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 = 134

Data Set Standard Deviation = 1.4011
Numerator = 27295.6
Denominator = 33069.6
W Statistic = 0.825398 = 27295.6 / 33069.6

5% Critical value of 0.976 exceeds 0.825398
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.825398
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 = 133

Data Set Standard Deviation = 0.489142
Numerator = 2682.84
Denominator = 3972.51
W Statistic = 0.67535 = 2682.84 / 3972.51

5% Critical value of 0.976 exceeds 0.67535
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.67535
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 = 105

Data Set Standard Deviation = 0.538531
Numerator = 1455.89
Denominator = 2952.86
W Statistic = 0.493043 = 1455.89 / 2952.86

5% Critical value of 0.976 exceeds 0.493043
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.493043
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 = 136

Data Set Standard Deviation = 1.25962
Numerator = 23477
Denominator = 27561
W Statistic = 0.851819 = 23477 / 27561

5% Critical value of 0.976 exceeds 0.851819
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.851819
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 = 136

Data Set Standard Deviation = 1.20886
Numerator = 17063.5
Denominator = 25384.4
W Statistic = 0.672204 = 17063.5 / 25384.4

5% Critical value of 0.976 exceeds 0.672204
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.672204
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 = 136

Data Set Standard Deviation = 0.998736
Numerator = 9966.51
Denominator = 17326.8
W Statistic = 0.575207 = 9966.51 / 17326.8

5% Critical value of 0.976 exceeds 0.575207
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.575207
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 95% One-Sided Comparison

Background Samples = 30
Background Mean = 0.940184
Background Std Dev = 0.331504

Number of comparisons = 6
Future Samples (k) = 6
Actual confidence level is 1.0 - (0.05/6) = 99.1667 %
t is Percentile of Student's T-Test (0.95/6) = 0.991667
Degrees of Freedom = 30 (background observations) - 1
t(0.991667, 30) = 2.56014

Well MW-3

Date	Samples	Mean	Interval	Significant
6/2/2020	1	3.17388	[0, 1.80291]	TRUE

Well MW-4

Date	Samples	Mean	Interval	Significant
6/2/2020	1	2.16905	[0, 1.80291]	TRUE

Well MW-5

Date	Samples	Mean	Interval	Significant
6/2/2020	1	4.42125	[0, 1.80291]	TRUE

Well TMW-1

Date	Samples	Mean	Interval	Significant
6/2/2020	1	3.04927	[0, 1.80291]	TRUE

Well TMW-2

Date	Samples	Mean	Interval	Significant
6/2/2020	1	3.54385	[0, 1.80291]	TRUE

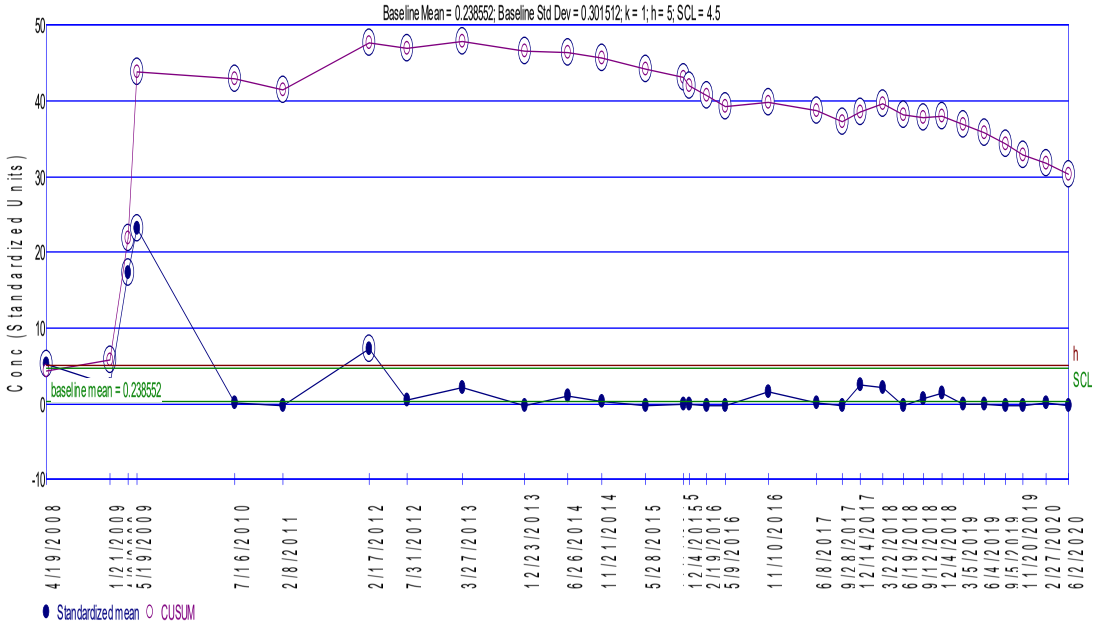
Well TMW-3

Date	Samples	Mean	Interval	Significant
6/2/2020	1	4.13836	[0, 1.80291]	TRUE

Aluminum

Inter-Well Shewhart-CUSUM Control Chart of MW-3

Baseline Mean = 0.238552; Baseline Std Dev = 0.301512; k = 1; h = 5; SCL = 4.5

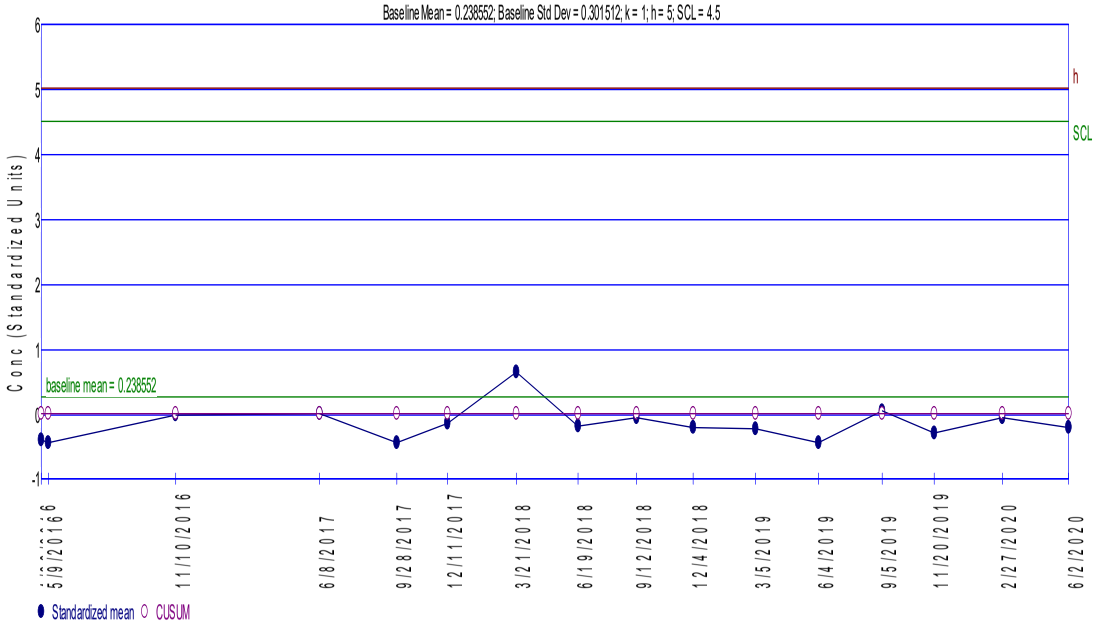


Sample Date

Aluminum

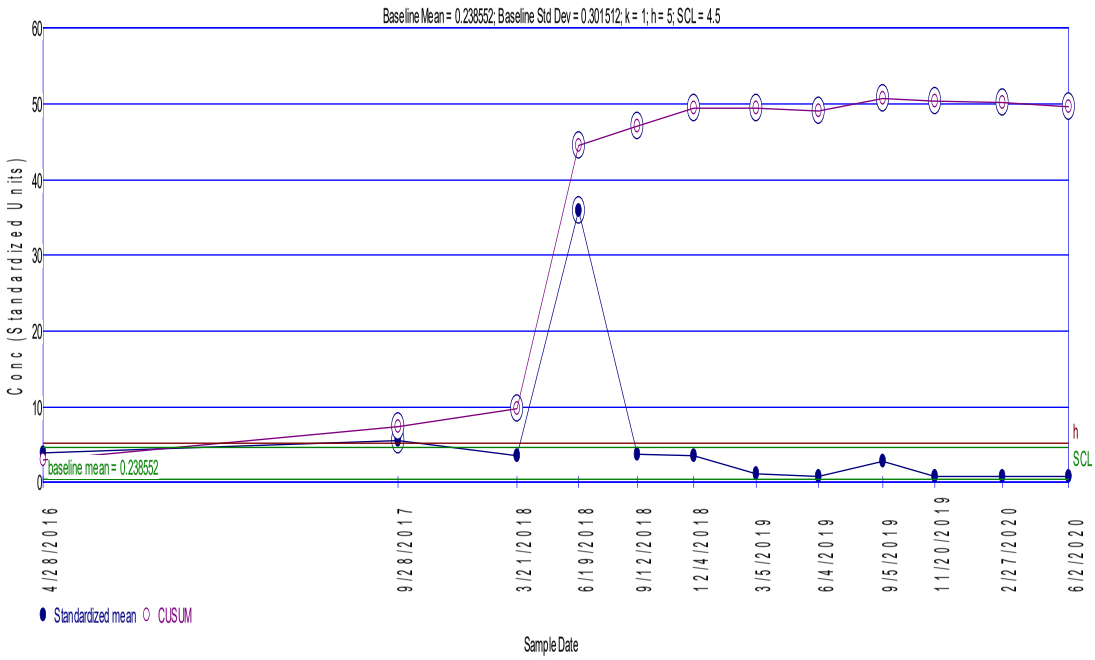
Inter-Well Shewhart-CUSUM Control Chart of MW-5

Baseline Mean = 0.238552; Baseline Std Dev = 0.301512; k = 1; h = 5; SCL = 4.5

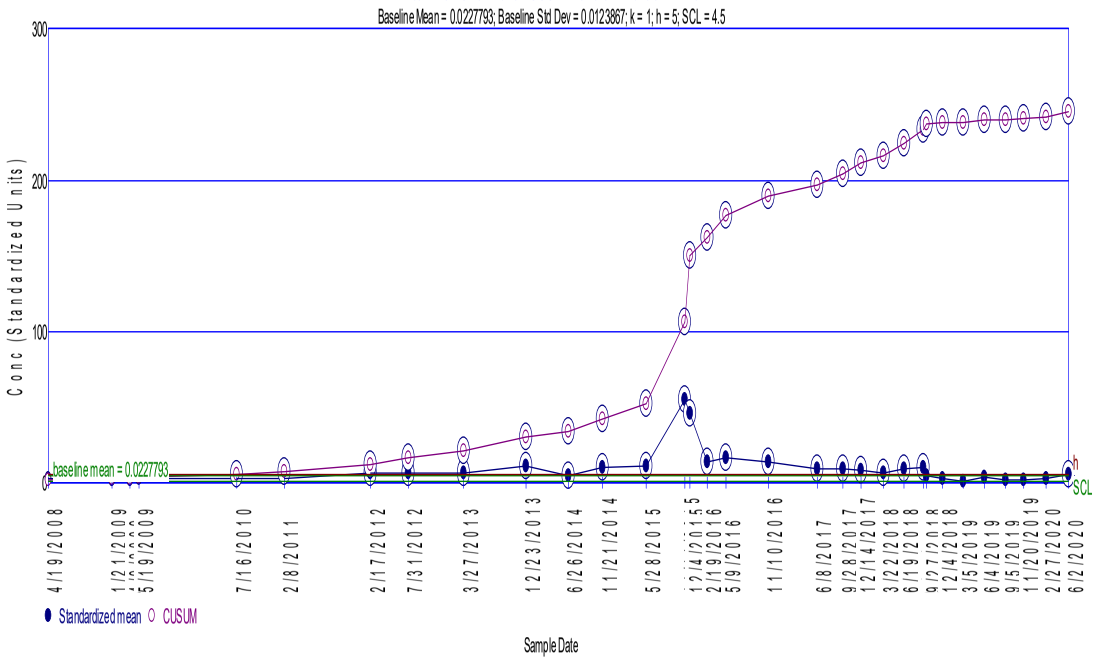


Sample Date

Aluminum



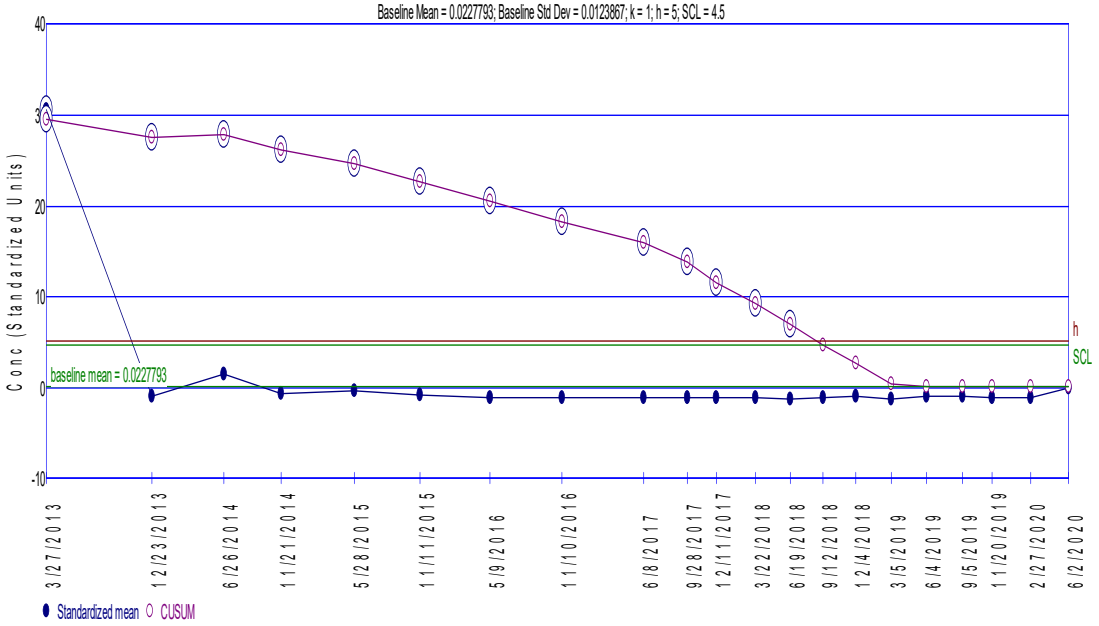
Barium



Barium

Inter-Well Shewhart-CUSUM Control Chart of MW-4

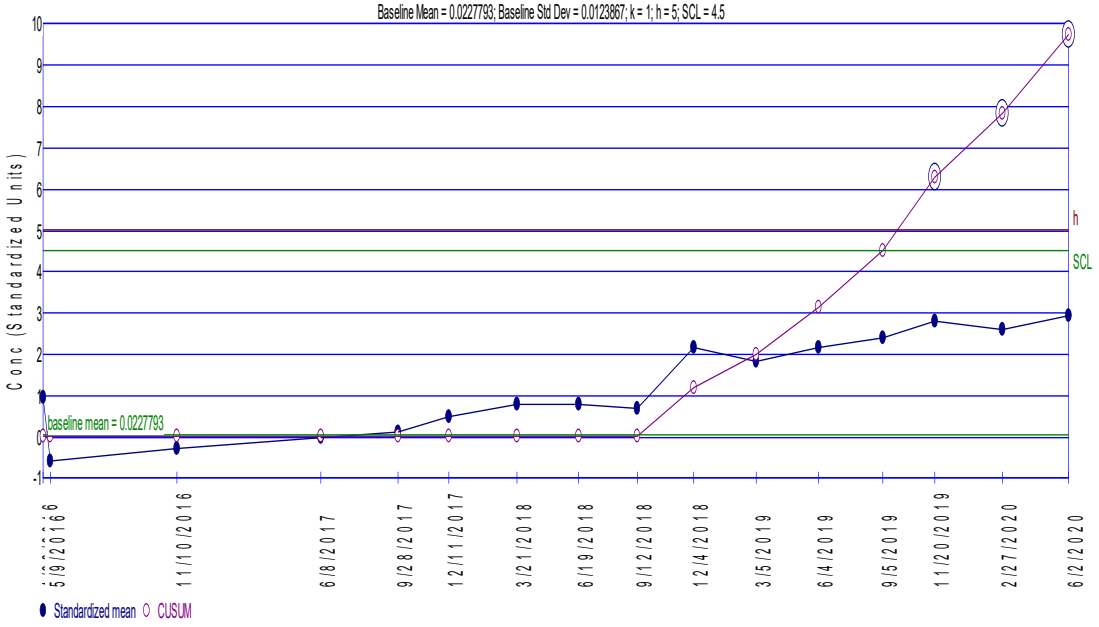
Baseline Mean = 0.0227793; Baseline Std Dev = 0.0123867; k = 1; h = 5; SCL = 4.5



Barium

Inter-Well Shewhart-CUSUM Control Chart of MW-5

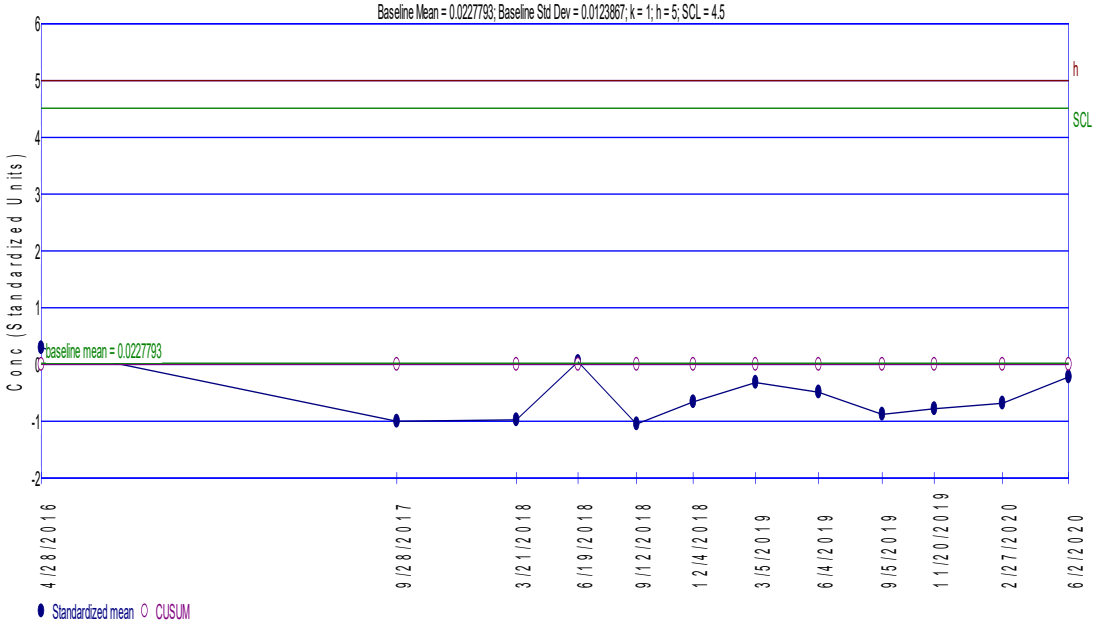
Baseline Mean = 0.0227793; Baseline Std Dev = 0.0123867; k = 1; h = 5; SCL = 4.5



Barium

Inter-Well Shewhart-CUSUM Control Chart of TMW-1

Baseline Mean = 0.0227793; Baseline Std Dev = 0.0123867; k = 1; h = 5; SCL = 4.5

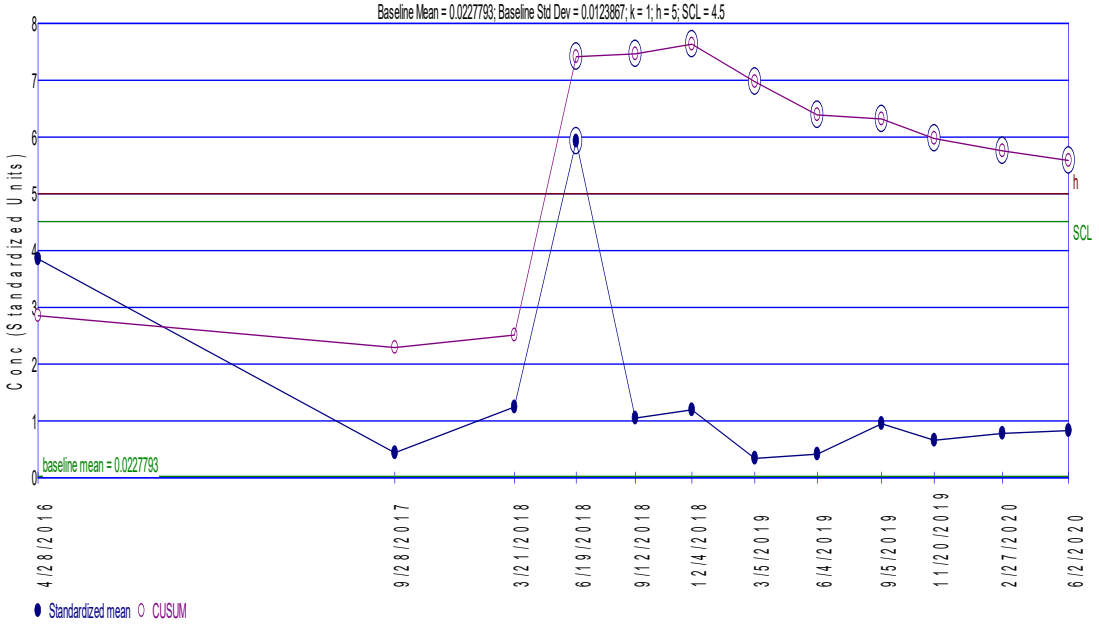


Sample Date

Barium

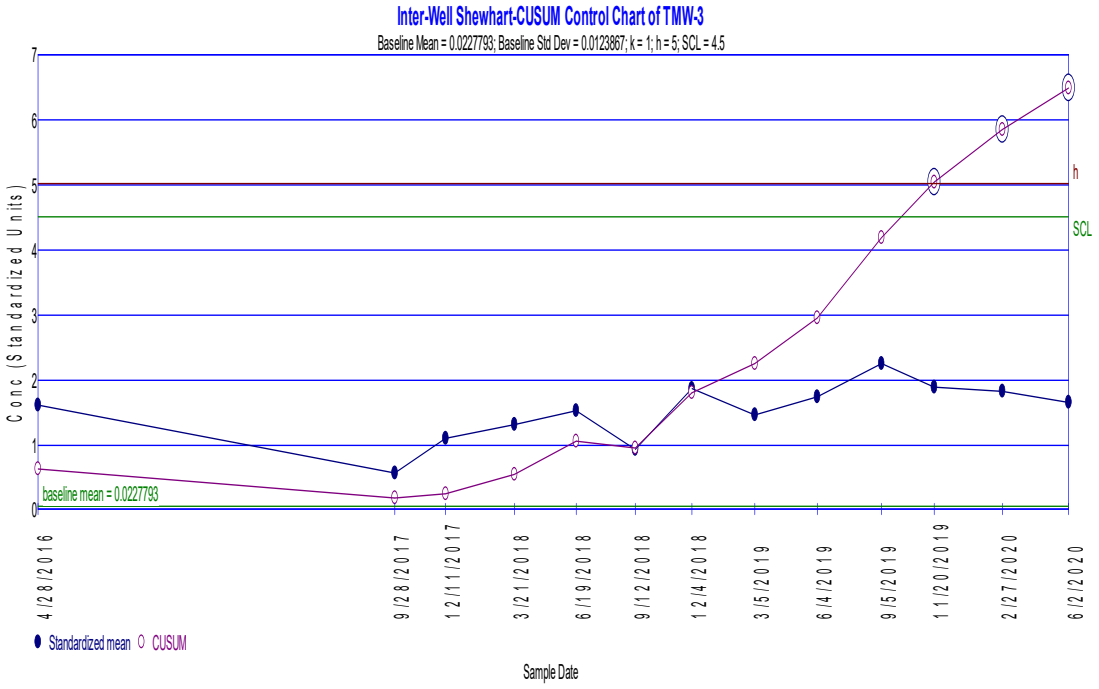
Inter-Well Shewhart-CUSUM Control Chart of TMW-2

Baseline Mean = 0.0227793; Baseline Std Dev = 0.0123867; k = 1; h = 5; SCL = 4.5



Sample Date

Barium


Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 0.0227793; Baseline Std Dev = 0.0123867; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 0.0227793
4/28/2016
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
12/4/2018
3/5/2019
6/4/2019
9/5/2019
11/20/2019
2/27/2020
6/2/2020
Standardized mean
CUSUM
Sample Date

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Total Cadmium

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

Total Percent Non-Detects = 88.1481%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 28
Maximum Background Value = 0.001
Confidence Level = 82.4%
False Positive Rate = 17.6%

Location	Date	Count	Mean	Significant
MW-3	**6/2/2020**	**1**	**0.00278**	**TRUE**
MW-4	6/2/2020	1	0.001	FALSE
MW-5	6/2/2020	1	0.001	FALSE
TMW-1	6/2/2020	1	0.001	FALSE
TMW-2	6/2/2020	1	0.001	FALSE
TMW-3	6/2/2020	1	0.001	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Chromium

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

Total Percent Non-Detects = 73.1343%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 29
Maximum Background Value = 0.12
Confidence Level = 82.9%
False Positive Rate = 17.1%

Location	Date	Count	Mean	Significant
MW-3	6/2/2020	1	0.002	FALSE
MW-4	6/2/2020	1	0.00208	FALSE
MW-5	6/2/2020	1	0.00608	FALSE
TMW-1	6/2/2020	1	0.002	FALSE
TMW-2	6/2/2020	1	0.002	FALSE
TMW-3	6/2/2020	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Cobalt

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

Total Percent Non-Detects = 58.9552%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 29
Maximum Background Value = 0.0763
Confidence Level = 82.9%
False Positive Rate = 17.1%

Location	Date	Count	Mean	Significant
MW-3	6/2/2020	1	0.00401	FALSE
MW-4	6/2/2020	1	0.002	FALSE
MW-5	6/2/2020	1	0.00204	FALSE
TMW-1	6/2/2020	1	0.002	FALSE
TMW-2	6/2/2020	1	0.002	FALSE
TMW-3	6/2/2020	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 = 84.2105%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 29
Maximum Background Value = 0.028
Confidence Level = 82.9%
False Positive Rate = 17.1%

Location	Date	Count	Mean	Significant
MW-3	6/2/2020	1	0.005	FALSE
MW-4	6/2/2020	1	0.00536	FALSE
MW-5	6/2/2020	1	0.00528	FALSE
TMW-1	6/2/2020	1	0.005	FALSE
TMW-2	6/2/2020	1	0.005	FALSE
TMW-3	6/2/2020	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) = 19
Maximum Background Value = 0.178
Confidence Level = 76%
False Positive Rate = 24%

Location	Date	Count	Mean	Significant
MW-3	**6/2/2020**	**1**	**0.218**	**TRUE**
MW-4	6/2/2020	1	0.15	FALSE
MW-5	6/2/2020	1	0.15	FALSE
TMW-1	6/2/2020	1	0.15	FALSE
TMW-2	6/2/2020	1	0.15	FALSE
TMW-3	6/2/2020	1	0.15	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Nickel

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

Total Percent Non-Detects = 60.2941%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 29
Maximum Background Value = 0.2
Confidence Level = 82.9%
False Positive Rate = 17.1%

Location	Date	Count	Mean	Significant
MW-3	6/2/2020	1	0.00564	FALSE
MW-4	6/2/2020	1	0.002	FALSE
MW-5	6/2/2020	1	0.00651	FALSE
TMW-1	6/2/2020	1	0.002	FALSE
TMW-2	6/2/2020	1	0.002	FALSE
TMW-3	6/2/2020	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Sulfate

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

Total Percent Non-Detects = 63.9706%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 28
Maximum Background Value = 18.8
Confidence Level = 82.4%
False Positive Rate = 17.6%

Location	Date	Count	Mean	Significant
MW-3	**6/2/2020**	**1**	**28.9**	**TRUE**
MW-4	6/2/2020	1	5	FALSE
MW-5	6/2/2020	1	9.29	FALSE
TMW-1	6/2/2020	1	5	FALSE
TMW-2	6/2/2020	1	5	FALSE
TMW-3	6/2/2020	1	5	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Zinc

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

Total Percent Non-Detects = 67.6471%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 29
Maximum Background Value = 0.0281
Confidence Level = 82.9%
False Positive Rate = 17.1%

Location	Date	Count	Mean	Significant
MW-3	**6/2/2020**	**1**	**0.0295**	**TRUE**
MW-4	6/2/2020	1	0.025	FALSE
MW-5	6/2/2020	1	0.025	FALSE
TMW-1	6/2/2020	1	0.025	FALSE
TMW-2	6/2/2020	1	0.025	FALSE
TMW-3	6/2/2020	1	0.025	FALSE

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Total Cadmium

Location: MW-3

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

Total non detects is 44
Non detect rank is 22.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.001	22.5
	1/21/2009	ND<0.001	22.5
	4/9/2009	ND<0.001	22.5
	5/19/2009	ND<0.001	22.5
	7/16/2010	ND<0.001	22.5
	2/8/2011	ND<0.001	22.5
	2/17/2012	ND<0.001	22.5
	7/31/2012	ND<0.001	22.5
	12/23/2013	ND<0.001	22.5
	6/26/2014	ND<0.001	22.5
	11/21/2014	ND<0.001	22.5
	5/28/2015	ND<0.001	22.5
	11/11/2015	ND<0.001	22.5
	5/9/2016	ND<0.001	22.5
	11/10/2016	ND<0.001	22.5
	6/8/2017	ND<0.001	22.5
	9/28/2017	ND<0.001	22.5
	12/11/2017	ND<0.001	22.5
	3/21/2018	ND<0.001	22.5
	6/19/2018	ND<0.001	22.5
	9/12/2018	ND<0.001	22.5
	12/4/2018	ND<0.001	22.5
	3/5/2019	ND<0.001	22.5
	6/4/2019	ND<0.001	22.5
	9/5/2019	ND<0.001	22.5
	11/20/2019	ND<0.001	22.5
	2/27/2020	ND<0.001	22.5
	6/2/2020	ND<0.001	22.5
MW-3	4/19/2008	ND<0.001	22.5
	1/21/2009	ND<0.001	22.5
	4/9/2009	ND<0.001	22.5
	5/19/2009	ND<0.001	22.5
	7/16/2010	ND<0.001	22.5
	2/8/2011	ND<0.001	22.5
	2/17/2012	ND<0.001	22.5
	7/31/2012	ND<0.001	22.5
	12/23/2013	ND<0.001	22.5
	6/26/2014	ND<0.001	22.5
	11/21/2014	ND<0.001	22.5
	5/28/2015	ND<0.001	22.5
	11/11/2015	ND<0.001	22.5
	12/4/2015	ND<0.001	22.5
	2/19/2016	ND<0.001	22.5
	5/9/2016	ND<0.001	22.5
	11/10/2016	0.00177	46

6/8/2017	0.0286	55
8/8/2017	0.0113	53
9/28/2017	0.00926	52
12/14/2017	0.00659	49
3/22/2018	0.00671	50
6/19/2018	0.0312	57
9/12/2018	0.297	60
9/27/2018	0.204	59
12/4/2018	0.144	58
3/5/2019	0.0117	54
6/4/2019	0.0292	56
9/5/2019	0.0088	51
11/20/2019	0.00157	45
2/27/2020	0.00212	47
6/2/2020	0.00278	48

The Wilcoxon Statistic is 672
The Expected value is is 448
The Standard Deviation is 67.4883
The Z Score is 3.31169
The Standard Deviation adjusted for ties is 52.5249
The Z Score adjusted for ties is 4.25512
3.31169 > 2.326 indicating statistical significance at 1% level
4.25512 > 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 22
Non detect rank is 11.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.1	11.5
	1/21/2009	ND<0.1	11.5
	4/9/2009	ND<0.1	11.5
	5/19/2009	ND<0.1	11.5
	5/9/2016	ND<0.1	11.5
	11/10/2016	ND<0.1	11.5
	6/8/2017	0.178	27
	9/28/2017	ND<0.1	11.5
	12/11/2017	ND<0.1	11.5
	3/21/2018	ND<0.1	11.5
	6/19/2018	ND<0.1	11.5
	9/12/2018	ND<0.1	11.5
	12/4/2018	ND<0.1	11.5
	3/5/2019	ND<0.1	11.5
	6/4/2019	ND<0.1	11.5
	9/5/2019	ND<0.1	11.5
	11/20/2019	ND<0.1	11.5
	2/27/2020	ND<0.1	11.5
	6/2/2020	ND<0.15	11.5
MW-3	1/21/2009	ND<0.1	11.5
	4/9/2009	ND<0.1	11.5
	5/19/2009	ND<0.1	11.5
	5/9/2016	0.105	23
	11/10/2016	ND<0.1	11.5
	6/8/2017	0.208	30
	9/28/2017	0.226	32
	12/14/2017	0.149	24
	3/22/2018	0.274	34
	6/19/2018	0.248	33
	9/12/2018	0.543	37
	12/4/2018	0.4	36
	3/5/2019	0.163	26
	6/4/2019	0.183	28
	9/5/2019	0.306	35
	11/20/2019	0.197	29
	2/27/2020	0.161	25
	6/2/2020	0.218	31

The Wilcoxon Statistic is 298
The Expected value is is 171
The Standard Deviation is 32.909
The Z Score is 3.84394
The Standard Deviation adjusted for ties is 29.2514
The Z Score adjusted for ties is 4.32459

3.84394 > 2.326 indicating statistical significance at 1% level
4.32459 > 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 18
Non detect rank is 9.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	8.9	26
	7/16/2010	9.4	29
	2/8/2011	5.8	23
	9/14/2011	6.6	25
	2/17/2012	ND<5	9.5
	7/31/2012	ND<5	9.5
	3/27/2013	5.1	20
	12/23/2013	6.1	24
	6/26/2014	ND<5	9.5
	11/21/2014	9.1	28
	5/28/2015	ND<5	9.5
	11/11/2015	18.8	36
	5/9/2016	ND<5	9.5
	8/18/2016	3.51	19
	11/10/2016	16.5	35
	6/8/2017	ND<5	9.5
	9/28/2017	ND<5	9.5
	12/11/2017	ND<5	9.5
	3/21/2018	ND<5	9.5
	6/19/2018	ND<5	9.5
	9/12/2018	12.3	33
	12/4/2018	ND<5	9.5
	3/5/2019	ND<5	9.5
	6/4/2019	ND<5	9.5
	9/5/2019	ND<5	9.5
	11/20/2019	ND<5	9.5
	2/27/2020	5.72	22
	6/2/2020	ND<5	9.5
MW-3	5/19/2009	ND<5	9.5
	7/16/2010	5.1	21
	2/8/2011	ND<5	9.5
	2/17/2012	22	37
	7/31/2012	23	41
	3/27/2013	16	34
	12/23/2013	12	32
	6/26/2014	9.7	30
	11/21/2014	11	31
	5/28/2015	9.09	27
	11/11/2015	29.3	44
	12/4/2015	29.1	43
	2/19/2016	22.2	38
	5/9/2016	22.3	39
	8/18/2016	95.7	52
	11/10/2016	34	46
	6/8/2017	93.7	51

9/28/2017	46.2	47
12/14/2017	46.2	48
3/22/2018	22.3	40
6/19/2018	30.1	45
9/12/2018	484	57
12/4/2018	324	56
3/5/2019	85.8	50
6/4/2019	219	55
9/5/2019	154	54
11/20/2019	111	53
2/27/2020	62	49
6/2/2020	28.9	42

The Wilcoxon Statistic is 746
The Expected value is is 406
The Standard Deviation is 62.6472
The Z Score is 5.41924
The Standard Deviation adjusted for ties is 61.6556
The Z Score adjusted for ties is 5.50639
5.41924 > 2.326 indicating statistical significance at 1% level
5.50639 > 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 30
Non detect rank is 15.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.011	31
	1/21/2009	0.015	38
	4/9/2009	0.011	32
	5/19/2009	0.021	44
	7/16/2010	0.011	33
	2/8/2011	0.016	41
	2/17/2012	ND<0.01	15.5
	7/31/2012	0.023	45
	3/27/2013	0.012	35
	12/23/2013	ND<0.01	15.5
	6/26/2014	ND<0.01	15.5
	11/21/2014	ND<0.025	15.5
	5/28/2015	ND<0.025	15.5
	11/11/2015	ND<0.025	15.5
	5/9/2016	0.0281	48
	11/10/2016	ND<0.025	15.5
	6/8/2017	ND<0.025	15.5
	9/28/2017	ND<0.025	15.5
	12/11/2017	ND<0.025	15.5
	3/21/2018	ND<0.025	15.5
	6/19/2018	ND<0.025	15.5
	9/12/2018	ND<0.025	15.5
	12/4/2018	ND<0.025	15.5
	3/5/2019	ND<0.025	15.5
	6/4/2019	ND<0.025	15.5
	9/5/2019	ND<0.025	15.5
	11/20/2019	ND<0.025	15.5
	2/27/2020	ND<0.025	15.5
	6/2/2020	ND<0.025	15.5
MW-3	4/19/2008	0.017	43
	1/21/2009	0.015	39
	4/9/2009	0.011	34
	5/19/2009	0.031	50
	7/16/2010	0.015	40
	2/8/2011	0.013	36
	2/17/2012	0.014	37
	7/31/2012	0.016	42
	3/27/2013	ND<0.01	15.5
	12/23/2013	ND<0.01	15.5
	6/26/2014	0.023	46
	11/21/2014	ND<0.025	15.5
	5/28/2015	ND<0.025	15.5
	11/11/2015	ND<0.025	15.5
	12/4/2015	ND<0.025	15.5
	2/19/2016	ND<0.025	15.5

5/9/2016	ND<0.025	15.5
11/10/2016	ND<0.025	15.5
6/8/2017	0.0769	54
9/28/2017	0.0439	52
12/14/2017	0.159	57
3/22/2018	0.0499	53
6/19/2018	0.109	56
9/12/2018	1.68	61
9/27/2018	1.58	60
12/4/2018	1.34	59
3/5/2019	0.0994	55
6/4/2019	0.197	58
9/5/2019	0.0324	51
11/20/2019	0.0251	47
2/27/2020	ND<0.025	15.5
6/2/2020	0.0295	49

The Wilcoxon Statistic is 706
The Expected value is is 464
The Standard Deviation is 69.2435
The Z Score is 3.48769
The Standard Deviation adjusted for ties is 64.9985
The Z Score adjusted for ties is 3.71547
3.48769 > 2.326 indicating statistical significance at 1% level
3.71547 > 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 = 28 - 57 = -29

Tied GrouValue	Members
1 0.1	4

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 156
B = 0
C = 24
D = 0
E = 12
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 325
Z-Score = -1.55316
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.55316| <= 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 = 34 - 56 = -22

Tied GrouValue	Members
1 0.1	2

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = -1.15137
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.15137| <= 1.97737 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 = 7 - 48 = -41

Tied GrouValue	Members

Time Period	Observations
9/28/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 2970
b = 8910
c = 220
Group Variance = 165
Z-Score = -3.114
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-3.114 < -1.65463 indicating a downward 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 = 24 - 81 = -57

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
9/27/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	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 = -2.77128
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.77128 < -1.65463 indicating a downward 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 = 56 - 35 = 21

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 1.0949
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.0949| <= 1.97737 indicating no evidence of a 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 = 85 - 6 = 79

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 4.2701
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.2701 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Barium

Location: TMW-1

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

95% Confidence Level

S Statistic = 35 - 20 = 15

Tied GrouValue	Members

Time Period	Observations
9/28/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 2970
b = 8910
c = 220
Group Variance = 165
Z-Score = 1.0899
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.0899| <= 1.97737 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 = 22 - 33 = -11

Tied GrouValue	Members

Time Period	Observations
9/28/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 2970
b = 8910
c = 220
Group Variance = 165
Z-Score = -0.778499
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.778499| <= 1.97737 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 = 51 - 15 = 36

Tied GrouValue	Members

Time Period	Observations
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 3828
b = 11880
c = 264
Group Variance = 212.667
Z-Score = 2.40004
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.40004 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Total Cadmium
Location: MW-3

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

95% Confidence Level

S Statistic = 53 - 67 = -14

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
8/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
9/27/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	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 = -0.585293
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.585293| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: MW-3

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

95% Confidence Level

S Statistic = 17 - 73 = -56

Tied GrouValue		Members
1	23.9	2

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = -3.01549
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-3.01549 < -1.65463 indicating a downward 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 = 74 - 17 = 57

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 3.06571
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.06571 > 1.65463 indicating an upward 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 = 80 - 10 = 70

Tied GrouValue		Members
1	83.5	2

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = 3.78307
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.78307 > 1.65463 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 = 89 - 2 = 87

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 4.70806
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.70806 > 1.65463 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 = 72 - 19 = 53

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 2.84673
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.84673 > 1.65463 indicating an upward 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 = 84 - 7 = 77

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 4.16061
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.16061 > 1.65463 indicating an upward 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 = 25 - 11 = 14

Tied GrouValue		Members
1	0.002	11

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 2970
B = 0
C = 990
D = 0
E = 110
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 168.667
Z-Score = 1.00099
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.00099| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chromium
Location: MW-5

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

95% Confidence Level

S Statistic = 61 - 24 = 37

Tied GrouValue		Members
1	0.002	4

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 156
B = 0
C = 24
D = 0
E = 12
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 325
Z-Score = 1.99692
Comparison Level at 95% confidence level = 1.65463 (upward trend)
1.99692 > 1.65463 indicating an upward 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 = 36 - 34 = 2

Tied GrouValue		Members
1	0.002	7

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 798
B = 0
C = 210
D = 0
E = 42
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 289.333
Z-Score = 0.0587896
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.0587896| <= 1.97737 indicating no evidence of a 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 = 57 - 32 = 25

Tied GrouValue		Members
1	0.00264	2
2	0.00204	2

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0
E = 4
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 331.667
Z-Score = 1.31783
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.31783| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Copper
Location: MW-4

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

95% Confidence Level

S Statistic = 13 - 0 = 13

Tied GrouValue		Members
1	0.005	13

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 4836
B = 0
C = 1716
D = 0
E = 156
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 65
Z-Score = 1.48842
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.48842| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Copper
Location: MW-5

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

95% Confidence Level

S Statistic = 23 - 2 = 21

Tied GrouValue		Members
1	0.005	12

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 3828
B = 0
C = 1320
D = 0
E = 132
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 121
Z-Score = 1.81818
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.81818| <= 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 = 50 - 41 = 9

Tied GrouValue	Members

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 0.437959
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.437959| <= 1.97737 indicating no evidence of a 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 = 61 - 41 = 20

Tied GrouValue		Members
1	0.002	3

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
9/27/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 66
B = 0
C = 6
D = 0
E = 6
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 404.667
Z-Score = 0.944506
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.944506| <= 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 = 48 - 42 = 6

Tied Grou	Value	Members
1	0.00651	2

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = 0.274136
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.274136| <= 1.97737 indicating no evidence of a 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 = 48 - 42 = 6

Tied Grou	Value	Members
1	46.2	2

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = 0.274136
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.274136| <= 1.97737 indicating no evidence of a 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 = 79 - 2 = 77

Tied Grou	Value	Members
1	5	5

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 300
B = 0
C = 60
D = 0
E = 20
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 317
Z-Score = 4.26859
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.26859 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Zinc
Location: MW-3

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

95% Confidence Level

S Statistic = 45 - 59 = -14

Tied Grou	Value	Members
1	0.025	2

Time Period	Observations
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
9/27/2018	1
12/4/2018	1
3/5/2019	1
6/4/2019	1
9/5/2019	1
11/20/2019	1
2/27/2020	1
6/2/2020	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 407.333
Z-Score = -0.644122
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.644122| <= 1.97737 indicating no evidence of a trend

APPENDIX C
LABORATORY ANALYTICAL REPORTS & FIELD INFORMATION LOGS

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

June 12, 2020

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1224773
Samples Received:	06/03/2020
Project Number:	181-364
Description:	Former EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 117 Seaboard Ln. Suite E100 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 Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

MW-1 L1224773-01 GW

Collected by: AB/PC | Collected date/time: 06/02/20 11:00 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:30	06/08/20 00:30	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 18:56	06/07/20 18:56	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 21:49	06/08/20 21:49	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:23	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/03/20 22:01	06/03/20 22:01	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486727	1	06/03/20 22:00	06/04/20 13:04	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 05:32	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:30	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 15:38	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 00:06	06/06/20 00:06	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 10:12	LEL	Mt. Juliet, TN

MW-3 L1224773-02 GW

Collected by: AB/PC | Collected date/time: 06/02/20 16:00 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:34	06/08/20 00:34	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 19:03	06/07/20 19:03	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 21:59	06/08/20 21:59	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:24	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/03/20 22:22	06/03/20 22:22	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486727	1	06/03/20 22:00	06/04/20 13:09	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 05:34	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:34	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 15:42	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 00:26	06/06/20 00:26	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 10:59	LEL	Mt. Juliet, TN

MW-4 L1224773-03 GW

Collected by: AB/PC | Collected date/time: 06/02/20 14:50 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:37	06/08/20 00:37	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 19:10	06/07/20 19:10	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 22:02	06/08/20 22:02	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:25	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/03/20 23:27	06/03/20 23:27	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486727	1	06/03/20 22:00	06/04/20 13:11	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 05:37	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1485474	1	06/03/20 19:40	06/04/20 16:37	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:37	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 16:01	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 00:47	06/06/20 00:47	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 11:11	LEL	Mt. Juliet, TN

MW-5 L1224773-04 GW

Collected by: AB/PC | Collected date/time: 06/02/20 13:50 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:41	06/08/20 00:41	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 19:17	06/07/20 19:17	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 22:04	06/08/20 22:04	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:26	LRP	Mt. Juliet, TN

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

MW-5 L1224773-04 GW

Collected by: AB/PC | Collected date/time: 06/02/20 13:50 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1486662	1	06/03/20 23:38	06/03/20 23:38	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486727	1	06/03/20 22:00	06/04/20 13:13	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 05:40	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:41	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 16:05	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 01:08	06/06/20 01:08	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 11:23	LEL	Mt. Juliet, TN

TMW-1 L1224773-05 GW

Collected by: AB/PC | Collected date/time: 06/02/20 13:10 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:44	06/08/20 00:44	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 19:32	06/07/20 19:32	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 22:07	06/08/20 22:07	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:26	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/03/20 23:49	06/03/20 23:49	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486727	1	06/03/20 22:00	06/04/20 11:10	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 04:25	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:44	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 16:08	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 01:28	06/06/20 01:28	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 11:34	LEL	Mt. Juliet, TN

TMW-2 L1224773-06 GW

Collected by: AB/PC | Collected date/time: 06/02/20 15:00 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:47	06/08/20 00:47	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 19:40	06/07/20 19:40	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 22:11	06/08/20 22:11	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:26	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/04/20 00:00	06/04/20 00:00	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486728	1	06/04/20 10:13	06/04/20 19:25	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 04:28	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:47	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 16:12	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 01:49	06/06/20 01:49	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 11:46	LEL	Mt. Juliet, TN

TMW-3 L1224773-07 GW

Collected by: AB/PC | Collected date/time: 06/02/20 16:10 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:51	06/08/20 00:51	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 19:47	06/07/20 19:47	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 22:19	06/08/20 22:19	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:26	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/04/20 00:11	06/04/20 00:11	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486728	1	06/04/20 10:13	06/04/20 19:27	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 04:30	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:51	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 16:15	LD	Mt. Juliet, TN

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

TMW-3 L1224773-07 GW

Collected by: AB/PC | Collected date/time: 06/02/20 16:10 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 02:09	06/06/20 02:09	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 11:58	LEL	Mt. Juliet, TN

DUPLICATE L1224773-08 GW

Collected by: AB/PC | Collected date/time: 06/02/20 00:00 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:54	06/08/20 00:54	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 19:53	06/07/20 19:53	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 22:21	06/08/20 22:21	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:26	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/04/20 00:22	06/04/20 00:22	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486728	1	06/04/20 10:13	06/04/20 19:33	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 04:33	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:54	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 16:19	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/06/20 02:30	06/06/20 02:30	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 12:10	LEL	Mt. Juliet, TN

FIELD BLANK L1224773-09 GW

Collected by: AB/PC | Collected date/time: 06/02/20 16:25 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:58	06/08/20 00:58	LAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 20:00	06/07/20 20:00	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1489079	1	06/08/20 22:22	06/08/20 22:22	DGR	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489888	1	06/10/20 06:50	06/10/20 13:26	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/04/20 00:33	06/04/20 00:33	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486728	1	06/04/20 10:13	06/04/20 19:35	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 04:36	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:58	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 16:22	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/05/20 20:20	06/05/20 20:20	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 12:33	LEL	Mt. Juliet, TN

TRIP BLANK L1224773-10 GW

Collected by: AB/PC | Collected date/time: 06/02/20 00:00 | Received date/time: 06/03/20 13:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	1	06/05/20 20:41	06/05/20 20:41	ADM	Mt. Juliet, TN

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

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	19.0		2.50	1	06/08/2020 00:30	WG1486748

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	48.7		20.0	1	06/07/2020 18:56	WG1486929

Sample Narrative:
L1224773-01 WG1486929: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	06/08/2020 21:49	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:23	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/03/2020 22:01	WG1486662
Chloride	2.27		1.00	1	06/03/2020 22:01	WG1486662
Fluoride	ND		0.150	1	06/03/2020 22:01	WG1486662
Nitrate	ND		0.100	1	06/03/2020 22:01	WG1486662
Sulfate	ND		5.00	1	06/03/2020 22:01	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	0.000888		0.000200	1	06/04/2020 13:04	WG1486727

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 05:32	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	06/08/2020 00:30	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:30	WG1486748
Arsenic	0.0174		0.00200	1	06/08/2020 00:30	WG1486748
Barium	ND		0.0200	1	06/08/2020 00:30	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:30	WG1486748
Cadmium	ND		0.00100	1	06/08/2020 00:30	WG1486748
Calcium	3.40		1.00	1	06/08/2020 00:30	WG1486748
Chromium	ND		0.00200	1	06/08/2020 00:30	WG1486748
Cobalt	0.0432		0.00200	1	06/08/2020 00:30	WG1486748
Copper	ND		0.00500	1	06/08/2020 00:30	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	13.6		0.100	1	06/08/2020 00:30	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:30	WG1486748
Magnesium	2.56		1.00	1	06/08/2020 00:30	WG1486748
Manganese	0.856		0.00500	1	06/08/2020 00:30	WG1486748
Nickel	0.00630		0.00200	1	06/08/2020 00:30	WG1486748
Potassium	ND		2.00	1	06/08/2020 00:30	WG1486748
Selenium	ND		0.00200	1	06/08/2020 15:38	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:30	WG1486748
Sodium	2.62		2.00	1	06/08/2020 00:30	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:30	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:30	WG1486748
Zinc	ND		0.0250	1	06/08/2020 00:30	WG1486748

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	06/06/2020 00:06	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 00:06	WG1487790
Benzene	ND		0.00100	1	06/06/2020 00:06	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 00:06	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 00:06	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 00:06	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 00:06	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 00:06	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 00:06	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 00:06	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 00:06	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 00:06	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 00:06	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 00:06	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 00:06	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 00:06	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 00:06	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 00:06	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 00:06	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 00:06	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 00:06	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 00:06	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 00:06	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 00:06	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 00:06	WG1487790
Styrene	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 00:06	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 00:06	WG1487790
Toluene	ND		0.00100	1	06/06/2020 00:06	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 00:06	WG1487790

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	06/06/2020 00:06	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 00:06	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 00:06	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 00:06	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 00:06	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 00:06	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 00:06	WG1487790
(S) Toluene-d8	*110*		*80.0-120*		*06/06/2020 00:06*	WG1487790
(S) 4-Bromofluorobenzene	*94.7*		*77.0-126*		*06/06/2020 00:06*	WG1487790
(S) 1,2-Dichloroethane-d4	*115*		*70.0-130*		*06/06/2020 00:06*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 10:12	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 10:12	WG1487526

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

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	71.7		2.50	1	06/08/2020 00:34	WG1486748

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	06/07/2020 19:03	WG1486929

Sample Narrative:
L1224773-02 WG1486929: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	06/08/2020 21:59	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:24	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/03/2020 22:22	WG1486662
Chloride	23.9		1.00	1	06/03/2020 22:22	WG1486662
Fluoride	0.218		0.150	1	06/03/2020 22:22	WG1486662
Nitrate	0.340	P1	0.100	1	06/03/2020 22:22	WG1486662
Sulfate	28.9		5.00	1	06/03/2020 22:22	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 13:09	WG1486727

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 05:34	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.101		0.100	1	06/08/2020 00:34	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:34	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:34	WG1486748
Barium	0.0816		0.0200	1	06/08/2020 00:34	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:34	WG1486748
Cadmium	0.00278		0.00100	1	06/08/2020 00:34	WG1486748
Calcium	18.5		1.00	1	06/08/2020 00:34	WG1486748
Chromium	ND		0.00200	1	06/08/2020 00:34	WG1486748
Cobalt	0.00401		0.00200	1	06/08/2020 00:34	WG1486748
Copper	ND		0.00500	1	06/08/2020 00:34	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.302		0.100	1	06/08/2020 00:34	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:34	WG1486748
Magnesium	6.20		1.00	1	06/08/2020 00:34	WG1486748
Manganese	0.636		0.00500	1	06/08/2020 00:34	WG1486748
Nickel	0.00564		0.00200	1	06/08/2020 00:34	WG1486748
Potassium	4.57		2.00	1	06/08/2020 00:34	WG1486748
Selenium	ND		0.00200	1	06/08/2020 15:42	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:34	WG1486748
Sodium	7.38		2.00	1	06/08/2020 00:34	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:34	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:34	WG1486748
Zinc	0.0295		0.0250	1	06/08/2020 00:34	WG1486748

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	06/06/2020 00:26	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 00:26	WG1487790
Benzene	ND		0.00100	1	06/06/2020 00:26	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 00:26	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 00:26	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 00:26	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 00:26	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 00:26	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 00:26	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 00:26	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 00:26	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 00:26	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 00:26	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 00:26	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 00:26	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 00:26	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 00:26	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 00:26	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 00:26	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 00:26	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 00:26	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 00:26	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 00:26	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 00:26	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 00:26	WG1487790
Styrene	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 00:26	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 00:26	WG1487790
Toluene	ND		0.00100	1	06/06/2020 00:26	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 00:26	WG1487790

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	06/06/2020 00:26	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 00:26	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 00:26	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 00:26	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 00:26	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 00:26	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 00:26	WG1487790
(S) Toluene-d8	*108*		*80.0-120*		*06/06/2020 00:26*	WG1487790
(S) 4-Bromofluorobenzene	*94.9*		*77.0-126*		*06/06/2020 00:26*	WG1487790
(S) 1,2-Dichloroethane-d4	*113*		*70.0-130*		*06/06/2020 00:26*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 10:59	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 10:59	WG1487526

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

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	22.6		2.50	1	06/08/2020 00:37	WG1486748

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	21.5		20.0	1	06/07/2020 19:10	WG1486929

Sample Narrative:
L1224773-03 WG1486929: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	06/08/2020 22:02	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:25	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/03/2020 23:27	WG1486662
Chloride	8.75		1.00	1	06/03/2020 23:27	WG1486662
Fluoride	ND		0.150	1	06/03/2020 23:27	WG1486662
Nitrate	0.301		0.100	1	06/03/2020 23:27	WG1486662
Sulfate	ND		5.00	1	06/03/2020 23:27	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 13:11	WG1486727

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 05:37	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	06/08/2020 00:37	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:37	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:37	WG1486748
Barium	ND		0.0200	1	06/08/2020 00:37	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:37	WG1486748
Cadmium	ND		0.00100	1	06/08/2020 00:37	WG1486748
Calcium	4.79		1.00	1	06/08/2020 00:37	WG1486748
Chromium	0.00208		0.00200	1	06/08/2020 00:37	WG1486748
Cobalt	ND		0.00200	1	06/08/2020 00:37	WG1486748
Copper	0.00536		0.00500	1	06/08/2020 00:37	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.162		0.100	1	06/08/2020 00:37	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:37	WG1486748
Magnesium	2.59		1.00	1	06/08/2020 00:37	WG1486748
Manganese	0.0215		0.00500	1	06/08/2020 00:37	WG1486748
Nickel	ND		0.00200	1	06/08/2020 00:37	WG1486748
Potassium	ND		2.00	1	06/08/2020 00:37	WG1486748
Potassium,Dissolved	ND		2.00	1	06/04/2020 16:37	WG1485474
Selenium	ND		0.00200	1	06/08/2020 16:01	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:37	WG1486748
Sodium	3.24		2.00	1	06/08/2020 00:37	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:37	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:37	WG1486748
Zinc	ND		0.0250	1	06/08/2020 00:37	WG1486748

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	06/06/2020 00:47	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 00:47	WG1487790
Benzene	ND		0.00100	1	06/06/2020 00:47	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 00:47	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 00:47	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 00:47	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 00:47	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 00:47	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 00:47	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 00:47	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 00:47	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 00:47	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 00:47	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 00:47	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 00:47	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 00:47	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 00:47	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 00:47	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 00:47	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 00:47	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 00:47	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 00:47	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 00:47	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 00:47	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 00:47	WG1487790
Styrene	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 00:47	WG1487790
Toluene	ND		0.00100	1	06/06/2020 00:47	WG1487790

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
1,1,2-Trichloroethane	ND		0.00100	1	06/06/2020 00:47	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 00:47	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 00:47	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 00:47	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 00:47	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 00:47	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 00:47	WG1487790
(S) Toluene-d8	*113*		*80.0-120*		*06/06/2020 00:47*	WG1487790
(S) 4-Bromofluorobenzene	*96.4*		*77.0-126*		*06/06/2020 00:47*	WG1487790
(S) 1,2-Dichloroethane-d4	*116*		*70.0-130*		*06/06/2020 00:47*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 11:11	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 11:11	WG1487526

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

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	92.1		2.50	1	06/08/2020 00:41	WG1486748

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	06/07/2020 19:17	WG1486929

Sample Narrative:
L1224773-04 WG1486929: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	06/08/2020 22:04	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:26	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/03/2020 23:38	WG1486662
Chloride	83.2		1.00	1	06/03/2020 23:38	WG1486662
Fluoride	ND		0.150	1	06/03/2020 23:38	WG1486662
Nitrate	1.31		0.100	1	06/03/2020 23:38	WG1486662
Sulfate	9.29		5.00	1	06/03/2020 23:38	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 13:13	WG1486727

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 05:40	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.171		0.100	1	06/08/2020 00:41	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:41	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:41	WG1486748
Barium	0.0589		0.0200	1	06/08/2020 00:41	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:41	WG1486748
Cadmium	ND		0.00100	1	06/08/2020 00:41	WG1486748
Calcium	17.1		1.00	1	06/08/2020 00:41	WG1486748
Chromium	0.00608		0.00200	1	06/08/2020 00:41	WG1486748
Cobalt	0.00204		0.00200	1	06/08/2020 00:41	WG1486748
Copper	0.00528		0.00500	1	06/08/2020 00:41	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.483		0.100	1	06/08/2020 00:41	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:41	WG1486748
Magnesium	12.0		1.00	1	06/08/2020 00:41	WG1486748
Manganese	0.224		0.00500	1	06/08/2020 00:41	WG1486748
Nickel	0.00651		0.00200	1	06/08/2020 00:41	WG1486748
Potassium	ND		2.00	1	06/08/2020 00:41	WG1486748
Selenium	ND		0.00200	1	06/08/2020 16:05	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:41	WG1486748
Sodium	18.7		2.00	1	06/08/2020 00:41	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:41	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:41	WG1486748
Zinc	ND		0.0250	1	06/08/2020 00:41	WG1486748

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	06/06/2020 01:08	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 01:08	WG1487790
Benzene	ND		0.00100	1	06/06/2020 01:08	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 01:08	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 01:08	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 01:08	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 01:08	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 01:08	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 01:08	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 01:08	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 01:08	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 01:08	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 01:08	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 01:08	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 01:08	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 01:08	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 01:08	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 01:08	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 01:08	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 01:08	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 01:08	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 01:08	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 01:08	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 01:08	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 01:08	WG1487790
Styrene	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 01:08	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 01:08	WG1487790
Toluene	ND		0.00100	1	06/06/2020 01:08	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 01:08	WG1487790

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	06/06/2020 01:08	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 01:08	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 01:08	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 01:08	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 01:08	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 01:08	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 01:08	WG1487790
(S) Toluene-d8	*107*		*80.0-120*		*06/06/2020 01:08*	WG1487790
(S) 4-Bromofluorobenzene	*95.3*		*77.0-126*		*06/06/2020 01:08*	WG1487790
(S) 1,2-Dichloroethane-d4	*114*		*70.0-130*		*06/06/2020 01:08*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 11:23	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 11:23	WG1487526

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	38.4		2.50	1	06/08/2020 00:44	WG1486748

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	06/07/2020 19:32	WG1486929

Sample Narrative:
L1224773-05 WG1486929: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	06/08/2020 22:07	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:26	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/03/2020 23:49	WG1486662
Chloride	21.1		1.00	1	06/03/2020 23:49	WG1486662
Fluoride	ND		0.150	1	06/03/2020 23:49	WG1486662
Nitrate	1.22		0.100	1	06/03/2020 23:49	WG1486662
Sulfate	ND		5.00	1	06/03/2020 23:49	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 11:10	WG1486727

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 04:25	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	06/08/2020 00:44	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:44	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:44	WG1486748
Barium	ND		0.0200	1	06/08/2020 00:44	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:44	WG1486748
Cadmium	ND		0.00100	1	06/08/2020 00:44	WG1486748
Calcium	10.7		1.00	1	06/08/2020 00:44	WG1486748
Chromium	ND		0.00200	1	06/08/2020 00:44	WG1486748
Cobalt	ND		0.00200	1	06/08/2020 00:44	WG1486748
Copper	ND		0.00500	1	06/08/2020 00:44	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.145		0.100	1	06/08/2020 00:44	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:44	WG1486748
Magnesium	2.87		1.00	1	06/08/2020 00:44	WG1486748
Manganese	0.0112		0.00500	1	06/08/2020 00:44	WG1486748
Nickel	ND		0.00200	1	06/08/2020 00:44	WG1486748
Potassium	ND		2.00	1	06/08/2020 00:44	WG1486748
Selenium	ND		0.00200	1	06/08/2020 16:08	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:44	WG1486748
Sodium	3.25		2.00	1	06/08/2020 00:44	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:44	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:44	WG1486748
Zinc	ND		0.0250	1	06/08/2020 00:44	WG1486748

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	06/06/2020 01:28	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 01:28	WG1487790
Benzene	ND		0.00100	1	06/06/2020 01:28	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 01:28	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 01:28	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 01:28	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 01:28	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 01:28	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 01:28	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 01:28	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 01:28	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 01:28	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 01:28	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 01:28	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 01:28	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 01:28	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 01:28	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 01:28	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 01:28	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 01:28	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 01:28	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 01:28	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 01:28	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 01:28	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 01:28	WG1487790
Styrene	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 01:28	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 01:28	WG1487790
Toluene	ND		0.00100	1	06/06/2020 01:28	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 01:28	WG1487790

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	06/06/2020 01:28	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 01:28	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 01:28	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 01:28	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 01:28	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 01:28	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 01:28	WG1487790
(S) Toluene-d8	*113*		*80.0-120*		*06/06/2020 01:28*	WG1487790
(S) 4-Bromofluorobenzene	*97.2*		*77.0-126*		*06/06/2020 01:28*	WG1487790
(S) 1,2-Dichloroethane-d4	*112*		*70.0-130*		*06/06/2020 01:28*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 11:34	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 11:34	WG1487526

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	47.7		2.50	1	06/08/2020 00:47	WG1486748

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	06/07/2020 19:40	WG1486929

Sample Narrative:

L1224773-06 WG1486929: 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		0.250	1	06/08/2020 22:11	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:26	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/04/2020 00:00	WG1486662
Chloride	34.6		1.00	1	06/04/2020 00:00	WG1486662
Fluoride	ND		0.150	1	06/04/2020 00:00	WG1486662
Nitrate	0.573		0.100	1	06/04/2020 00:00	WG1486662
Sulfate	ND		5.00	1	06/04/2020 00:00	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 19:25	WG1486728

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 04:28	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.410		0.100	1	06/08/2020 00:47	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:47	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:47	WG1486748
Barium	0.0330		0.0200	1	06/08/2020 00:47	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:47	WG1486748
Cadmium	ND		0.00100	1	06/08/2020 00:47	WG1486748
Calcium	12.1		1.00	1	06/08/2020 00:47	WG1486748
Chromium	ND		0.00200	1	06/08/2020 00:47	WG1486748
Cobalt	ND		0.00200	1	06/08/2020 00:47	WG1486748
Copper	ND		0.00500	1	06/08/2020 00:47	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.317		0.100	1	06/08/2020 00:47	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:47	WG1486748
Magnesium	4.26		1.00	1	06/08/2020 00:47	WG1486748
Manganese	0.00576		0.00500	1	06/08/2020 00:47	WG1486748
Nickel	ND		0.00200	1	06/08/2020 00:47	WG1486748
Potassium	ND		2.00	1	06/08/2020 00:47	WG1486748
Selenium	ND		0.00200	1	06/08/2020 16:12	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:47	WG1486748
Sodium	4.31		2.00	1	06/08/2020 00:47	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:47	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:47	WG1486748
Zinc	ND		0.0250	1	06/08/2020 00:47	WG1486748

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	06/06/2020 01:49	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 01:49	WG1487790
Benzene	ND		0.00100	1	06/06/2020 01:49	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 01:49	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 01:49	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 01:49	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 01:49	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 01:49	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 01:49	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 01:49	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 01:49	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 01:49	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 01:49	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 01:49	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 01:49	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 01:49	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 01:49	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 01:49	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 01:49	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 01:49	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 01:49	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 01:49	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 01:49	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 01:49	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 01:49	WG1487790
Styrene	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 01:49	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 01:49	WG1487790
Toluene	ND		0.00100	1	06/06/2020 01:49	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 01:49	WG1487790

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	06/06/2020 01:49	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 01:49	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 01:49	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 01:49	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 01:49	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 01:49	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 01:49	WG1487790
(S) Toluene-d8	*111*		*80.0-120*		*06/06/2020 01:49*	WG1487790
(S) 4-Bromofluorobenzene	*97.3*		*77.0-126*		*06/06/2020 01:49*	WG1487790
(S) 1,2-Dichloroethane-d4	*114*		*70.0-130*		*06/06/2020 01:49*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 11:46	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 11:46	WG1487526

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

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	77.8		2.50	1	06/08/2020 00:51	WG1486748

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	06/07/2020 19:47	WG1486929

Sample Narrative:
L1224773-07 WG1486929: 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		0.250	1	06/08/2020 22:19	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:26	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/04/2020 00:11	WG1486662
Chloride	62.7		1.00	1	06/04/2020 00:11	WG1486662
Fluoride	ND		0.150	1	06/04/2020 00:11	WG1486662
Nitrate	4.57		0.100	1	06/04/2020 00:11	WG1486662
Sulfate	ND		5.00	1	06/04/2020 00:11	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 19:27	WG1486728

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 04:30	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	06/08/2020 00:51	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:51	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:51	WG1486748
Barium	0.0431		0.0200	1	06/08/2020 00:51	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:51	WG1486748
Cadmium	ND		0.00100	1	06/08/2020 00:51	WG1486748
Calcium	20.5		1.00	1	06/08/2020 00:51	WG1486748
Chromium	ND		0.00200	1	06/08/2020 00:51	WG1486748
Cobalt	ND		0.00200	1	06/08/2020 00:51	WG1486748
Copper	ND		0.00500	1	06/08/2020 00:51	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	06/08/2020 00:51	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:51	WG1486748
Magnesium	6.45		1.00	1	06/08/2020 00:51	WG1486748
Manganese	0.00869		0.00500	1	06/08/2020 00:51	WG1486748
Nickel	ND		0.00200	1	06/08/2020 00:51	WG1486748
Potassium	ND		2.00	1	06/08/2020 00:51	WG1486748
Selenium	ND		0.00200	1	06/08/2020 16:15	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:51	WG1486748
Sodium	12.1		2.00	1	06/08/2020 00:51	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:51	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:51	WG1486748
Zinc	ND		0.0250	1	06/08/2020 00:51	WG1486748

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	06/06/2020 02:09	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 02:09	WG1487790
Benzene	ND		0.00100	1	06/06/2020 02:09	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 02:09	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 02:09	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 02:09	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 02:09	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 02:09	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 02:09	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 02:09	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 02:09	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 02:09	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 02:09	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 02:09	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 02:09	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 02:09	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 02:09	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 02:09	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 02:09	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 02:09	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 02:09	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 02:09	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 02:09	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 02:09	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 02:09	WG1487790
Styrene	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 02:09	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 02:09	WG1487790
Toluene	ND		0.00100	1	06/06/2020 02:09	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 02:09	WG1487790

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	06/06/2020 02:09	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 02:09	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 02:09	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 02:09	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 02:09	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 02:09	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 02:09	WG1487790
(S) Toluene-d8	*109*		*80.0-120*		*06/06/2020 02:09*	WG1487790
(S) 4-Bromofluorobenzene	*95.2*		*77.0-126*		*06/06/2020 02:09*	WG1487790
(S) 1,2-Dichloroethane-d4	*114*		*70.0-130*		*06/06/2020 02:09*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 11:58	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 11:58	WG1487526

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

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	73.5		2.50	1	06/08/2020 00:54	WG1486748

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	42.0		20.0	1	06/07/2020 19:53	WG1486929

Sample Narrative:
L1224773-08 WG1486929: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	06/08/2020 22:21	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:26	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/04/2020 00:22	WG1486662
Chloride	24.2		1.00	1	06/04/2020 00:22	WG1486662
Fluoride	0.221		0.150	1	06/04/2020 00:22	WG1486662
Nitrate	0.384	Q	0.100	1	06/04/2020 00:22	WG1486662
Sulfate	29.7		5.00	1	06/04/2020 00:22	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 19:33	WG1486728

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 04:33	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.110		0.100	1	06/08/2020 00:54	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:54	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:54	WG1486748
Barium	0.0815		0.0200	1	06/08/2020 00:54	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:54	WG1486748
Cadmium	0.00261		0.00100	1	06/08/2020 00:54	WG1486748
Calcium	18.9		1.00	1	06/08/2020 00:54	WG1486748
Chromium	0.00281		0.00200	1	06/08/2020 00:54	WG1486748
Cobalt	0.00421		0.00200	1	06/08/2020 00:54	WG1486748
Copper	0.00523		0.00500	1	06/08/2020 00:54	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.305		0.100	1	06/08/2020 00:54	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:54	WG1486748
Magnesium	6.39		1.00	1	06/08/2020 00:54	WG1486748
Manganese	0.641		0.00500	1	06/08/2020 00:54	WG1486748
Nickel	0.00638		0.00200	1	06/08/2020 00:54	WG1486748
Potassium	4.63		2.00	1	06/08/2020 00:54	WG1486748
Selenium	ND		0.00200	1	06/08/2020 16:19	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:54	WG1486748
Sodium	7.34		2.00	1	06/08/2020 00:54	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:54	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:54	WG1486748
Zinc	0.0290		0.0250	1	06/08/2020 00:54	WG1486748

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	06/06/2020 02:30	WG1487790
Acrylonitrile	ND		0.0100	1	06/06/2020 02:30	WG1487790
Benzene	ND		0.00100	1	06/06/2020 02:30	WG1487790
Bromochloromethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
Bromodichloromethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
Bromoform	ND		0.00100	1	06/06/2020 02:30	WG1487790
Bromomethane	ND		0.00500	1	06/06/2020 02:30	WG1487790
Carbon disulfide	ND		0.00100	1	06/06/2020 02:30	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/06/2020 02:30	WG1487790
Chlorobenzene	ND		0.00100	1	06/06/2020 02:30	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
Chloroethane	ND		0.00500	1	06/06/2020 02:30	WG1487790
Chloroform	ND		0.00500	1	06/06/2020 02:30	WG1487790
Chloromethane	ND		0.00250	1	06/06/2020 02:30	WG1487790
Dibromomethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/06/2020 02:30	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/06/2020 02:30	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/06/2020 02:30	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/06/2020 02:30	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 02:30	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/06/2020 02:30	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 02:30	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/06/2020 02:30	WG1487790
Ethylbenzene	ND		0.00100	1	06/06/2020 02:30	WG1487790
2-Hexanone	ND		0.0100	1	06/06/2020 02:30	WG1487790
Iodomethane	ND		0.0100	1	06/06/2020 02:30	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/06/2020 02:30	WG1487790
Methylene Chloride	ND		0.00500	1	06/06/2020 02:30	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/06/2020 02:30	WG1487790
Styrene	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/06/2020 02:30	WG1487790
Tetrachloroethene	ND		0.00100	1	06/06/2020 02:30	WG1487790
Toluene	ND		0.00100	1	06/06/2020 02:30	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/06/2020 02:30	WG1487790

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	06/06/2020 02:30	WG1487790
Trichloroethene	ND		0.00100	1	06/06/2020 02:30	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/06/2020 02:30	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/06/2020 02:30	WG1487790
Vinyl acetate	ND		0.0100	1	06/06/2020 02:30	WG1487790
Vinyl chloride	ND		0.00100	1	06/06/2020 02:30	WG1487790
Xylenes, Total	ND		0.00300	1	06/06/2020 02:30	WG1487790
(S) Toluene-d8	*110*		*80.0-120*		*06/06/2020 02:30*	WG1487790
(S) 4-Bromofluorobenzene	*94.0*		*77.0-126*		*06/06/2020 02:30*	WG1487790
(S) 1,2-Dichloroethane-d4	*117*		*70.0-130*		*06/06/2020 02:30*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 12:10	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 12:10	WG1487526

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

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	ND		2.50	1	06/08/2020 00:58	WG1486748

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	06/07/2020 20:00	WG1486929

Sample Narrative:
L1224773-09 WG1486929: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	06/08/2020 22:22	WG1489079

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		20.0	1	06/10/2020 13:26	WG1489888

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	06/04/2020 00:33	WG1486662
Chloride	ND		1.00	1	06/04/2020 00:33	WG1486662
Fluoride	ND		0.150	1	06/04/2020 00:33	WG1486662
Nitrate	ND		0.100	1	06/04/2020 00:33	WG1486662
Sulfate	ND		5.00	1	06/04/2020 00:33	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 19:35	WG1486728

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 04:36	WG1486745

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	06/08/2020 00:58	WG1486748
Antimony	ND		0.00400	1	06/08/2020 00:58	WG1486748
Arsenic	ND		0.00200	1	06/08/2020 00:58	WG1486748
Barium	ND		0.0200	1	06/08/2020 00:58	WG1486748
Beryllium	ND		0.00200	1	06/08/2020 00:58	WG1486748
Cadmium	ND		0.00100	1	06/08/2020 00:58	WG1486748
Calcium	ND		1.00	1	06/08/2020 00:58	WG1486748
Chromium	ND		0.00200	1	06/08/2020 00:58	WG1486748
Cobalt	ND		0.00200	1	06/08/2020 00:58	WG1486748
Copper	ND		0.00500	1	06/08/2020 00:58	WG1486748

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	06/08/2020 00:58	WG1486748
Lead	ND		0.00500	1	06/08/2020 00:58	WG1486748
Magnesium	ND		1.00	1	06/08/2020 00:58	WG1486748
Manganese	ND		0.00500	1	06/08/2020 00:58	WG1486748
Nickel	ND		0.00200	1	06/08/2020 00:58	WG1486748
Potassium	ND		2.00	1	06/08/2020 00:58	WG1486748
Selenium	ND		0.00200	1	06/08/2020 16:22	WG1486748
Silver	ND		0.00200	1	06/08/2020 00:58	WG1486748
Sodium	ND		2.00	1	06/08/2020 00:58	WG1486748
Thallium	ND		0.00200	1	06/08/2020 00:58	WG1486748
Vanadium	ND		0.00500	1	06/08/2020 00:58	WG1486748
Zinc	ND		0.0250	1	06/08/2020 00:58	WG1486748

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	06/05/2020 20:20	WG1487790
Acrylonitrile	ND		0.0100	1	06/05/2020 20:20	WG1487790
Benzene	ND		0.00100	1	06/05/2020 20:20	WG1487790
Bromochloromethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
Bromodichloromethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
Bromoform	ND		0.00100	1	06/05/2020 20:20	WG1487790
Bromomethane	ND		0.00500	1	06/05/2020 20:20	WG1487790
Carbon disulfide	ND		0.00100	1	06/05/2020 20:20	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/05/2020 20:20	WG1487790
Chlorobenzene	ND		0.00100	1	06/05/2020 20:20	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
Chloroethane	ND		0.00500	1	06/05/2020 20:20	WG1487790
Chloroform	ND		0.00500	1	06/05/2020 20:20	WG1487790
Chloromethane	ND		0.00250	1	06/05/2020 20:20	WG1487790
Dibromomethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/05/2020 20:20	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/05/2020 20:20	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/05/2020 20:20	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/05/2020 20:20	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/05/2020 20:20	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/05/2020 20:20	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/05/2020 20:20	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/05/2020 20:20	WG1487790
Ethylbenzene	ND		0.00100	1	06/05/2020 20:20	WG1487790
2-Hexanone	ND		0.0100	1	06/05/2020 20:20	WG1487790
Iodomethane	ND		0.0100	1	06/05/2020 20:20	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/05/2020 20:20	WG1487790
Methylene Chloride	ND		0.00500	1	06/05/2020 20:20	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/05/2020 20:20	WG1487790
Styrene	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/05/2020 20:20	WG1487790
Tetrachloroethene	ND		0.00100	1	06/05/2020 20:20	WG1487790
Toluene	ND		0.00100	1	06/05/2020 20:20	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/05/2020 20:20	WG1487790

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	06/05/2020 20:20	WG1487790
Trichloroethene	ND		0.00100	1	06/05/2020 20:20	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/05/2020 20:20	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/05/2020 20:20	WG1487790
Vinyl acetate	ND		0.0100	1	06/05/2020 20:20	WG1487790
Vinyl chloride	ND		0.00100	1	06/05/2020 20:20	WG1487790
Xylenes, Total	ND		0.00300	1	06/05/2020 20:20	WG1487790
(S) Toluene-d8	*110*		*80.0-120*		*06/05/2020 20:20*	WG1487790
(S) 4-Bromofluorobenzene	*96.9*		*77.0-126*		*06/05/2020 20:20*	WG1487790
(S) 1,2-Dichloroethane-d4	*114*		*70.0-130*		*06/05/2020 20:20*	WG1487790

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 12:33	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 12:33	WG1487526

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acetone	ND		0.0500	1	06/05/2020 20:41	WG1487790
Acrylonitrile	ND		0.0100	1	06/05/2020 20:41	WG1487790
Benzene	ND		0.00100	1	06/05/2020 20:41	WG1487790
Bromochloromethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
Bromodichloromethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
Bromoform	ND		0.00100	1	06/05/2020 20:41	WG1487790
Bromomethane	ND		0.00500	1	06/05/2020 20:41	WG1487790
Carbon disulfide	ND		0.00100	1	06/05/2020 20:41	WG1487790
Carbon tetrachloride	ND		0.00100	1	06/05/2020 20:41	WG1487790
Chlorobenzene	ND		0.00100	1	06/05/2020 20:41	WG1487790
Chlorodibromomethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
Chloroethane	ND		0.00500	1	06/05/2020 20:41	WG1487790
Chloroform	ND		0.00500	1	06/05/2020 20:41	WG1487790
Chloromethane	ND		0.00250	1	06/05/2020 20:41	WG1487790
Dibromomethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	06/05/2020 20:41	WG1487790
1,2-Dibromoethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,2-Dichlorobenzene	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,4-Dichlorobenzene	ND		0.00100	1	06/05/2020 20:41	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.00250	1	06/05/2020 20:41	WG1487790
1,1-Dichloroethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,2-Dichloroethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,1-Dichloroethene	ND		0.00100	1	06/05/2020 20:41	WG1487790
cis-1,2-Dichloroethene	ND		0.00100	1	06/05/2020 20:41	WG1487790
trans-1,2-Dichloroethene	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,2-Dichloropropane	ND		0.00100	1	06/05/2020 20:41	WG1487790
cis-1,3-Dichloropropene	ND		0.00100	1	06/05/2020 20:41	WG1487790
trans-1,3-Dichloropropene	ND		0.00100	1	06/05/2020 20:41	WG1487790
Ethylbenzene	ND		0.00100	1	06/05/2020 20:41	WG1487790
2-Hexanone	ND		0.0100	1	06/05/2020 20:41	WG1487790
Iodomethane	ND		0.0100	1	06/05/2020 20:41	WG1487790
2-Butanone (MEK)	ND		0.0100	1	06/05/2020 20:41	WG1487790
Methylene Chloride	ND		0.00500	1	06/05/2020 20:41	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	06/05/2020 20:41	WG1487790
Styrene	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
Tetrachloroethene	ND		0.00100	1	06/05/2020 20:41	WG1487790
Toluene	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,1,1-Trichloroethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
1,1,2-Trichloroethane	ND		0.00100	1	06/05/2020 20:41	WG1487790
Trichloroethene	ND		0.00100	1	06/05/2020 20:41	WG1487790
Trichlorofluoromethane	ND		0.00500	1	06/05/2020 20:41	WG1487790
1,2,3-Trichloropropane	ND		0.00250	1	06/05/2020 20:41	WG1487790
Vinyl acetate	ND		0.0100	1	06/05/2020 20:41	WG1487790
Vinyl chloride	ND		0.00100	1	06/05/2020 20:41	WG1487790
Xylenes, Total	ND		0.00300	1	06/05/2020 20:41	WG1487790
(S) Toluene-d8	*111*		*80.0-120*		*06/05/2020 20:41*	WG1487790
(S) 4-Bromofluorobenzene	*96.9*		*77.0-126*		*06/05/2020 20:41*	WG1487790
(S) 1,2-Dichloroethane-d4	*113*		*70.0-130*		*06/05/2020 20:41*	WG1487790

Method Blank (MB)

(MB) R3535923-1 06/07/20 18:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity	U		8.45	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

Original Sample (OS) • Duplicate (DUP)

(OS) • (DUP) R3535923-2 06/07/20 18:33

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

Sample Narrative:

DUP: Endpoint pH 4.5

Original Sample (OS) • Duplicate (DUP)

(OS) • (DUP) R3535923-4 06/07/20 20:43

Analyte	Original Result	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity		68.3	1	0.0381		20

Sample Narrative:

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3535923-3 06/07/20 19:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	101	101	85.0-115	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3536389-1 06/08/20 21:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ammonia Nitrogen	U		0.117	0.250

L1224773-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1224773-02 06/08/20 21:59 • (DUP) R3536389-5 06/08/20 22:01

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	ND	1	9.04		10

L1224773-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1224773-05 06/08/20 22:07 • (DUP) R3536389-7 06/08/20 22:09

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

Laboratory Control Sample (LCS)

(LCS) R3536389-2 06/08/20 21:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7.50	7.41	98.8	90.0-110	

L1224773-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1224773-01 06/08/20 21:49 • (MS) R3536389-3 06/08/20 21:56 • (MSD) R3536389-4 06/08/20 21:57

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5.00	ND	5.15	5.18	103	104	1	90.0-110			0.445	10

L1224773-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L1224773-04 06/08/20 22:04 • (MS) R3536389-6 06/08/20 22:06

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	4.96	99.3	1	90.0-110	

Method Blank (MB)

(MB) R3537033-1 06/10/20 13:20

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
COD	U		11.7	20.0

L1224554-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1224554-01 06/10/20 13:20 • (DUP) R3537033-3 06/10/20 13:20

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	67.9	72.2	1	6.12		20

L1224773-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1224773-03 06/10/20 13:25 • (DUP) R3537033-6 06/10/20 13:25

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

Laboratory Control Sample (LCS)

(LCS) R3537033-2 06/10/20 13:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	222	220	99.2	90.0-110	

L1224603-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1224603-01 06/10/20 13:22 • (MS) R3537033-4 06/10/20 13:22 • (MSD) R3537033-5 06/10/20 13:22

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 %
COD	400	73.0	502	488	107	104	1	80.0-120			2.84	20

Method Blank (MB)

(MB) R3534976-1 06/03/20 20:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.353	1.00
Chloride	U		0.379	1.00
Fluoride	U		0.0640	0.150
Nitrate	U		0.0480	0.100
Sulfate	U		0.594	5.00

L1224773-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1224773-02 06/03/20 22:22 • (DUP) R3534976-3 06/03/20 22:33

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	ND	1	0.000		15
Chloride	23.9	23.9	1	0.0930		15
Fluoride	0.218	0.227	1	4.00		15
Nitrate	0.340	0.406	1	17.7	P1	15
Sulfate	28.9	29.0	1	0.493		15

L1224773-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1224773-09 06/04/20 00:33 • (DUP) R3534976-6 06/04/20 00:44

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	ND	1	0.000		15
Chloride	ND	ND	1	0.000		15
Fluoride	ND	ND	1	0.000		15
Nitrate	ND	ND	1	1.78		15
Sulfate	ND	ND	1	0.000		15

Laboratory Control Sample (LCS)

(LCS) R3534976-2 06/03/20 20:36

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	38.9	97.3	80.0-120	
Fluoride	8.00	8.06	101	80.0-120	
Nitrate	8.00	7.78	97.3	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3534976-2 06/03/20 20:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	38.0	95.0	80.0-120	

L1224773-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1224773-02 06/03/20 22:22 • (MS) R3534976-4 06/03/20 22:44 • (MSD) R3534976-5 06/03/20 23:17

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 %
Bromide	50.0	ND	48.5	48.6	97.0	97.2	1	80.0-120			0.239	15
Chloride	50.0	23.9	72.4	72.2	97.1	96.6	1	80.0-120			0.360	15
Fluoride	5.00	0.218	5.23	5.22	100	100	1	80.0-120			0.214	15
Nitrate	5.00	0.340	5.62	5.63	106	106	1	80.0-120			0.229	15
Sulfate	50.0	28.9	76.5	76.2	95.3	94.7	1	80.0-120			0.394	15

L1224773-09 Original Sample (OS) • Matrix Spike (MS)

(OS) L1224773-09 06/04/20 00:33 • (MS) R3534976-7 06/04/20 00:54

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	51.3	103	1	80.0-120	
Chloride	50.0	ND	50.1	100	1	80.0-120	
Fluoride	5.00	ND	5.15	103	1	80.0-120	
Nitrate	5.00	ND	5.55	110	1	80.0-120	
Sulfate	50.0	ND	49.4	98.8	1	80.0-120	

Method Blank (MB)

(MB) R3535075-1 06/04/20 11:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3535075-2 06/04/20 11:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00310	103	80.0-120	

L1224773-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1224773-05 06/04/20 11:10 • (MS) R3535075-3 06/04/20 11:12 • (MSD) R3535075-4 06/04/20 11:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00330	0.00305	110	102	1	75.0-125			7.89	20

Method Blank (MB)

(MB) R3535229-1 06/04/20 18:52

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3535229-2 06/04/20 18:54

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00299	99.7	80.0-120	

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

(OS) • (MS) R3535229-3 06/04/20 18:57 • (MSD) R3535229-4 06/04/20 18:59

Analyte	Spike Amount mg/l	Original Result	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300		0.00312	0.00325	104	108	1	75.0-125			3.91	20

Method Blank (MB)

(MB) R3536954-1 06/10/20 04:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0254	0.200

Laboratory Control Sample (LCS)

(LCS) R3536954-2 06/10/20 04:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron	1.00	0.974	97.4	80.0-120	

Method Blank (MB)

(MB) R3535023-1 06/04/20 11:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Potassium,Dissolved	U		0.534	2.00

Laboratory Control Sample (LCS)

(LCS) R3535023-2 06/04/20 11:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Potassium,Dissolved	5.00	4.90	98.1	80.0-120	

Method Blank (MB)

(MB) R3536041-1 06/07/20 23:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	U		0.0554	0.100
Antimony	U		0.00132	0.00400
Arsenic	U		0.000735	0.00200
Barium	U		0.00778	0.0200
Beryllium	U		0.000454	0.00200
Cadmium	U		0.000478	0.00100
Calcium	U		0.480	1.00
Chromium	U		0.00149	0.00200
Copper	U		0.00250	0.00500
Cobalt	U		0.000477	0.00200
Iron	U		0.0489	0.100
Lead	U		0.00249	0.00500
Magnesium	U		0.465	1.00
Manganese	U		0.00132	0.00500
Nickel	U		0.000952	0.00200
Potassium	U		0.534	2.00
Silver	U		0.000513	0.00200
Sodium	U		0.630	2.00
Thallium	U		0.000460	0.00200
Vanadium	U		0.000986	0.00500
Zinc	U		0.00996	0.0250

Method Blank (MB)

(MB) R3536323-1 06/08/20 15:11

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Selenium	U		0.000657	0.00200

Laboratory Control Sample (LCS)

(LCS) R3536041-2 06/07/20 23:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Aluminum	5.00	4.42	88.4	80.0-120	
Antimony	0.0500	0.0449	89.8	80.0-120	
Arsenic	0.0500	0.0448	89.7	80.0-120	
Barium	0.0500	0.0458	91.6	80.0-120	
Beryllium	0.0500	0.0440	88.0	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3536041-2 06/07/20 23:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Cadmium	0.0500	0.0483	96.6	80.0-120	
Calcium	5.00	4.69	93.7	80.0-120	
Chromium	0.0500	0.0476	95.2	80.0-120	
Copper	0.0500	0.0534	107	80.0-120	
Cobalt	0.0500	0.0465	93.0	80.0-120	
Iron	5.00	4.56	91.3	80.0-120	
Lead	0.0500	0.0449	89.8	80.0-120	
Magnesium	5.00	4.44	88.8	80.0-120	
Manganese	0.0500	0.0459	91.8	80.0-120	
Nickel	0.0500	0.0482	96.5	80.0-120	
Potassium	5.00	4.49	89.7	80.0-120	
Silver	0.0500	0.0447	89.3	80.0-120	
Sodium	5.00	4.40	88.0	80.0-120	
Thallium	0.0500	0.0448	89.6	80.0-120	
Vanadium	0.0500	0.0452	90.4	80.0-120	
Zinc	0.500	0.456	91.1	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3536323-2 06/08/20 15:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Selenium	0.0500	0.0474	94.8	80.0-120	

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

(OS) • (MS) R3536041-4 06/07/20 23:55 • (MSD) R3536041-5 06/07/20 23:58

Analyte	Spike Amount mg/l	Original Result	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500		0.0458	0.0475	91.5	94.9	1	75.0-125			3.64	20
Arsenic	0.0500		0.0448	0.0452	89.5	90.3	1	75.0-125			0.914	20
Barium	0.0500		0.0961	0.0965	91.1	91.9	1	75.0-125			0.403	20
Beryllium	0.0500		0.0430	0.0438	86.0	87.6	1	75.0-125			1.91	20
Thallium	0.0500		0.0460	0.0470	92.1	94.0	1	75.0-125			2.02	20

Method Blank (MB)

(MB) R3535707-2 06/05/20 19:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0113	0.0500
Acrylonitrile	U		0.000671	0.0100
Benzene	U		0.0000941	0.00100
Bromodichloromethane	U		0.000136	0.00100
Bromochloromethane	U		0.000128	0.00100
Bromoform	U		0.000129	0.00100
Bromomethane	U		0.000605	0.00500
Carbon disulfide	U		0.0000962	0.00100
Carbon tetrachloride	U		0.000128	0.00100
Chlorobenzene	U		0.000116	0.00100
Chlorodibromomethane	U		0.000140	0.00100
Chloroethane	U		0.000192	0.00500
Chloroform	U		0.000111	0.00500
Chloromethane	U		0.000960	0.00250
1,2-Dibromo-3-Chloropropane	U		0.000276	0.00500
1,2-Dibromoethane	U		0.000126	0.00100
Dibromomethane	U		0.000122	0.00100
1,2-Dichlorobenzene	U		0.000107	0.00100
1,4-Dichlorobenzene	U		0.000120	0.00100
trans-1,4-Dichloro-2-butene	U		0.000467	0.00250
1,1-Dichloroethane	U		0.000100	0.00100
1,2-Dichloroethane	U		0.0000819	0.00100
1,1-Dichloroethene	U		0.000188	0.00100
cis-1,2-Dichloroethene	U		0.000126	0.00100
trans-1,2-Dichloroethene	U		0.000149	0.00100
1,2-Dichloropropane	U		0.000149	0.00100
cis-1,3-Dichloropropene	U		0.000111	0.00100
trans-1,3-Dichloropropene	U		0.000118	0.00100
Ethylbenzene	U		0.000137	0.00100
2-Hexanone	U		0.000787	0.0100
Iodomethane	U		0.00600	0.0100
2-Butanone (MEK)	U		0.00119	0.0100
Methylene Chloride	U		0.000430	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.000478	0.0100
Styrene	U		0.000118	0.00100
1,1,1,2-Tetrachloroethane	U		0.000147	0.00100
1,1,2,2-Tetrachloroethane	U		0.000133	0.00100
Tetrachloroethene	U		0.000300	0.00100
Toluene	U		0.000278	0.00100
1,1,1-Trichloroethane	U		0.000149	0.00100

Method Blank (MB)

(MB) R3535707-2 06/05/20 19:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,1,2-Trichloroethane	U		0.000158	0.00100
Trichloroethene	U		0.000190	0.00100
Trichlorofluoromethane	U		0.000160	0.00500
1,2,3-Trichloropropane	U		0.000237	0.00250
Vinyl acetate	U		0.000692	0.0100
Vinyl chloride	U		0.000234	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*112*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*113*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3535707-1 06/05/20 18:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	0.0250	0.0227	90.8	19.0-160	
Acrylonitrile	0.0250	0.0219	87.6	55.0-149	
Benzene	0.00500	0.00482	96.4	70.0-123	
Bromodichloromethane	0.00500	0.00458	91.6	75.0-120	
Bromochloromethane	0.00500	0.00486	97.2	76.0-122	
Bromoform	0.00500	0.00425	85.0	68.0-132	
Bromomethane	0.00500	0.00365	73.0	10.0-160	
Carbon disulfide	0.00500	0.00552	110	61.0-128	
Carbon tetrachloride	0.00500	0.00526	105	68.0-126	
Chlorobenzene	0.00500	0.00471	94.2	80.0-121	
Chlorodibromomethane	0.00500	0.00455	91.0	77.0-125	
Chloroethane	0.00500	0.00574	115	47.0-150	
Chloroform	0.00500	0.00478	95.6	73.0-120	
Chloromethane	0.00500	0.00398	79.6	41.0-142	
1,2-Dibromo-3-Chloropropane	0.00500	0.00377	75.4	58.0-134	
1,2-Dibromoethane	0.00500	0.00480	96.0	80.0-122	
Dibromomethane	0.00500	0.00525	105	80.0-120	
1,2-Dichlorobenzene	0.00500	0.00500	100	79.0-121	
1,4-Dichlorobenzene	0.00500	0.00505	101	79.0-120	
trans-1,4-Dichloro-2-butene	0.00500	0.00478	95.6	33.0-144	
1,1-Dichloroethane	0.00500	0.00536	107	70.0-126	
1,2-Dichloroethane	0.00500	0.00507	101	70.0-128	
1,1-Dichloroethene	0.00500	0.00557	111	71.0-124	

Laboratory Control Sample (LCS)

(LCS) R3535707-1 06/05/20 18:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	0.00500	0.00497	99.4	73.0-120	
trans-1,2-Dichloroethene	0.00500	0.00532	106	73.0-120	
1,2-Dichloropropane	0.00500	0.00496	99.2	77.0-125	
cis-1,3-Dichloropropene	0.00500	0.00493	98.6	80.0-123	
trans-1,3-Dichloropropene	0.00500	0.00484	96.8	78.0-124	
Ethylbenzene	0.00500	0.00474	94.8	79.0-123	
2-Hexanone	0.0250	0.0191	76.4	67.0-149	
Iodomethane	0.0250	0.0199	79.6	33.0-147	
2-Butanone (MEK)	0.0250	0.0213	85.2	44.0-160	
Methylene Chloride	0.00500	0.00487	97.4	67.0-120	
4-Methyl-2-pentanone (MIBK)	0.0250	0.0184	73.6	68.0-142	
Styrene	0.00500	0.00442	88.4	73.0-130	
1,1,1,2-Tetrachloroethane	0.00500	0.00457	91.4	75.0-125	
1,1,2,2-Tetrachloroethane	0.00500	0.00436	87.2	65.0-130	
Tetrachloroethene	0.00500	0.00524	105	72.0-132	
Toluene	0.00500	0.00457	91.4	79.0-120	
1,1,1-Trichloroethane	0.00500	0.00501	100	73.0-124	
1,1,2-Trichloroethane	0.00500	0.00493	98.6	80.0-120	
Trichloroethene	0.00500	0.00501	100	78.0-124	
Trichlorofluoromethane	0.00500	0.00664	133	59.0-147	
1,2,3-Trichloropropane	0.00500	0.00459	91.8	73.0-130	
Vinyl acetate	0.0250	0.0255	102	11.0-160	
Vinyl chloride	0.00500	0.00578	116	67.0-131	
Xylenes, Total	0.0150	0.0142	94.7	79.0-123	
(S) Toluene-d8			*109*	*80.0-120*	
(S) 4-Bromofluorobenzene			*97.2*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*112*	*70.0-130*	

Method Blank (MB)

(MB) R3536228-1 06/08/20 09:48

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ethylene Dibromide	U		0.00000536	0.0000200
1,2-Dibromo-3-Chloropropane	U		0.00000748	0.0000200

L1224702-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1224702-01 06/08/20 10:35 • (DUP) R3536228-3 06/08/20 10:24

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

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

(LCS) R3536228-4 06/08/20 12:21 • (LCSD) R3536228-5 06/08/20 14:31

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	0.000223	0.000209	89.2	83.6	60.0-140			6.48	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000216	0.000205	86.4	82.0	60.0-140			5.23	20

L1224773-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1224773-01 06/08/20 10:12 • (MS) R3536228-2 06/08/20 10:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ethylene Dibromide	0.000100	ND	0.000105	105	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.000100	ND	0.0000929	92.9	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.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

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
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
Q	Sample was prepared and/or analyzed past holding time as defined in the method. Concentrations should be considered minimum values.

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	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

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

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

Our Locations

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

Civil & Environmental Consultants - TN

117 Seaboard Ln.
Suite E100
Franklin, TN 37067

Billing Information:
Dr. Kevin Wolfe
117 Seaboard Ln.
Suite E100
Franklin, TN 37067

Report to: Philip Campbell

Email To: pcampbell@cecinc.com

Project Description: Former EWS Camden Class 2 Landfill

City/State Collected: Camden, TN

Please Circle: PT MT CT ET

Phone: 615-333-7797

Client Project # 181-364

Lab Project # CEC-181364

Collected by (print): A Black / Phillip Campbell

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	**WetChem** 250mlHDPE-NoPres	ALK 100ml Amb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss. Metals-FF 250mlHDPE-HNO3	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl	V8260AP1-Trip Blank 40mlAmb-HCl-Blk	Remarks	Sample # (lab only)
MW-1	G	GW		6/2	1100	11	X	X	X	X	X	X	X			-01
MW-3		GW		6/2	1600	11	X	X	X	X	X	X	X			-02
MW-4		GW		6/2	1450	11	X	X	X	X	X	X	X			-03
MW-5		GW		6/2	1350	11	X	X	X	X	X	X	X			-04
TMW-1		GW		6/2	1310	11	X	X	X	X	X	X	X			-05
TMW-2		GW		6/2	1500	11	X	X	X	X	X	X	X			-06
TMW-3		GW		6/2	1610	11	X	X	X	X	X	X	X			-07
DUPLICATE		GW		6/2	—	11	X	X	X	X	X	X	X			-08
FIELD BLANK	↓	GW		6/2	1625	10	X	X	X		X	X	X			-09
~~EQUIPMENT BLANK~~		GW				~~10~~	X	X	X		X	X	X			

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

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Fax: 615-758-5859

SDG # U224773

C050

Acctnum: CEC

Template: T133579

Prelogin: P776511

PM: 526 - Chris McCord

PB: 6/1/20 mvb

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
Tot/Diss Metals=M6020AP1+Al,Ca,Fe,K,Mg,Mn,Na,B(6010/7470).

pH _____ Temp _____

Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier X

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
RAD Screen <0.5 mR/hr:		Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	6/3/20	13:20	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No HCl / MeoH TBR

Temp: 1.6 / 1.1 °C Bottles Received: 90

4.4 - 1 = 4.3

Date: 6/3/20 Time: 1320

If preservation required by Login: Date/Time

Hold:

Condition NCF / OK

Civil & Environmental Consultants - TN

117 Seaboard Ln.
Suite E100
Franklin, TN 37067

Billing Information:
Dr. Kevin Wolfe
117 Seaboard Ln.
Suite E100
Franklin, TN 37067

Pres Chk

Report to: Philip Campbell

Email To: pcampbell@cecinc.com

Project Description: Former EWS Camden Class 2 Landfill

City/State Collected: Camden, TN

Please Circle: PT MT CT ET

Phone: 615-333-7797

Client Project # 181-364

Lab Project # CEC-181364

Collected by (print): Alex Black

Site/Facility ID # CAMDEN, TN

P.O. #

Collected by (signature):

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 100ml Amb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss. Metals-FF 250mlHDPE-HNO3	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl	V8260AP1-Trip Blank 40mlAmb-HCl-Blk			Remarks	Sample # (lab only)
TRIP BLANK	—	GW				2 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

SDG # L1224773

Table #

Acctnum: CEC

Template: T133579

Prelogin: P776511

PM: 526 - Chris McCord

PB: 6/1/20 MM

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
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:	MP	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
RAD Screen <0.5 mR/hr:		Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	6/3/20	13:20	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCl / MeoH
TBR

Temp: ~~A6~~ 4 °C Bottles Received: 90
FH
4.4.1=4.3

Date: 6/3/20 Time: 1320

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

June 12, 2020

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1224739
Samples Received:	06/03/2020
Project Number:	181-364
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 117 Seaboard Ln. Suite E100 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 Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

IWC-L L1224739-01 GW

Collected by: Brad Curtis
Collected date/time: 06/02/20 13:15
Received date/time: 06/03/20 15:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1486748	1	06/08/20 00:27	06/08/20 00:27	LD	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1486929	1	06/07/20 18:48	06/07/20 18:48	MCG	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1487485	50	06/09/20 02:23	06/09/20 02:23	MCG	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1489534	1	06/09/20 14:46	06/09/20 19:46	LRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	1	06/03/20 21:28	06/03/20 21:28	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	100	06/03/20 21:39	06/03/20 21:39	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1486662	5	06/04/20 02:48	06/04/20 02:48	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1486727	1	06/03/20 22:00	06/04/20 13:02	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1486730	1	06/04/20 10:11	06/04/20 20:14	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1486745	1	06/08/20 16:52	06/10/20 05:29	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1487358	1	06/04/20 20:37	06/05/20 08:40	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1485474	1	06/03/20 19:40	06/04/20 16:34	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1485474	1	06/03/20 19:40	06/04/20 18:09	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/08/20 00:27	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	1	06/07/20 17:54	06/09/20 00:34	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1486748	5	06/07/20 17:54	06/08/20 16:44	RDS	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1487790	50	06/05/20 23:45	06/05/20 23:45	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1487526	1	06/05/20 07:08	06/08/20 10:47	LEL	Mt. Juliet, TN

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

Additional Information

Analyte	Result	Units
pH (On Site)	6.4	su

Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (calculated) as CaCO3	1270		2.50	1	06/08/2020 00:27	WG1486748

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	36.6		20.0	1	06/07/2020 18:48	WG1486929

Sample Narrative:

L1224739-01 WG1486929: 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	41.0		12.5	50	06/09/2020 02:23	WG1487485

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	171		20.0	1	06/09/2020 19:46	WG1489534

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	1.42		1.00	1	06/03/2020 21:28	WG1486662
Chloride	2340		100	100	06/03/2020 21:39	WG1486662
Fluoride	ND		0.150	1	06/03/2020 21:28	WG1486662
Nitrate	ND		0.100	1	06/03/2020 21:28	WG1486662
Sulfate	131		25.0	5	06/04/2020 02:48	WG1486662

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	06/04/2020 13:02	WG1486727
Mercury,Dissolved	ND		0.000200	1	06/04/2020 20:14	WG1486730

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	06/10/2020 05:29	WG1486745
Boron,Dissolved	ND		0.200	1	06/05/2020 08:40	WG1487358

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	5.17		0.100	1	06/08/2020 00:27	WG1486748
Aluminum,Dissolved	ND		0.100	1	06/04/2020 16:34	WG1485474
Antimony	ND		0.00400	1	06/08/2020 00:27	WG1486748
Antimony,Dissolved	ND		0.00400	1	06/04/2020 16:34	WG1485474
Arsenic	ND		0.0100	5	06/08/2020 16:44	WG1486748
Arsenic,Dissolved	ND		0.00200	1	06/04/2020 16:34	WG1485474
Barium	0.0932		0.0200	1	06/08/2020 00:27	WG1486748
Barium,Dissolved	0.0965		0.0200	1	06/04/2020 16:34	WG1485474
Beryllium	ND		0.00200	1	06/08/2020 00:27	WG1486748
Beryllium,Dissolved	ND		0.00200	1	06/04/2020 16:34	WG1485474
Cadmium	0.764		0.00100	1	06/08/2020 00:27	WG1486748
Cadmium,Dissolved	ND		0.00100	1	06/04/2020 16:34	WG1485474
Calcium	421		1.00	1	06/08/2020 00:27	WG1486748
Calcium,Dissolved	447		1.00	1	06/04/2020 16:34	WG1485474
Chromium	0.0969		0.0100	5	06/08/2020 16:44	WG1486748
Chromium,Dissolved	ND		0.00200	1	06/04/2020 16:34	WG1485474
Cobalt	0.0159		0.0100	5	06/08/2020 16:44	WG1486748
Cobalt,Dissolved	ND		0.00200	1	06/04/2020 16:34	WG1485474
Copper	0.0712		0.00500	1	06/08/2020 00:27	WG1486748
Copper,Dissolved	ND		0.00500	1	06/04/2020 16:34	WG1485474
Iron	7.95		0.500	5	06/08/2020 16:44	WG1486748
Iron,Dissolved	ND		0.100	1	06/04/2020 16:34	WG1485474
Lead	0.0159		0.00500	1	06/08/2020 00:27	WG1486748
Lead,Dissolved	ND		0.00500	1	06/04/2020 16:34	WG1485474
Magnesium	51.7		1.00	1	06/08/2020 00:27	WG1486748
Magnesium,Dissolved	56.2		1.00	1	06/04/2020 16:34	WG1485474
Manganese	3.28		0.0250	5	06/08/2020 16:44	WG1486748
Manganese,Dissolved	2.93		0.00500	1	06/04/2020 16:34	WG1485474
Nickel	0.0978		0.0100	5	06/08/2020 16:44	WG1486748
Nickel,Dissolved	ND		0.00200	1	06/04/2020 18:09	WG1485474
Potassium	331		2.00	1	06/08/2020 00:27	WG1486748
Potassium,Dissolved	361		2.00	1	06/04/2020 16:34	WG1485474
Selenium	0.00447		0.00200	1	06/09/2020 00:34	WG1486748
Selenium,Dissolved	ND		0.00200	1	06/04/2020 16:34	WG1485474
Silver	ND		0.00200	1	06/08/2020 00:27	WG1486748
Silver,Dissolved	ND		0.00200	1	06/04/2020 16:34	WG1485474
Sodium	556		2.00	1	06/08/2020 00:27	WG1486748
Sodium,Dissolved	611		2.00	1	06/04/2020 16:34	WG1485474
Thallium	ND		0.00200	1	06/08/2020 00:27	WG1486748
Thallium,Dissolved	ND		0.00200	1	06/04/2020 16:34	WG1485474
Vanadium	ND		0.0250	5	06/08/2020 16:44	WG1486748
Vanadium,Dissolved	ND		0.00500	1	06/04/2020 16:34	WG1485474
Zinc	11.5		0.125	5	06/08/2020 16:44	WG1486748
Zinc,Dissolved	6.68		0.0250	1	06/04/2020 16:34	WG1485474

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		2.50	50	06/05/2020 23:45	WG1487790
Acrylonitrile	ND		0.500	50	06/05/2020 23:45	WG1487790
Benzene	ND		0.0500	50	06/05/2020 23:45	WG1487790
Bromochloromethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
Bromodichloromethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
Bromoform	ND		0.0500	50	06/05/2020 23:45	WG1487790
Bromomethane	ND		0.250	50	06/05/2020 23:45	WG1487790
Carbon disulfide	4.07		0.0500	50	06/05/2020 23:45	WG1487790

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	ND		0.0500	50	06/05/2020 23:45	WG1487790
Chlorobenzene	ND		0.0500	50	06/05/2020 23:45	WG1487790
Chlorodibromomethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
Chloroethane	ND		0.250	50	06/05/2020 23:45	WG1487790
Chloroform	ND		0.250	50	06/05/2020 23:45	WG1487790
Chloromethane	ND		0.125	50	06/05/2020 23:45	WG1487790
Dibromomethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,2-Dibromo-3-Chloropropane	ND		0.250	50	06/05/2020 23:45	WG1487790
1,2-Dibromoethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,2-Dichlorobenzene	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,4-Dichlorobenzene	ND		0.0500	50	06/05/2020 23:45	WG1487790
trans-1,4-Dichloro-2-butene	ND		0.125	50	06/05/2020 23:45	WG1487790
1,1-Dichloroethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,2-Dichloroethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,1-Dichloroethene	ND		0.0500	50	06/05/2020 23:45	WG1487790
cis-1,2-Dichloroethene	ND		0.0500	50	06/05/2020 23:45	WG1487790
trans-1,2-Dichloroethene	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,2-Dichloropropane	ND		0.0500	50	06/05/2020 23:45	WG1487790
cis-1,3-Dichloropropene	ND		0.0500	50	06/05/2020 23:45	WG1487790
trans-1,3-Dichloropropene	ND		0.0500	50	06/05/2020 23:45	WG1487790
Ethylbenzene	ND		0.0500	50	06/05/2020 23:45	WG1487790
2-Hexanone	ND		0.500	50	06/05/2020 23:45	WG1487790
Iodomethane	ND		0.500	50	06/05/2020 23:45	WG1487790
2-Butanone (MEK)	ND		0.500	50	06/05/2020 23:45	WG1487790
Methylene Chloride	ND		0.250	50	06/05/2020 23:45	WG1487790
4-Methyl-2-pentanone (MIBK)	ND		0.500	50	06/05/2020 23:45	WG1487790
Styrene	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,1,1,2-Tetrachloroethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,1,2,2-Tetrachloroethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
Tetrachloroethene	ND		0.0500	50	06/05/2020 23:45	WG1487790
Toluene	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,1,1-Trichloroethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
1,1,2-Trichloroethane	ND		0.0500	50	06/05/2020 23:45	WG1487790
Trichloroethene	ND		0.0500	50	06/05/2020 23:45	WG1487790
Trichlorofluoromethane	ND		0.250	50	06/05/2020 23:45	WG1487790
1,2,3-Trichloropropane	ND		0.125	50	06/05/2020 23:45	WG1487790
Vinyl acetate	ND		0.500	50	06/05/2020 23:45	WG1487790
Vinyl chloride	ND		0.0500	50	06/05/2020 23:45	WG1487790
Xylenes, Total	ND		0.150	50	06/05/2020 23:45	WG1487790
(S) Toluene-d8	*111*		*80.0-120*		*06/05/2020 23:45*	WG1487790
(S) 4-Bromofluorobenzene	*95.8*		*77.0-126*		*06/05/2020 23:45*	WG1487790
(S) 1,2-Dichloroethane-d4	*111*		*70.0-130*		*06/05/2020 23:45*	WG1487790

Sample Narrative:

L1224739-01 WG1487790: Target compound too high to run at a lower dilution.

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	06/08/2020 10:47	WG1487526
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	06/08/2020 10:47	WG1487526

Method Blank (MB)

(MB) R3535923-1 06/07/20 18:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity	U		8.45	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3535923-3 06/07/20 19:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	101	101	85.0-115	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3536496-1 06/09/20 02:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ammonia Nitrogen	U		0.117	0.250

L1224697-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1224697-02 06/09/20 02:16 • (DUP) R3536496-5 06/09/20 02:18

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

Laboratory Control Sample (LCS)

(LCS) R3536496-2 06/09/20 02:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7.50	7.82	104	90.0-110	

L1224697-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1224697-01 06/09/20 02:11 • (MS) R3536496-3 06/09/20 02:13 • (MSD) R3536496-4 06/09/20 02:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5.00	ND	5.01	5.18	100	104	1	90.0-110			3.28	10

L1224783-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1224783-02 06/09/20 02:41 • (MS) R3536496-7 06/09/20 02:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5.00	0.271	4.73	89.3	1	90.0-110	J6

Method Blank (MB)

(MB) R3536757-1 06/09/20 19:39

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
COD	U		11.7	20.0

Laboratory Control Sample (LCS)

(LCS) R3536757-2 06/09/20 19:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	222	220	99.0	90.0-110	

Method Blank (MB)

(MB) R3534976-1 06/03/20 20:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.353	1.00
Chloride	U		0.379	1.00
Fluoride	U		0.0640	0.150
Nitrate	U		0.0480	0.100
Sulfate	U		0.594	5.00

Laboratory Control Sample (LCS)

(LCS) R3534976-2 06/03/20 20:36

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	38.9	97.3	80.0-120	
Fluoride	8.00	8.06	101	80.0-120	
Nitrate	8.00	7.78	97.3	80.0-120	
Sulfate	40.0	38.0	95.0	80.0-120	

Method Blank (MB)

(MB) R3535075-1 06/04/20 11:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3535075-2 06/04/20 11:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00310	103	80.0-120	

Method Blank (MB)

(MB) R3535230-1 06/04/20 19:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3535230-2 06/04/20 19:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury,Dissolved	0.00300	0.00320	107	80.0-120	

Method Blank (MB)

(MB) R3536954-1 06/10/20 04:44

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Boron	U		0.0254	0.200

Laboratory Control Sample (LCS)

(LCS) R3536954-2 06/10/20 04:46

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Boron	1.00	0.974	97.4	80.0-120	

L1224697-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1224697-02 06/10/20 04:49 • (MS) R3536954-4 06/10/20 04:54 • (MSD) R3536954-5 06/10/20 04:56

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l		mg/l	mg/l	%	%		%			%	%
Boron	1.00		0.993	1.00	99.3	100	1	75.0-125			1.14	20

Method Blank (MB)

(MB) R3535371-1 06/05/20 07:30

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0254	0.200

Laboratory Control Sample (LCS)

(LCS) R3535371-2 06/05/20 07:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron,Dissolved	1.00	0.949	94.9	80.0-120	

Method Blank (MB)

(MB) R3535023-1 06/04/20 11:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	U		0.0554	0.100
Antimony,Dissolved	U		0.00132	0.00400
Arsenic,Dissolved	U		0.000735	0.00200
Barium,Dissolved	U		0.00778	0.0200
Beryllium,Dissolved	U		0.000454	0.00200
Cadmium,Dissolved	U		0.000478	0.00100
Calcium,Dissolved	U		0.480	1.00
Chromium,Dissolved	U		0.00149	0.00200
Copper,Dissolved	U		0.00250	0.00500
Cobalt,Dissolved	U		0.000477	0.00200
Iron,Dissolved	U		0.0489	0.100
Lead,Dissolved	U		0.00249	0.00500
Magnesium,Dissolved	U		0.465	1.00
Manganese,Dissolved	U		0.00132	0.00500
Nickel,Dissolved	U		0.000952	0.00200
Potassium,Dissolved	U		0.534	2.00
Selenium,Dissolved	U		0.000657	0.00200
Silver,Dissolved	U		0.000513	0.00200
Sodium,Dissolved	U		0.630	2.00
Thallium,Dissolved	U		0.000460	0.00200
Vanadium,Dissolved	U		0.000986	0.00500
Zinc,Dissolved	U		0.00996	0.0250

Laboratory Control Sample (LCS)

(LCS) R3535023-2 06/04/20 11:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Aluminum,Dissolved	5.00	4.85	96.9	80.0-120	
Antimony,Dissolved	0.0500	0.0468	93.7	80.0-120	
Arsenic,Dissolved	0.0500	0.0472	94.4	80.0-120	
Barium,Dissolved	0.0500	0.0475	95.0	80.0-120	
Beryllium,Dissolved	0.0500	0.0475	95.1	80.0-120	
Cadmium,Dissolved	0.0500	0.0509	102	80.0-120	
Calcium,Dissolved	5.00	4.99	99.8	80.0-120	
Chromium,Dissolved	0.0500	0.0494	98.8	80.0-120	
Copper,Dissolved	0.0500	0.0461	92.2	80.0-120	
Cobalt,Dissolved	0.0500	0.0496	99.3	80.0-120	
Iron,Dissolved	5.00	4.92	98.3	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3535023-2 06/04/20 11:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Lead,Dissolved	0.0500	0.0475	95.0	80.0-120	
Magnesium,Dissolved	5.00	4.98	99.6	80.0-120	
Manganese,Dissolved	0.0500	0.0491	98.3	80.0-120	
Nickel,Dissolved	0.0500	0.0504	101	80.0-120	
Potassium,Dissolved	5.00	4.90	98.1	80.0-120	
Selenium,Dissolved	0.0500	0.0510	102	80.0-120	
Silver,Dissolved	0.0500	0.0485	97.1	80.0-120	
Sodium,Dissolved	5.00	4.91	98.1	80.0-120	
Thallium,Dissolved	0.0500	0.0469	93.8	80.0-120	
Vanadium,Dissolved	0.0500	0.0484	96.9	80.0-120	
Zinc,Dissolved	0.500	0.470	93.9	80.0-120	

Method Blank (MB)

(MB) R3536041-1 06/07/20 23:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	U		0.0554	0.100
Antimony	U		0.00132	0.00400
Arsenic	U		0.000735	0.00200
Barium	U		0.00778	0.0200
Beryllium	U		0.000454	0.00200
Cadmium	U		0.000478	0.00100
Calcium	U		0.480	1.00
Chromium	U		0.00149	0.00200
Copper	U		0.00250	0.00500
Cobalt	U		0.000477	0.00200
Iron	U		0.0489	0.100
Lead	U		0.00249	0.00500
Magnesium	U		0.465	1.00
Manganese	U		0.00132	0.00500
Nickel	U		0.000952	0.00200
Potassium	U		0.534	2.00
Silver	U		0.000513	0.00200
Sodium	U		0.630	2.00
Thallium	U		0.000460	0.00200
Vanadium	U		0.000986	0.00500
Zinc	U		0.00996	0.0250

Method Blank (MB)

(MB) R3536323-1 06/08/20 15:11

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Selenium	U		0.000657	0.00200

Laboratory Control Sample (LCS)

(LCS) R3536041-2 06/07/20 23:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Aluminum	5.00	4.42	88.4	80.0-120	
Antimony	0.0500	0.0449	89.8	80.0-120	
Arsenic	0.0500	0.0448	89.7	80.0-120	
Barium	0.0500	0.0458	91.6	80.0-120	
Beryllium	0.0500	0.0440	88.0	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3536041-2 06/07/20 23:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Cadmium	0.0500	0.0483	96.6	80.0-120	
Calcium	5.00	4.69	93.7	80.0-120	
Chromium	0.0500	0.0476	95.2	80.0-120	
Copper	0.0500	0.0534	107	80.0-120	
Cobalt	0.0500	0.0465	93.0	80.0-120	
Iron	5.00	4.56	91.3	80.0-120	
Lead	0.0500	0.0449	89.8	80.0-120	
Magnesium	5.00	4.44	88.8	80.0-120	
Manganese	0.0500	0.0459	91.8	80.0-120	
Nickel	0.0500	0.0482	96.5	80.0-120	
Potassium	5.00	4.49	89.7	80.0-120	
Silver	0.0500	0.0447	89.3	80.0-120	
Sodium	5.00	4.40	88.0	80.0-120	
Thallium	0.0500	0.0448	89.6	80.0-120	
Vanadium	0.0500	0.0452	90.4	80.0-120	
Zinc	0.500	0.456	91.1	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3536323-2 06/08/20 15:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Selenium	0.0500	0.0474	94.8	80.0-120	

Method Blank (MB)

(MB) R3535707-2 06/05/20 19:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0113	0.0500
Acrylonitrile	U		0.000671	0.0100
Benzene	U		0.0000941	0.00100
Bromodichloromethane	U		0.000136	0.00100
Bromochloromethane	U		0.000128	0.00100
Bromoform	U		0.000129	0.00100
Bromomethane	U		0.000605	0.00500
Carbon disulfide	U		0.0000962	0.00100
Carbon tetrachloride	U		0.000128	0.00100
Chlorobenzene	U		0.000116	0.00100
Chlorodibromomethane	U		0.000140	0.00100
Chloroethane	U		0.000192	0.00500
Chloroform	U		0.000111	0.00500
Chloromethane	U		0.000960	0.00250
1,2-Dibromo-3-Chloropropane	U		0.000276	0.00500
1,2-Dibromoethane	U		0.000126	0.00100
Dibromomethane	U		0.000122	0.00100
1,2-Dichlorobenzene	U		0.000107	0.00100
1,4-Dichlorobenzene	U		0.000120	0.00100
trans-1,4-Dichloro-2-butene	U		0.000467	0.00250
1,1-Dichloroethane	U		0.000100	0.00100
1,2-Dichloroethane	U		0.0000819	0.00100
1,1-Dichloroethene	U		0.000188	0.00100
cis-1,2-Dichloroethene	U		0.000126	0.00100
trans-1,2-Dichloroethene	U		0.000149	0.00100
1,2-Dichloropropane	U		0.000149	0.00100
cis-1,3-Dichloropropene	U		0.000111	0.00100
trans-1,3-Dichloropropene	U		0.000118	0.00100
Ethylbenzene	U		0.000137	0.00100
2-Hexanone	U		0.000787	0.0100
Iodomethane	U		0.00600	0.0100
2-Butanone (MEK)	U		0.00119	0.0100
Methylene Chloride	U		0.000430	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.000478	0.0100
Styrene	U		0.000118	0.00100
1,1,1,2-Tetrachloroethane	U		0.000147	0.00100
1,1,2,2-Tetrachloroethane	U		0.000133	0.00100
Tetrachloroethene	U		0.000300	0.00100
Toluene	U		0.000278	0.00100
1,1,1-Trichloroethane	U		0.000149	0.00100

Method Blank (MB)

(MB) R3535707-2 06/05/20 19:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,1,2-Trichloroethane	U		0.000158	0.00100
Trichloroethene	U		0.000190	0.00100
Trichlorofluoromethane	U		0.000160	0.00500
1,2,3-Trichloropropane	U		0.000237	0.00250
Vinyl acetate	U		0.000692	0.0100
Vinyl chloride	U		0.000234	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*112*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*113*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3535707-1 06/05/20 18:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	0.0250	0.0227	90.8	19.0-160	
Acrylonitrile	0.0250	0.0219	87.6	55.0-149	
Benzene	0.00500	0.00482	96.4	70.0-123	
Bromodichloromethane	0.00500	0.00458	91.6	75.0-120	
Bromochloromethane	0.00500	0.00486	97.2	76.0-122	
Bromoform	0.00500	0.00425	85.0	68.0-132	
Bromomethane	0.00500	0.00365	73.0	10.0-160	
Carbon disulfide	0.00500	0.00552	110	61.0-128	
Carbon tetrachloride	0.00500	0.00526	105	68.0-126	
Chlorobenzene	0.00500	0.00471	94.2	80.0-121	
Chlorodibromomethane	0.00500	0.00455	91.0	77.0-125	
Chloroethane	0.00500	0.00574	115	47.0-150	
Chloroform	0.00500	0.00478	95.6	73.0-120	
Chloromethane	0.00500	0.00398	79.6	41.0-142	
1,2-Dibromo-3-Chloropropane	0.00500	0.00377	75.4	58.0-134	
1,2-Dibromoethane	0.00500	0.00480	96.0	80.0-122	
Dibromomethane	0.00500	0.00525	105	80.0-120	
1,2-Dichlorobenzene	0.00500	0.00500	100	79.0-121	
1,4-Dichlorobenzene	0.00500	0.00505	101	79.0-120	
trans-1,4-Dichloro-2-butene	0.00500	0.00478	95.6	33.0-144	
1,1-Dichloroethane	0.00500	0.00536	107	70.0-126	
1,2-Dichloroethane	0.00500	0.00507	101	70.0-128	
1,1-Dichloroethene	0.00500	0.00557	111	71.0-124	

Laboratory Control Sample (LCS)

(LCS) R3535707-1 06/05/20 18:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	0.00500	0.00497	99.4	73.0-120	
trans-1,2-Dichloroethene	0.00500	0.00532	106	73.0-120	
1,2-Dichloropropane	0.00500	0.00496	99.2	77.0-125	
cis-1,3-Dichloropropene	0.00500	0.00493	98.6	80.0-123	
trans-1,3-Dichloropropene	0.00500	0.00484	96.8	78.0-124	
Ethylbenzene	0.00500	0.00474	94.8	79.0-123	
2-Hexanone	0.0250	0.0191	76.4	67.0-149	
Iodomethane	0.0250	0.0199	79.6	33.0-147	
2-Butanone (MEK)	0.0250	0.0213	85.2	44.0-160	
Methylene Chloride	0.00500	0.00487	97.4	67.0-120	
4-Methyl-2-pentanone (MIBK)	0.0250	0.0184	73.6	68.0-142	
Styrene	0.00500	0.00442	88.4	73.0-130	
1,1,1,2-Tetrachloroethane	0.00500	0.00457	91.4	75.0-125	
1,1,2,2-Tetrachloroethane	0.00500	0.00436	87.2	65.0-130	
Tetrachloroethene	0.00500	0.00524	105	72.0-132	
Toluene	0.00500	0.00457	91.4	79.0-120	
1,1,1-Trichloroethane	0.00500	0.00501	100	73.0-124	
1,1,2-Trichloroethane	0.00500	0.00493	98.6	80.0-120	
Trichloroethene	0.00500	0.00501	100	78.0-124	
Trichlorofluoromethane	0.00500	0.00664	133	59.0-147	
1,2,3-Trichloropropane	0.00500	0.00459	91.8	73.0-130	
Vinyl acetate	0.0250	0.0255	102	11.0-160	
Vinyl chloride	0.00500	0.00578	116	67.0-131	
Xylenes, Total	0.0150	0.0142	94.7	79.0-123	
(S) Toluene-d8			*109*	*80.0-120*	
(S) 4-Bromofluorobenzene			*97.2*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*112*	*70.0-130*	

Method Blank (MB)

(MB) R3536228-1 06/08/20 09:48

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ethylene Dibromide	U		0.00000536	0.0000200
1,2-Dibromo-3-Chloropropane	U		0.00000748	0.0000200

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

(LCS) R3536228-4 06/08/20 12:21 • (LCSD) R3536228-5 06/08/20 14:31

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	0.000223	0.000209	89.2	83.6	60.0-140			6.48	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000216	0.000205	86.4	82.0	60.0-140			5.23	20

L1224773-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1224773-01 06/08/20 10:12 • (MS) R3536228-2 06/08/20 10:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ethylene Dibromide	0.000100	ND	0.000105	105	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.000100	ND	0.0000929	92.9	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.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

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
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

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

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

Our Locations

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

Civil & Environmental Consultants - TN

117 Seaboard Ln.
Suite E100
Franklin, TN 37067

Billing Information:
Dr. Kevin Wolfe
117 Seaboard Ln.
Suite E100
Franklin, TN 37067

Report to: Philip Campbell

Email To: pcampbell@cecinc.com

Project Description: EWS Camden Class 2 Landfill

City/State Collected: Camden TN

Please Circle: PT MT CT ET

Phone: 615-333-7797

Client Project # 181-364

Lab Project # CEC-181364

Collected by (print): Brad Curtis

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

Pres Chk

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

E176

Table # L122479

Acctnum: CEC

Template: T133582

Prelogin: P776513

PM: 526 - Chris McCord

PB: 6/1/2016

Shipped Via: Courier

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**WetChem** 250mlHDPE-NoPres	ALK 100ml Amb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss.Metals 250mlHDPE-NoPres	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl				Remarks	Sample # (lab only)
IWC-L	Grab	GW		6-2-20	13:15	11	X	X	X	X	X	X	X					-01
APWC-L		GW				11	X	X	X	X	X	X	X					

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

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

pH 6.4 Temp ___

Flow ___ Other ___

Samples returned via: __ UPS __ FedEx __ Courier X

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
RAD Screen <0.5 mR/hr:		Y N

	Date:	Time:	
Relinquished by: (Signature)	6/2/20	1645	Received by: (Signature) Alex Black
Relinquished by: (Signature)	6/3/20	13:20	Received by: (Signature)
Relinquished by: (Signature)	6-3-20	15:15	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: 1.6 °C 0.6-1=0.5 Bottles Received: 11

If preservation required by Login: Date/Time

Date: 3-6-20 Time: 15:15

Hold:

Condition: NCF / OK

GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 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**	80s, sunny
DATE & TIME	6/2/20 10:00	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	P. Campbell / A. Black
TOTAL WELL DEPTH (feet)	30.50	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	21.69	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	8.81	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	1V = 1.44 3V = 4.32	**EQUIPMENT BLANK COLLECTED?**	N

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	21.75	10:23	16.1	3.97	83.4	68.3	9.79	183.9	47.6
1.00	21.75	10:27	15.6	4.17	46.6	38.7	4.63	212.3	20.8
1.50	21.75	10:31	15.6	4.44	61.0	50.1	2.75	172.6	15.5
2.00	21.75	10:35	15.5	4.61	72.2	60.1	1.98	104.4	15.4
2.25	21.75	10:39	15.5	4.72	82.2	67.3	1.52	84.0	14.0
2.50	21.75	10:43	15.5	4.82	90.0	73.8	1.22	68.9	13.5
3.00	21.75	10:47	15.6	4.94	95.1	78.2	1.02	56.2	11.9
3.50	21.75	10:51	15.7	5.01	98.3	80.9	0.88	47.5	9.52
4.00	21.75	10:55	15.7	5.10	101.9	83.8	0.86	40.0	9.45
4.50	21.75	10:59	15.7	5.13	103.4	85.0	0.84	36.4	9.04

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
4.5	21.75	11:00	15.7	5.13	103.4	85.0	0.84	36.4	9.04

Preservatives Used	See COC	**Sample Charateristics (Odor, Color)**	clear
Number of Containers	10	**Sampler Signature**	

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 Franklin, Tennessee 37067 - 800-763-2326 - www.cecinc.com

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 80's, humid
DATE & TIME	6-2-201 15:00	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	NA, parameters only	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	10	**SAMPLING EQUIPMENT**	~~Bailer~~ NA
DEPTH TO WATER (feet)	6.60	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NA
WATER COLUMN (feet)	3.40	**FIELD BLANK COLLECTED?**	NA
PURGE VOLUME (gallons)	1vol ≈ 0.6 gallons	**EQUIPMENT BLANK COLLECTED?**	NA

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
—	6.60	1500	17.6	5.87	353.2	303.8	1.87	252.4	NA

Preservatives Used	NA	**Sample Charateristics (Odor, Color)**	NA
Number of Containers	NA	**Sampler Signature**	[signature]

WELL DATA

Number of Baffles	4	**Well Cap Dedicated/In Place?**	No /NA
Lock Condition	good	**Fittings/Well Head Condition**	NA
Pad/Casing Quality	OK	**Well Clear of Weeds/Accessible?**	yes/yes

GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 Franklin, Tennessee 37067 - 800-763-2326 - www.cecinc.com

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 84°, humid
DATE & TIME	6-2-20 / 15:15	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	27	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	18.59	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	yes
WATER COLUMN (feet)	8.41	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	1 vol ≈ 1.4 gallons 3 vol ≈ 4.2 gallons	**EQUIPMENT BLANK COLLECTED?**	NA

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	18.67	15:20	15.5	5.29	293.5	250.3	7.05	262.2	12.5
0.25	18.73	15:25	16.4	4.93	361.1	302.3	0.93	272.5	3.13
0.50	18.73	15:30	16.5	4.90	364.3	305.2	0.58	275.4	3.07
0.75	18.73	15:35	16.6	5.48	281.8	236.0	0.43	256.2	8.16
1.0	18.73	15:40	16.8	5.62	251.7	212.1	0.30	178.7	6.14
1.25	18.73	15:45	16.7	5.70	243.1	204.6	0.30	145.1	5.14
1.50	18.73	15:50	16.7	5.76	238.6	200.7	0.26	126.4	5.11
1.75	18.73	1555	16.6	5.78	236.8	198.9	0.38	116.8	5.36
2.00	18.73	1600	16.7	5.80	236.0	198.5	0.24	116.7	5.38

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.00	18.73	1600	16.7	5.80	236.0	198.5	0.24	116.7	5.38
Preservatives Used	HCl, HNO_3, Na thio, H_2SO_4, none			**Sample Charateristics (Odor, Color)**			Clear, No odor		
Number of Containers	10			**Sampler Signature**			Phil J. Campbell		

WELL DATA

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

some ants inside steel casing but not in PVC casing,
Very Large ant hills ≈ 20 ft. from well.

GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 Franklin, Tennessee 37067 - 800-763-2326 - www.cecinc.com

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-4
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 89°, humid
DATE & TIME	6-2-20 / 14:10	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	23.1	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	11.05	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	12.95	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	1vol ≈ 2 gallons 3vol ≈ 6.5 gallons	**EQUIPMENT BLANK COLLECTED?**	N/A

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.0	11.23	14:20	16.4	5.49	76.1	62.6	3.17	219.5	108
0.5	11.25	14:25	16.1	5.28	75.8	63.6	2.78	229.7	95.8
1.0	11.25	14:30	16.1	5.27	75.0	62.1	2.46	232.3	83.2
1.5	11.25	14:35	15.9	5.27	74.7	61.7	2.46	235.5	11.3
2.0	11.25	14:40	15.8	5.29	74.3	61.3	2.49	236.6	5.75
2.5	11.25	14:45	15.9	5.31	74.0	61.1	2.51	235.7	4.93

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.5	11.25	1450	15.9	5.31	74.0	61.1	2.51	235.7	4.93

Preservatives Used	Sulfuric	**Sample Charateristics (Odor, Color)**	Clear, No odor
Number of Containers	VO	**Sampler Signature**	Phil Campbell

WELL DATA

Number of Baffles	0	**Well Cap Dedicated/In Place?**	yes / yes
Lock Condition	good	**Fittings/Well Head Condition**	good / good.
Pad/Casing Quality	OK / OK	**Well Clear of Weeds/Accessible?**	some tall grass / yes

* Tree over Fence from storms

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-5
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 80's
DATE & TIME	6-2-20 / 13:00	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	33.85	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	8.90	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	24.95	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	1 vol ≈ 4.25 gallons 3 vol ≈ 12.5 gallons	**EQUIPMENT BLANK COLLECTED?**	NA

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	9.50	13:10	17.3	4.68	375.9	320.8	1.12	98.6	36.9
0.5	9.53	13:15	17.3	4.78	367.8	313.6	0.88	211.6	36.0
1.0	9.54	13:20	17.2	4.81	361.1	307.3	0.87	223.9	31.8
1.5	9.54	13:25	17.8	4.82	356.8	307.8	0.85	234.5	30.5
1.75	9.54	13:30	17.9	4.83	357.8	309.2	0.73	240.7	24.7
2.10	9.54	1335	17.8	4.86	358.6	309.4	0.68	245.8	23.9
2.25	9.54	13:40	17.6	4.86	358.4	307.6	0.66	253.7	18.2
2.50	9.54	1345	17.6	4.86	356.9	306.2	0.67	255.9	16.8

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.50	9.54	1350	17.6	4.86	356.9	306.2	0.67	255.9	10.6 @ metals

Preservatives Used	HCl, NaThio, H_2SO_4, HNO_3, None	**Sample Charateristics (Odor, Color)**	Clear, No odor
Number of Containers	10	**Sampler Signature**	Philip Campbell

WELL DATA

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

$\frac{0.5}{12} = 0.041$ $\pi r^2 = 0.00545 \times 7.48 \text{ gal}$

0.041 – multiply feet wc = 1 well volume.

GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 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**	81's sunny
DATE & TIME	6/2/20 1150	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow 3 well volumes	**FIELD REPRESENTATIVE**	Alex Black
TOTAL WELL DEPTH (feet)	32.50	**SAMPLING EQUIPMENT**	~~Bladder Pump~~ Peristaltic
DEPTH TO WATER (feet)	~~6.04~~ 6.04	**IS SAMPLE EQUIPMENT DEDICATED?**	~~Yes~~
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	26.46	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	1 Volume = 1.08 gallons	**EQUIPMENT BLANK COLLECTED?**	N

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.10	6.04	11:55	16.5	5.13	127.8	111.8	13.60	124.8	>1000
0.25	6.52	12:05	8.1	5.00	129.3	112.5	6.61	147.7	250
1.50	8.91	12:15	7.9	5.32	128.7	111.1	4.63	145.5	73.3
1.75	8.70	12:25	18.2	5.40	129.2	112.4	4.15	145.3	17.8
2.25	8.76	12:35	18.2	5.32	128.4	112.2	4.13	149.1	10.2
2.75	8.87	12:45	18.2	5.38	129.1	112.4	3.97	146.0	8.03
3.25	8.87	12:55	18.3	5.43	129.0	112.5	3.93	144.4	5.61
4.75	8.87	13:05	18.3	5.44	129.0	112.4	3.87	143.9	5.07

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
4.75	8.87	1310	18.3	5.44	129.0	112.4	3.87	143.9	5.07

Preservatives Used	See COC	**Sample Charateristics (Odor, Color)**	Clear
Number of Containers	10	**Sampler Signature**	

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 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**	80s sunny
DATE & TIME	6/2/20 1330	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Alex Black
TOTAL WELL DEPTH (feet)	27.50	**SAMPLING EQUIPMENT**	~~Bladder Pump~~ Peristaltic
DEPTH TO WATER (feet)	10.63	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	16.87	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	1V = 0.69	**EQUIPMENT BLANK COLLECTED?**	N

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	10.63	1335	17.2	5.01	121.6	103.7	18.17	158.7	OR
1	15.59	1345	17.2	5.27	140.8	119.9	5.23	154.2	612
1.75	15.32	1355	17.2	5.36	149.7	127.5	4.88	149.8	334
2.50	15.52	1405	17.1	5.40	153.5	130.7	4.80	148.5	243
3.00	15.31	1415	17.3	5.42	157.7	133.9	4.67	144.0	65.5
3.75	15.20	1425	17.5	5.45	158.2	135.4	4.52	142.3	34.9
4.25	14.95	1435	17.6	5.45	160.7	137.7	4.37	146.4	20.5
4.75	14.69	1445	17.8	5.42	161.1	138.8	4.68	144.7	13.6
5.25	14.35	1455	17.6	5.45	161.5	138.7	4.50	144.6	9.80

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
5.25	14.35	~~1450~~ 1500	17.6	5.45	161.5	138.7	4.50	144.6	9.80
Preservatives Used	See COC			**Sample Charateristics (Odor, Color)**			Clear		
Number of Containers	10			**Sampler Signature**					

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 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**	80s, Sunny
DATE & TIME	6/2/20 1520	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Alex Black
TOTAL WELL DEPTH (feet)	28.00	**SAMPLING EQUIPMENT**	~~Bladder Pump~~ Peristaltic
DEPTH TO WATER (feet)	9.10	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	18.9	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	1V = 0.78	**EQUIPMENT BLANK COLLECTED?**	N

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	9.10	1525	17.1	4.87	356.1	302.2	4.62	162.2	31.5
0.75	10.14	1535	17.2	4.99	308.0	261.4	1.35	160.1	59.4
1.25	10.09	1545	17.6	5.17	306.0	262.9	1.10	154.6	18.8
1.75	10.26	1555	16.9	5.17	305.2	258.1	1.06	156.0	15.0
2.50	10.42	1605	16.9	5.09	302.4	254.1	1.07	164.5	6.08

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.50	10.42	1610	16.9	5.09	302.4	254.1	1.07	164.5	6.08

Preservatives Used	See COC	**Sample Charateristics (Odor, Color)**	Clear
Number of Containers	~~6~~ 10	**Sampler Signature**	

WELL DATA

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

TAIL GATE SAFETY MEETING DOCUMENTATION [1]

DATE: 6-2-10 **LOCATION:** EWS

Project Name: Former EWS GW sampling **Project No:** 181-3841

CEC Work Type: ☐ Observation ☒ General Field Work ☐ Surveying ☐ Design-Build

Are there any new or unexpected hazards not identified on the Project Hazard Assessment Form? ☐ Yes ☐ No

SAFETY HAZARDS DISCUSSED:

1. History of site Cadmium & chloride
2. Sun & heat
3. bugs

HAZARD CONTROLS DISCUSSED:

1. PPE
2. work/rest, sunscreen & drinks
3. bug spray

List subcontractor activities that may impact work:

Identify Expected Weather Concerns

☒ Heat ☐ Sun ☐ Rain/Wet
☐ Cold ☐ Ice ☐ Wind
☐ Other: _____ ☐ Other: _____

ATTENDEES:

By signing below, I attest that I attended the Tail Gate Safety Meeting on the date indicated above:

	Signature	Printed Name
1		Philip Campbell
2		Alex Black
3		
4		
5		

(1) A Tail Gate Safety Meeting is required whenever more than two CEC employees are present at a job site and when any CEC employee is working with a CEC subcontractor. If CEC is a subcontractor, CEC employees should comply with and participate in the Prime Contractor's safety meetings.

APPENDIX D
CEC STANDARD OPERATING PROCEDURES

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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.