1ST QUARTER 2021 GROUNDWATER ASSESSMENT MONITORING REPORT MARCH 2021 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

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CEC PROJECT 181-364

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EXECUTIVE SUMMARY

This report documents the 1st quarter 2021 assessment-monitoring event, which was performed at the former Environmental Waste Solutions, LLC (EWS) Camden Class II Landfill on March 2, 2021.

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

Beginning in 2008, the site entered into the Groundwater Detection-Monitoring Program, and groundwater samples were collected from site monitoring wells on a semi-annual basis. EWS entered the Assessment Monitoring Program because of chloride concentrations reported above the 250 mg/l EPA secondary drinking water standard (2DWS) at monitoring well MW-3 during the November 2015 semi-annual detection-monitoring event. As a result, additional groundwater quality assessment activities were completed which included the installation of a new permanent groundwater monitoring well (MW-5), the installation of three (3) temporary monitoring wells (TMW-1, TMW-2, TMW-3), and completion of a private water-use survey. In addition, the semi-annual detection monitoring frequency was increased from semi-annual to quarterly assessment monitoring. The observed chloride concentration at MW-3 during this March 2021 event (18.4 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 1st quarter 2021 sampling event at the facility included the following sampling activities:

Groundwater samples were collected by CEC on March 2, 2021 from MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3. No leachate samples were collected from the "Industrial Waste Cell (IWC)" or the "Aluminum Processing Waste Cell (APWC)" during this sampling event since leachate was not currently being generated from the IWC or APWC. The amount of leachate produced from the IWC and APWC has been minimal since the landfill was capped, and the leachate flows being pumped from the IWC cell have been intermittent.

Pace Analytical (Pace) is the laboratory sub-contracted to perform the chemical analyses. Laboratory reports for the 1st quarter 2021 groundwater analyses were prepared by Pace and reported to CEC on March 10th, 2021 for the groundwater 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 at MW-3 (0.00249 mg/l) and the duplicate sample collected from MW-3 (0.00252 mg/l) during this March 2021 sampling event, which were less than the respective EPA maximum contamination limit (MCL) of 0.005 mg/l. In addition, the total cadmium detection during this event was lower in concentration than the concentrations reported during the previous two monitoring events in June 2020 and November 2020. 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 20 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). Since the fall of 2018, the total cadmium concentrations observed in MW-3 have shown an overall decrease in concentration. 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.

Nine 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), sulfate (MW-3), and zinc (MW-3). The chloride, total cadmium, 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 20.10 feet below the top of casing at the up-gradient monitor well MW-1 to approximately 7.60 feet below the top of casing at monitor well MW-4. The potentiometric gradient calculated from groundwater elevation data collected on March 2nd, 2021 is approximately 1.18%.

The potentiometric gradient is calculated according to the following formula:

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

$$\frac{(396.37') - (373.87')}{1{,}910'} * 100 = 1.18\%$$

The above calculation assumes a perpendicular gradient between the potentiometric elevations from MW-1 and MW-4. These assumptions may provide an artificially higher potentiometric gradient than is likely occurring at the site.

2.5 HYDRAULIC CONDUCTIVITY

Hydraulic conductivity estimations within the uppermost aquifer occurring beneath the landfill have not been determined at this time.

3.0 GROUNDWATER SAMPLING PROCEDURES

3.1 INSTRUMENTATION

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

3.2 GROUNDWATER PURGING AND COLLECTION OF FIELD PARAMETER VALUES

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

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

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

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

During the March 2nd, 2021 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.

A summary of 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 the field information logs located in **Appendix C – Laboratory Analytical Report & Field Information Logs.**

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

The amount of leachate produced from the "Industrial Waste Cell (IWC)" and "Aluminum Processing Waste Cell (APWC)" has been minimal since the landfill was capped, and the leachate being pumped from the IWC and APWC cells has been intermittent. During this March 2021 groundwater-sampling event, no leachate was being pumped from the IWC or APWC. Therefore, no IWC or APWC leachate samples were collected for analysis during this monitoring event. However, attempts will be made to sample the IWC and APWC leachate during the next scheduled pumping event. 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-1 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 QA/QC laboratory analytical results to CEC on March 10th, 2021. 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 report from the March 2021 event indicated that the same analyte was found in the associated laboratory method blank for the detected concentrations of chromium (MW-3, MW-3 Duplicate, MW-5, and TMW-3) and zinc (MW-3, MW-3 Duplicate) as indicated by laboratory qualifier "B". The associated method blank sample result indicated values for chromium (0.00163 mg/l) and zinc (0.00451 mg/l), which were estimated values as indicated by laboratory method blank qualifier "J", meaning that these method blank values were less than the respective PQL, but greater than the respective MDLs for each constituent. Since the same constituent concentrations were found in the method blank, the reported concentrations (indicated as laboratory qualifier "B") may be falsely higher than the actual concentrations. 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 each sample kit from Pace to the former EWS Class II Landfill site and back to Pace for analysis. 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 1st quarter 2021 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

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 **not** detected above the MCL (0.01 mg/l) at up-gradient MW-1 (0.00577 mg/l) during this 1st Quarter 2021 event. Arsenic has been detected at concentrations that exceed the MCL during previous monitoring events 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 March 2021 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 detected below the MCL (0.005 mg/l) at MW-3 and the duplicate sample collected from MW-3 during this March 2021 monitoring event. 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)
3/2/2021	**0.00249**	NA	**5.38**
12/8/2020	**0.00906**	**0.00787**	**10.8**
11/17/2020	**0.00816**	NA	**14.0**
8/26/2020	**0.00242**	NA	**6.66**
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

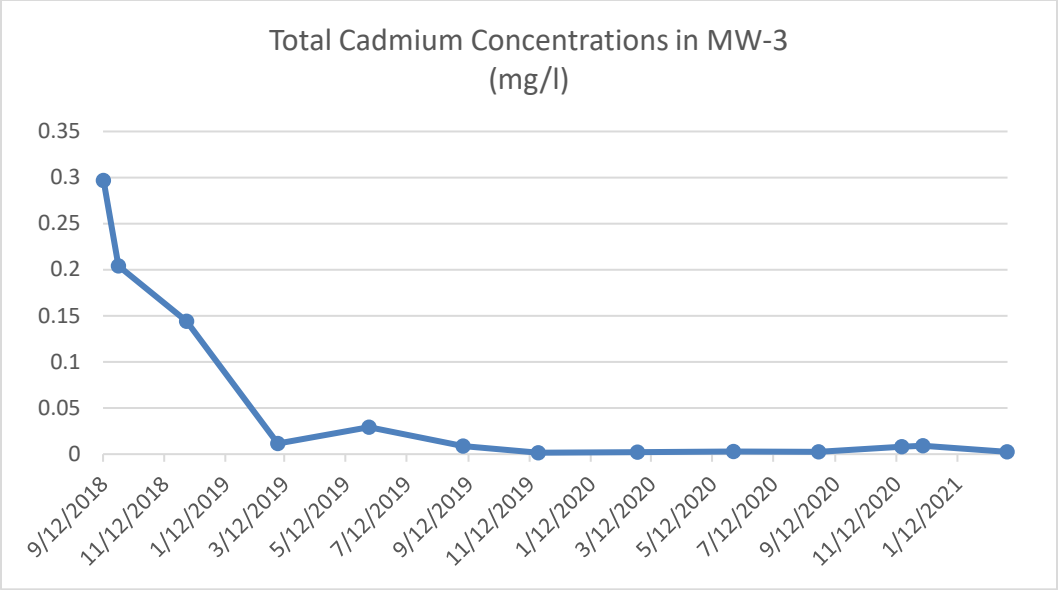


Figure – Cadmium concentrations in MW-3

Since the fall of 2018, the total cadmium observed in MW-3 has shown an overall decrease in concentration. During the previous four consecutive sampling events from November 2019 to August 2020, the cadmium concentrations at MW-3 were below the MCL. However, during the previous November 17, 2020 sampling event and the verification re-sample event on December 8, 2020, the observed cadmium concentrations at MW-3 were slightly above the MCL before returning below the MCL during this March 2021 event. Although the cadmium concentrations during the previous November 2020 event were above the MCL, these concentrations remain significantly lower than the concentrations observed in 2018. TDEC and CEC will continue to carefully monitor the total cadmium concentrations at MW-3 during future events.

Total Cobalt was detected in up-gradient well MW-1 (0.0313 mg/l). Cobalt was not detected in any down-gradient wells during this March 2021 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 March 2021 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-3 (0.00235 mg/l), MW-5 (0.00448 mg/l), and TMW-3 (0.00228 mg/l) which were not above the MCL of 0.1 mg/l for chromium.

Total Mercury was detected in up-gradient well MW-1 (0.00131 mg/l) during this March 2021 monitoring event, which was below the MCL of 0.002 mg/l for mercury concentrations. Total mercury has consistently been detected above the PQL at MW-1 since January 2009. Total

mercury was not detected above the laboratory PQL (0.000200 mg/l) at any of the down-gradient wells during this March 2021 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.

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

Laboratory analytical results for the groundwater samples collected during the March 2021 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 wells MW-3, MW-5, TMW-1, TMW-2, and TMW-3; **iron** in up-gradient well MW-1 and down-gradient well MW-5, TMW-1, and TMW-3; 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** concentrations observed in MW-3 (0.25 mg/l), MW-5 (0.51 mg/l), TMW-1 (0.303 mg/l), TMW-2 (0.371 mg/l), and TMW-3 (1.04) during this March 2021 sampling event were above the 2DWS (0.2 mg/l). During the previous August 2020 event, total aluminum was not detected above the PQL (<0.1 mg/l) in MW-3, MW-5, or TMW-2. Total aluminum was also detected in upgradient well MW-1 (0.152 mg/l), but below the 2DWS (0.2 mg/l). Aluminum was not detected above the PQL (<0.1 mg/l) at MW-4 during this March 2021 event.

The **Chloride** concentrations reported at MW-1 (2.15 mg/l), MW-3 (18.4 mg/l), MW-4 (9.45 mg/l), MW-5 (75.7 mg/l), TMW-1 (28 mg/l), TMW-2 (39.5 mg/l), and TMW-3 (65.1 mg/l) during this March 2021 event were below the 2DWS for chloride concentrations (250 mg/l). The chloride concentrations for this March 2021 event are similar to the concentrations observed at samples collected from each well during the previous November 2020 event. The chloride concentration at MW-3 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).

Fluoride was not detected above the PQLs of the laboratory in any wells during this March 2021 sampling event.

Total Iron was detected above the 2DWS (0.3 mg/l) in up-gradient well MW-1 (3.43 mg/l) and down-gradient well MW-5 (0.48 mg/l), TMW-1 (0.307 mg/l), and TMW-3 (0.966 mg/l) during this March 2021 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 March 2021 event at wells MW-3 (0.122 mg/l), MW-4 (0.177 mg/l), and TMW-2 (0.284 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 (0.741 mg/l) and down-gradient wells MW-3 (0.0808 mg/l), and MW-5 (0.242 mg/l) during the March 2021 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. During this March 2021 event, total manganese was also detected below 2DWS (0.05 mg/l) but above the laboratory PQL (<0.005 mg/l) in wells MW-4 (0.0127 mg/l), TMW-1 (0.035 mg/l), TMW-2 (00573 mg/l), and TMW-3 (0.0181 mg/l).

Total Nickel was detected in up-gradient well MW-1 (0.0057 mg/l) and down-gradient wells MW-3 (0.00347 mg/l) and MW-5 (0.00676 mg/l) during the March 2021 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 (50.4 mg/l) during this March 2021 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 was also detected in MW-1 (8.91 mg/l) and MW-5 (12.9 mg/l) during this March 2021 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 March 2021 event (5.21 mg/l) is lower than the previous November 2020 (6.86 mg/l) event. Overall, total magnesium levels in MW-3 have been decreasing since 2018.

Magnesium was also detected above the laboratory PQL (1.00 mg/l) during the March 2021 event in MW-1 (2.7 mg/l), MW-4 (3 mg/l), and MW-5 (11.7 mg/l), TMW-1 (3.73 mg/l), TMW-2 (5.02 mg/l), and TMW-3 (7.05 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. Six (6) QC qualifier codes (B, E, J, J3, J6, and V) were indicated during the laboratory analysis of groundwater samples collected during the March 02, 2021 event. Specific information concerning each laboratory QC qualifier code can be found on page 49 of 52 in the March 10, 2021 Laboratory Analytical Report in **Appendix C**.

5.0 STATISTICAL ANALYSIS

5.1 APPLICABLE METHODS

The Rules of the Tennessee Department of Environment and Conservation, Division of Solid Waste Management Chapter 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 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 (arsenic, barium, chloride, nickel, and mercury data) for MW-1 were not normally distributed and were evaluated using intra-well non-parametric statistical methods.

Inter-well analyses compared the concentrations observed at the down-gradient monitoring locations (MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3) to the concentrations observed at the up-gradient monitoring location (MW-1) during this monitoring event. Chloride data 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, 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 (40.00% non-detects) and barium (7.05% 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, 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.

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 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, sulfate at MW-3, and zinc at MW-3. When considering data since the November 10, 2016 sampling event, 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; 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. The total cadmium

concentrations observed at MW-3 were above the MCL of 0.005 mg/l from June 2017 to September 2019, and during the previous two sampling events in November 2020 and December 2020. However, the total cadmium concentrations observed at MW-3 from November 2019 to August 2020 were below the MCL. In addition, the total cadmium concentration observed during this March 2021 sampling event was below the MCL. Although the total cadmium concentration at MW-3 during this event was indicated as an SSI, no distinct statistically significant trend was identified by Mann-Kendall for total cadmium concentrations at MW-3 when considering data from the past 20 sampling events since November 10, 2016.

The chloride concentrations observed at MW-3 (18.4 mg/l), MW-4 (9.45 mg/l), MW-5 (75.7 mg/l), TMW-1 (28.0 mg/l), TMW-2 (39.5 mg/l), and TMW-3 (65.1 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 17 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-3 (0.00235 mg/l), (MW-5 (0.00448 mg/l), and TMW-3 (0.00228 mg/l) were less than the MCL (0.1 mg/l), and did not produce SSIs in reported concentrations during this event. When considering chromium data from MW-3, MW-5, and TMW-3 since November 2016, the data did not show an upward or downward trend in chromium concentrations at MW-5 using the Mann-Kendall trend analysis at the 95% confidence level. It should also be noted that the chromium detections reported during this event at MW-3, MW-5, and TMW-3 may be slightly biased high, considering chromium was detected in the associated lab method blank samples at these locations.

A SSI for 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 (50.4 mg/l) was lower than the previous November 2020 sample event (61.4mg/l), and remains below the 2DWS of 250 mg/l. Sulfate was also detected in MW-5 (12.9 mg/l) during this March 2021 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 concentrations observed at MW-3 (0.0292 mg/l) produced an SSI over background during this event. The zinc concentrations at MW-3 was less than the 2DWS limit of 5 mg/l. Zinc was most recently indicated as a SSI at MW-3 during the previous June 2020 and November 2020 events. 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. It should also be noted that the zinc detection reported during this

event at MW-3 may be slightly biased high, considering zinc was detected in the associated lab method blank samples at MW-3. Zinc was not detected above the PQL in any of the other monitoring wells across the site.

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

6.0 CONCLUSIONS

The results of the first quarter assessment-monitoring event of 2021 are summarized as follows:

- SSIs included chloride (MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3), total cadmium (MW-3), sulfate (MW-3), and zinc (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; 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 generally improved since closure activities have been completed. During this monitoring event, the total cadmium detection at MW-3 was less than the MCL. 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 cadmium concentrations at MW-3 remain significantly lower than the cadmium concentrations observed at MW-3 in previous sampling events. TDEC and CEC expect that the total cadmium concentrations observed at MW-3 will continue to decrease since landfill closure activities have been completed. TDEC and CEC will continue to carefully monitor the total cadmium concentrations at MW-3 during future events.
- A SSI was identified for the reported sulfate concentration at MW-3. However, the sulfate concentrations at MW-3 do not exhibit a statistically significant increasing or decreasing trend when considering data from MW-3 since November 10, 2016.
- The chloride concentrations at MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3 remain 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 second quarter 2021 assessment-monitoring event is tentatively scheduled for May 2021 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 has been minimal since the landfill was capped, and the leachate being pumped from the IWC and APWC cells has been intermittent. If

possible, leachate samples will also be collected from the APWC and IWC during the second quarter 2021 assessment-monitoring event.

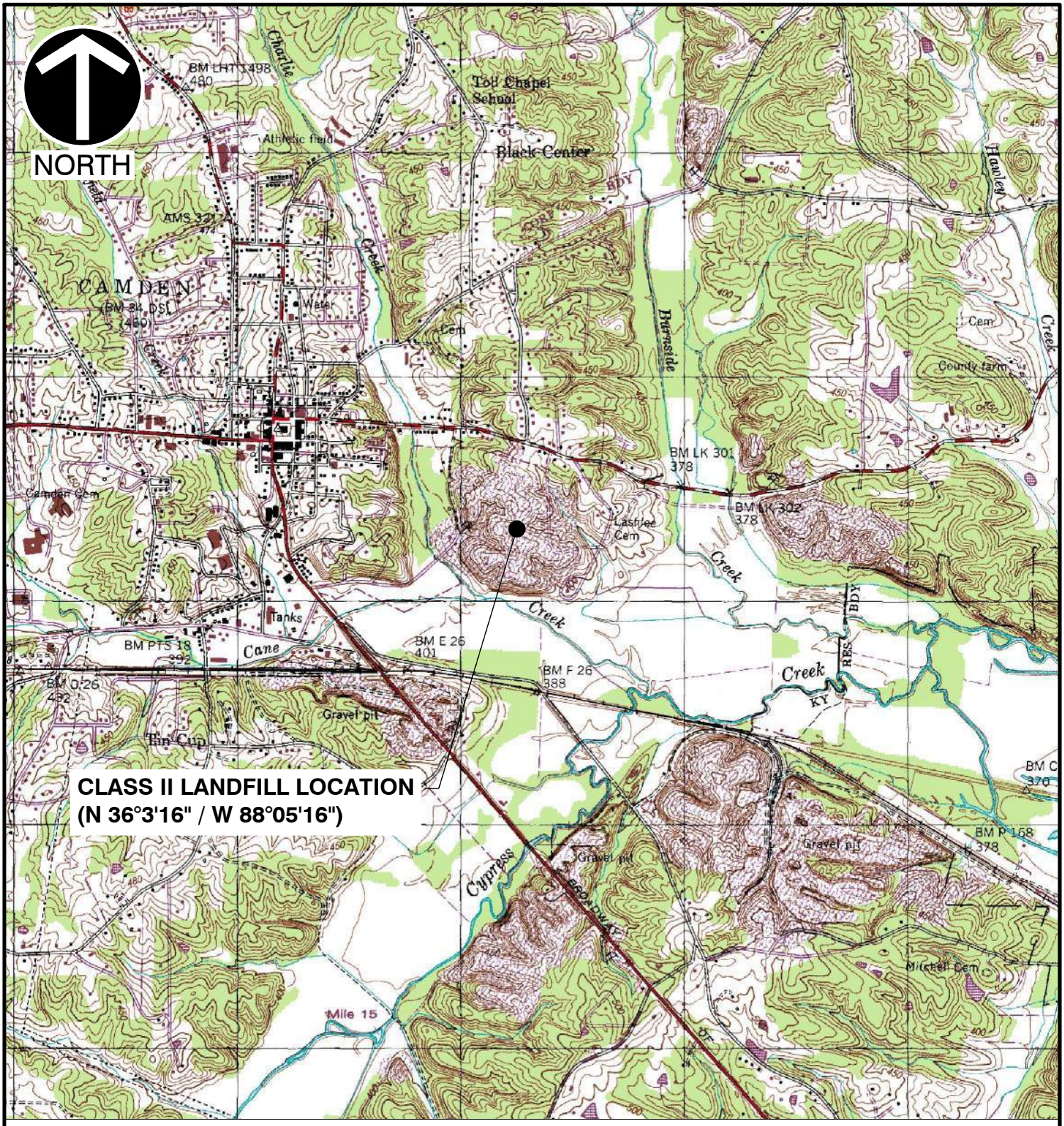
Since the former EWS Class II Landfill site remains in assessment monitoring, a private water use survey update is required annually. An annual water use survey update for the former EWS Class II Landfill site was completed by CEC in November 2020, and no new wells or springs were identified within the required search radius for the site during the November 2020 update. The annual 2020 water use survey update is documented in a separate report. The next scheduled water use survey update is scheduled for November 2021.

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.

* HAND SIGNATURE ON FILE

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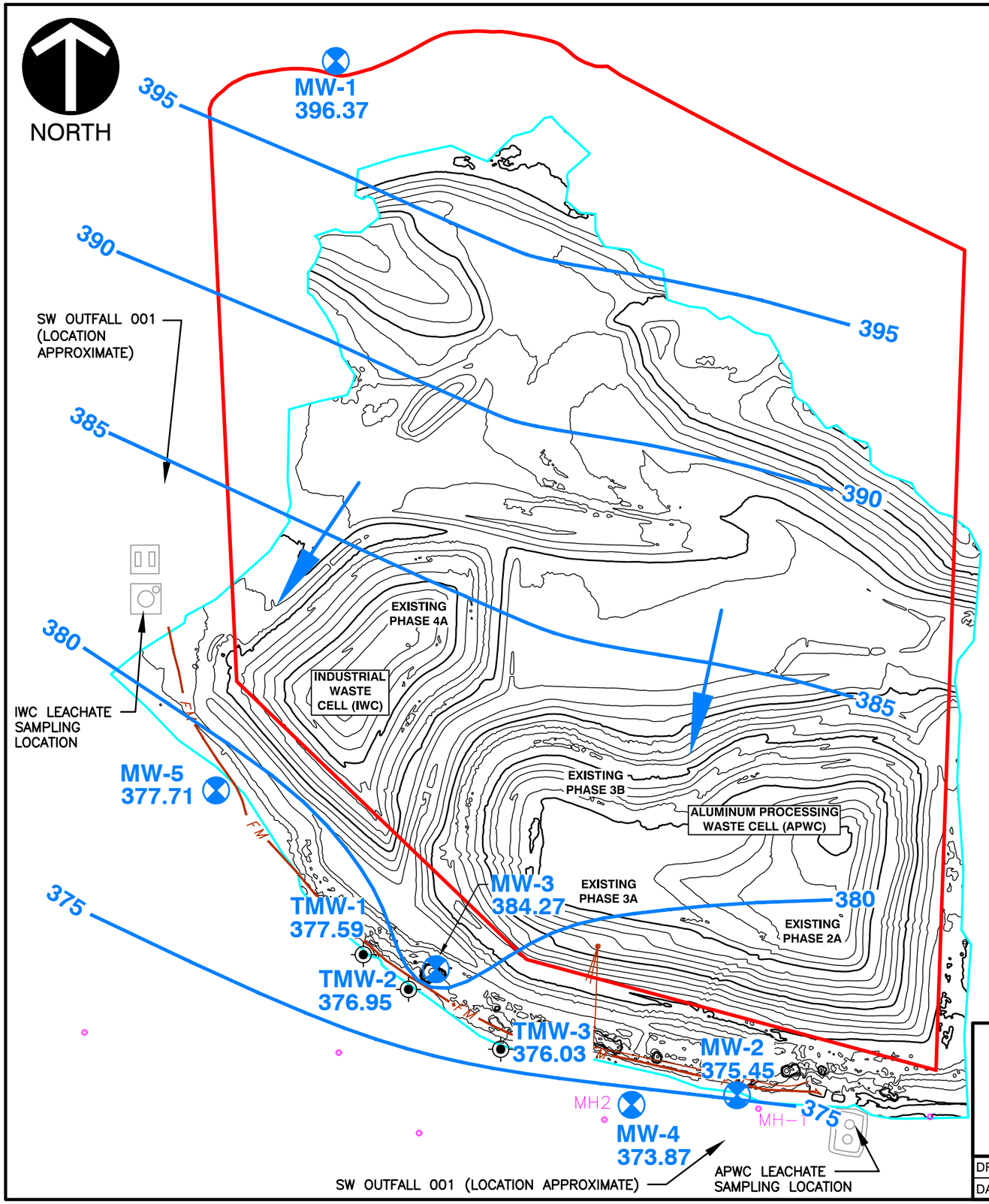
FORMER EWS SITE
CLASS II CAMDEN LANDFILL
CAMDEN, TENNESSEE

SITE LOCATION MAP 1Q2021

DRAWN BY:	AAB	CHECKED BY:	PC	APPROVED BY:	KBW*	FIGURE NO.:	1
DATE:	MARCH 2021	DWG SCALE:	1"=2000'	PROJECT NO:	181-364		

P:\2018\181-364\-CADD\Dwg\181-364_ FIGURE 1 - SITE LOCATION MAP.dwg{LAYOUT1} LS:(3/8/2021 - abaugh) - LP: 3/8/2021 2:12 PM



LEGEND

- MW1 396.37 — GROUND WATER MONITORING WELL GROUND WATER ELEVATION (FMSL)
- TMW-1 377.59 — 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.

$$i = \frac{396.37' \text{ (MW–1)} - 373.87' \text{ (MW–4)}}{1{,}910'} = 0.0118 \text{ ft/ft}$$

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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FORMER ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL
CAMDEN, TENNESSEE

MARCH 2021
POTENTIOMETRIC SURFACE MAP

DRAWN BY:	AAB	CHECKED BY:	PC	APPROVED BY:	*KW	FIGURE NO.:	2
DATE:	MARCH 2021	DWG SCALE:	1"=200'	PROJECT NO:	181-364.0005		

P:\2018\181-364\-CADD\DWG\181-364_ GROUNDWATER MAP MARCH 2021.DWG[FIG 2 (2)]LS:(LMCCULLOUGH - 4/30/2021) - LP: 5/3/2021_2:18:09_PM

Table 1

Former Environmental Waste Solutions Camden Class II Landfill

Field Parameters and Potentiometric Data - 1st Quarter 2021

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	3/2/2021	10:20	416.47	385.97	0.17	1.8	20.10	396.37	14.4	74.9	84.5	5.56	1.56	130.4	5.97
MW-2*	3/2/2021	11:40	380.35	367.70	0.17	1.3	4.90	375.45	9.3	196.6	280.0	5.96	3.36	193.6	8.61
MW-3	3/2/2021	12:55	392.90	365.10	0.17	3.3	8.63	384.27	12.7	168.1	219.5	4.98	2.81	223.0	5.38
MW-4	3/2/2021	12:15	381.47	358.37	0.17	2.6	7.60	373.87	13.3	63.4	81.7	5.55	2.80	202.2	5.11
MW-5	3/2/2021	11:20	385.25	351.40	0.17	4.5	7.54	377.71	15.4	285.2	349.1	5.30	0.88	188.8	9.70
TMW-1	3/2/2021	13:35	381.19	348.99	0.085	1.2	3.60	377.59	14.9	115.0	142.2	5.33	4.00	369.7	9.56
TMW-2	3/2/2021	12:45	384.27	356.77	0.085	0.9	7.32	376.95	14.9	137.1	170.3	5.33	4.95	397.1	8.53
TMW-3	3/2/2021	10:35	381.37	353.37	0.085	1.0	5.34	376.03	14.4	234.5	294.4	5.11	1.46	331.1	7.25
**Leachate (IWC-L)	3/2/2021	NS	NA	NA	NA	NA	NA	NA	NS	NS	NS	NS	NS	NS	NS
**Leachate (APWC-L)	3/2/2021	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 March 2, 2021.

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

**IWC-L and APWC-L were not producing leachate and were not sampled during this event.

NS= Not Sampled

NA= Not Applicable.

Table 2
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Groundwater and Leachate Analytical Data - 1st Quarter 2021

Parameter	MCL/GWPS (mg/l)	MW-1	Q	MW-3	Q	Duplicate (MW-3)	Q	MW-4	Q	MW-5	Q	TMW-1	Q	TMW-2	Q	TMW-3	Q	IWC-Leachate	Q	APWC-Leachate	Q	Field Blank	Q
		03/02/2021		03/02/2021		03/02/2021		03/02/2021		03/02/2021		03/02/2021		03/02/2021		03/02/2021		3/2/2021		3/2/2021		03/02/2021	
		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)	
Hardness	-	**30.2**		**56.8**		**56.6**		**26.1**		**92.5**		**47.7**		**55.3**		**84.0**		NS*		NS*		<2.50	
Alkalinity	-	**44.1**		<20.0		<20.0		**21.0**		<20.0		<20.0		<20.0		<20.0		NS*		NS*		<20.0	
Ammonia Nitrogen	-	<0.250		<0.250		<0.250		<0.250		<0.250		<0.250		<0.250		<0.250		NS*		NS*		<0.250	
COD	-	<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		NS*		NS*		<20.0	
Boron	-	<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		NS*		NS*		<0.200	
Bromide	-	<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		NS*		NS*		<1.00	
Chloride	250 [2]	**2.15**		**18.4**		**17.9**		**9.45**		**75.7**		**28.0**		**39.5**		**65.1**		NS*		NS*		<1.00	
Fluoride	2 [2]	<0.150		<0.150		<0.150		<0.150		<0.150		<0.150		<0.150		<0.150		NS*		NS*		<0.150	
Nitrate	10 [1]	<0.100		**0.459**		**0.482**		**0.847**		**1.27**		**1.72**		**0.878**		**5.70**		NS*		NS*		<0.100	
Sulfate	250 [2]	**8.91**		**50.4**		**50.7**		<5.00		**12.9**		<5.00		<5.00		<5.00		NS*		NS*		<5.00	
Aluminum	0.2 [2]	**0.152**		**0.250**		**0.218**		<0.100		**0.510**		**0.303**		**0.371**		**1.04**		NS*		NS*		<0.100	
Antimony	0.006	<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		<0.00400		NS*		NS*		<0.00400	
Arsenic	0.01	**0.00577**		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Barium	2	**0.0222**		**0.0467**		**0.0464**		<0.0200		**0.0582**		<0.0200		**0.033**		**0.0514**		NS*		NS*		<0.0200	
Beryllium	0.004	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Cadmium	0.005	<0.00100		**0.00249**		**0.00252**		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		NS*		NS*		<0.00100	
Calcium	-	**7.63**		**14.2**		**14.1**		**5.50**		**17.8**		**13.0**		**13.9**		**22.0**		NS*		NS*		<1.00	
Chromium	0.1	<0.00200		**0.00235**	B	**0.00207**	B	<0.00200		**0.00448**	B	<0.00200		<0.00200		**0.00228**	B	NS*		NS*		<0.00200	
Cobalt	0.006 [3]	**0.0313**		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Copper	1.3	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		NS*		NS*		<0.00500	
Iron	0.3 [2]	**3.43**		**0.122**		**0.113**		**0.177**		**0.480**		**0.307**		**0.284**		**0.966**		NS*		NS*		<0.100	
Lead	0.015	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Magnesium	-	**2.70**		**5.21**		**5.23**		**3.00**		**11.7**		**3.73**		**5.02**		**7.05**		NS*		NS*		<1.00	
Manganese	0.05 [2]	**0.741**		**0.0808**		**0.078**		**0.0127**		**0.242**		**0.035**		**0.00573**		**0.0181**		NS*		NS*		<0.00500	
Nickel	0.10 [1]	**0.0057**		**0.00347**		**0.00332**		<0.00200		**0.00676**		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Potassium	-	<2.00		**3.27**		**3.26**		<2.00		<2.00		<2.00		<2.00		<2.00		NS*		NS*		<2.00	
Selenium	0.05	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Silver	0.10 [2]	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Sodium	-	**7.59**		**11.9**		**12.1**		**3.68**		**20.3**		**4.40**		**5.56**		**14.3**		NS*		NS*		<2.00	
Thallium	0.002	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS*		NS*		<0.00200	
Vanadium	-	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		NS*		NS*		<0.00500	
Zinc	5 [2]	<0.0250		**0.0292**	B	**0.0284**	B	<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		NS*		NS*		<0.0250	
Mercury	0.002	**0.00131**		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		NS*		NS*		<0.000200	

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. Leachate levels were minimal during the groundwater sampling event and no leachate samples were collected 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:
B The same analyte is found in the associated blank

Table 3
Intra-Well and Inter-Well Statistical Summary
Environmental Waste Solutions Camden Class II Landfill IDL 03-0212 (Terminated)
Inorganic Analytical Data - 1st Quarter 2021

Intra-Well Statistical Summary (Upgradient Background Well MW-1)							
Constituent	Well	% Non Detects	Normality	Intra-well NPPL	Intra-well PPL	Shewhart-Cusum	SSI
Arsenic	MW-1	0.00	non-parametric	Pass	--	Pass	No
Barium	MW-1	9.38	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	34.38	non-parametric	Pass	--	Pass	No
Mercury	MW-1	31.25	non-parametric	Pass	--	Pass	No

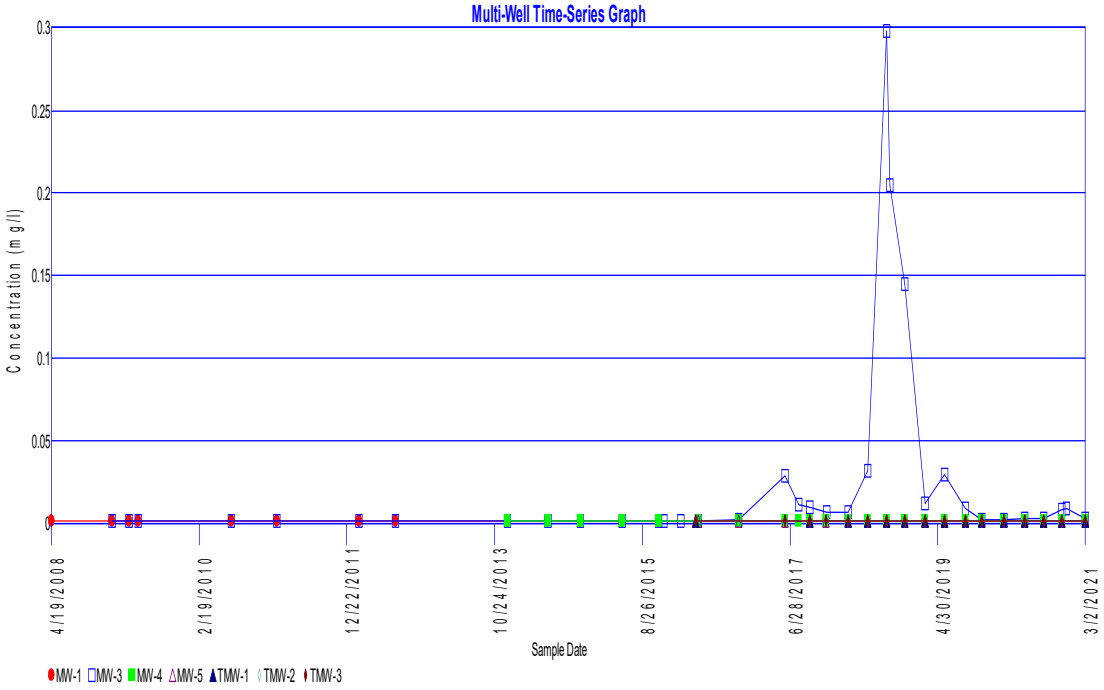
Inter-Well Statistical Summary (Downgradient Compliance Wells)								
Constituent	Well	Total % Non Detects	Normality	Inter-well NPPL	Inter-well PPL	Shewhart-Cusum	SSI	Mann-Kendall Trend Analysis[1]
Aluminum	MW-3	40.00	non-parametric	--	--	Pass	No	No Trend
	MW-5		non-parametric	--	--	Pass	No	No Trend
	TMW-1		non-parametric	--	--	Pass	No	No Trend
	TMW-2		non-parametric	--	--	Pass	No	**Downward Trend**
	TMW-3		non-parametric	--	--	Pass	No	No Trend
Barium	MW-3	7.05	non-parametric	--	--	Pass	No	**Downward Trend**
	MW-5		non-parametric	--	--	Pass	No	**Upward Trend**
	TMW-2		non-parametric	--	--	Pass	No	No Trend
	TMW-3		non-parametric	--	--	Pass	No	**Upward Trend**
Total Cadmium	MW-3	87.18	non-parametric	**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-3	73.55	non-parametric	Pass	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	No	No Trend
	TMW-3		non-parametric	Pass	--	--	No	No Trend
Nickel	MW-3	59.87	non-parametric	Pass	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	No	No Trend
Sulfate	MW-3	64.74	non-parametric	**Fail**	--	--	**Yes**	No Trend
	MW-5		non-parametric	Pass	--	--	No	**Upward Trend**
Zinc	MW-3	68.79	non-parametric	**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

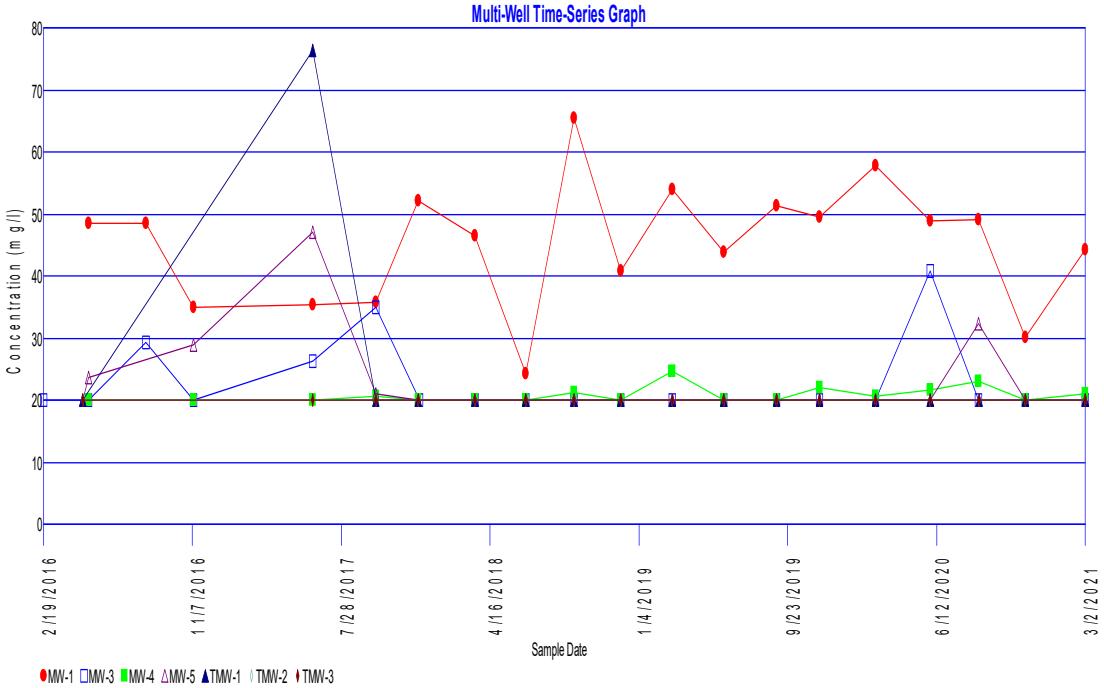
Total Cadmium

Multi-Well Time-Series Graph

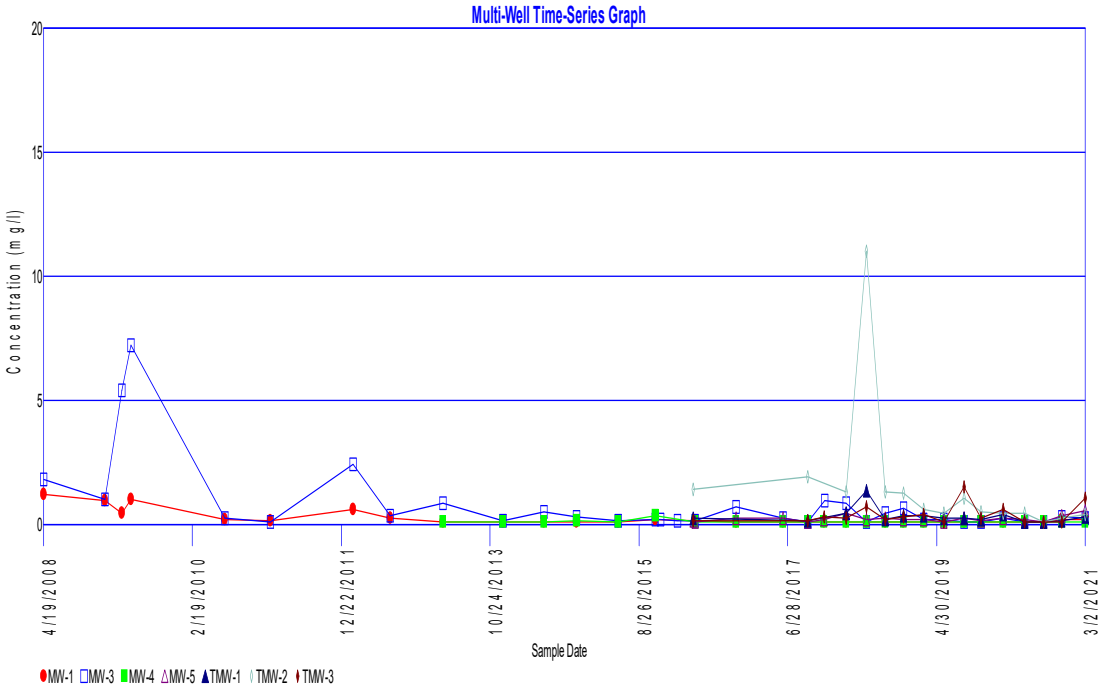


Alkalinity

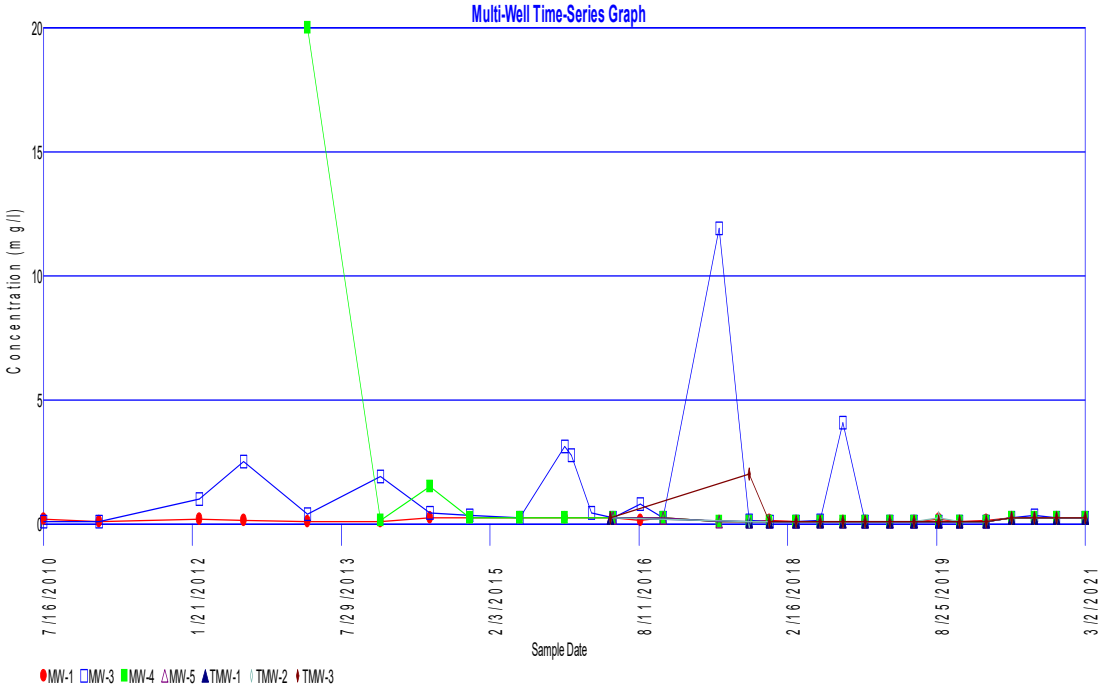
Multi-Well Time-Series Graph

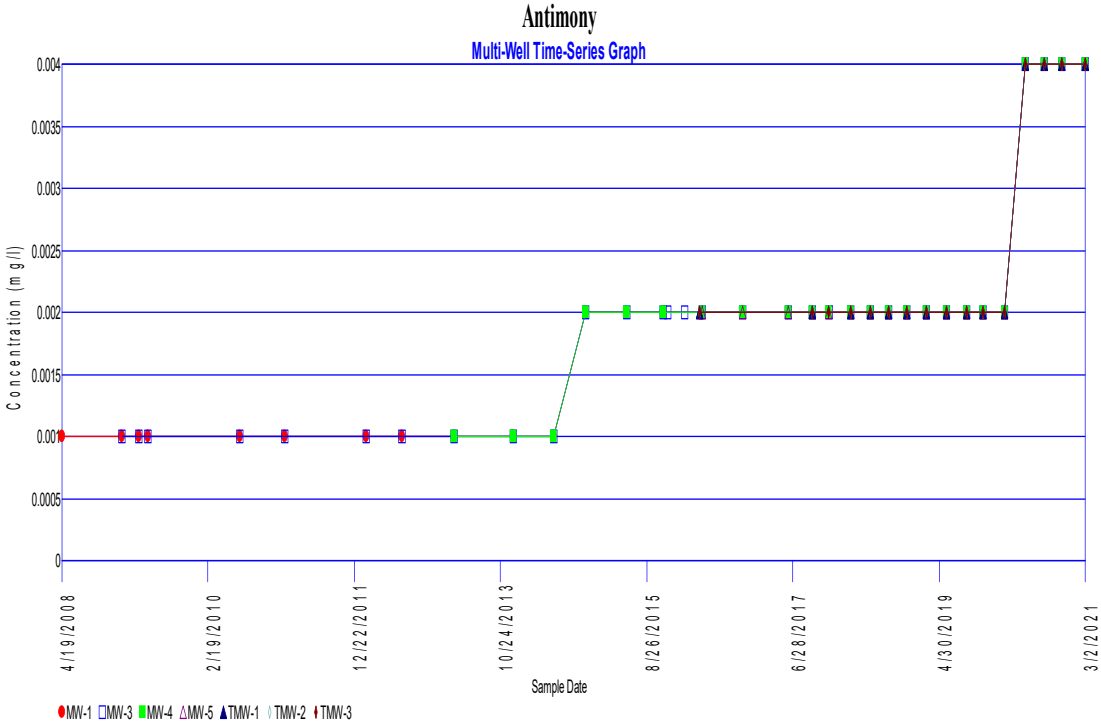


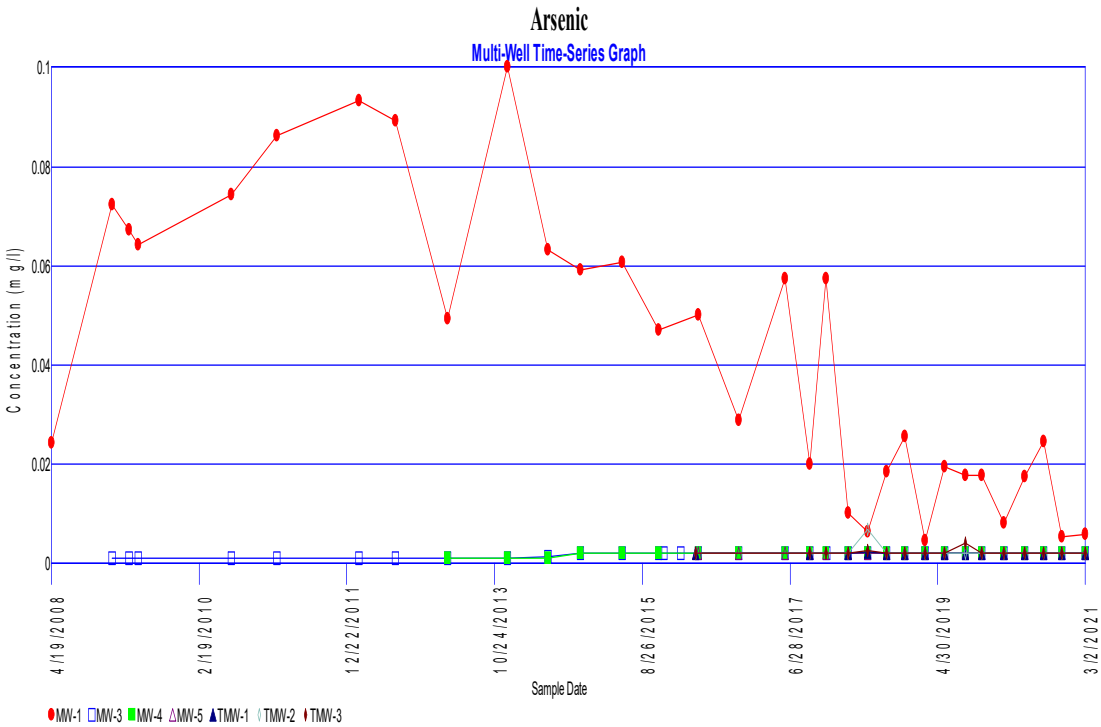
Aluminum



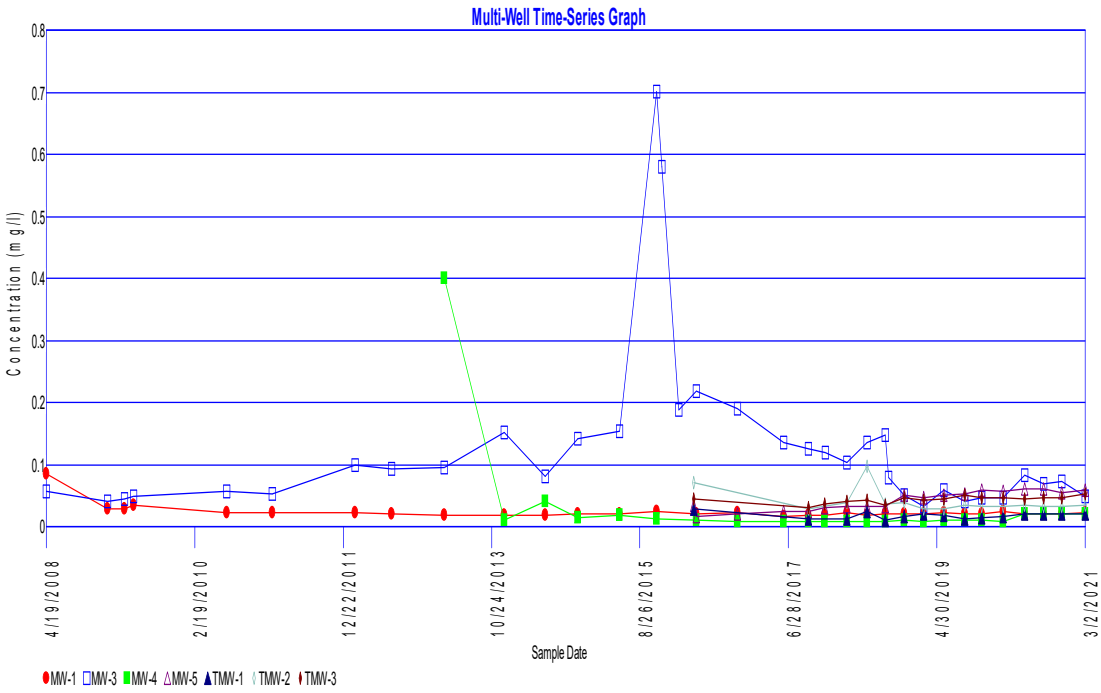
Ammonia Nitrogen



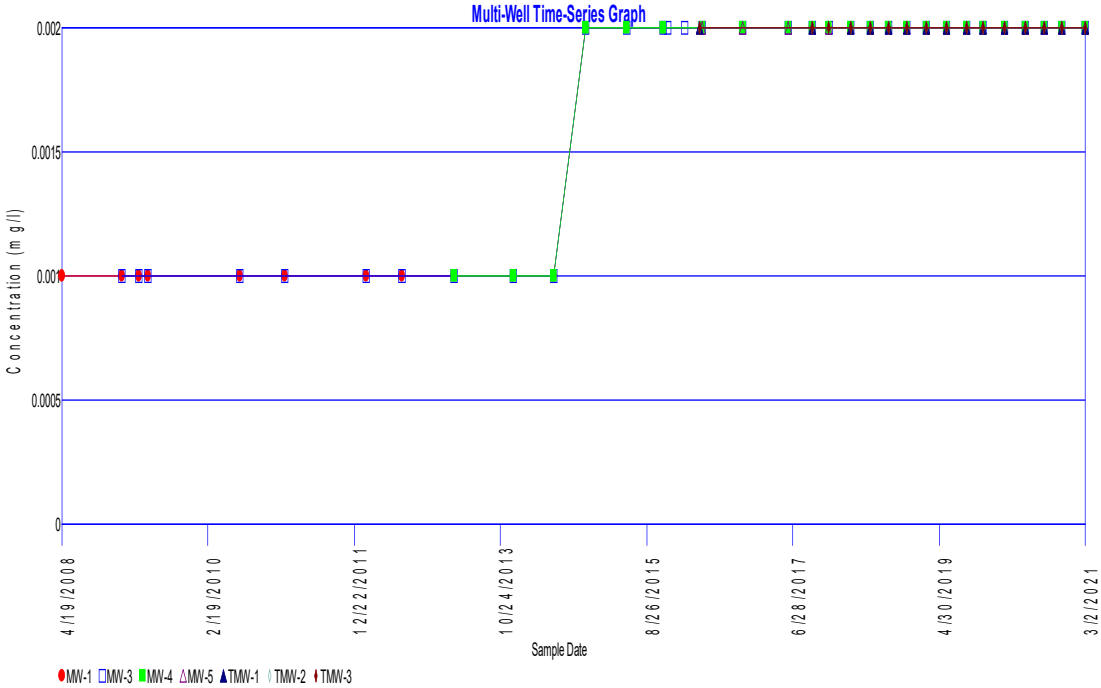

Antimony
Multi-Well Time-Series Graph
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
2/19/2010
12/22/2011
10/24/2013
8/26/2015
6/28/2017
4/30/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Arsenic
Multi-Well Time-Series Graph
0.1
0.08
0.06
0.04
0.02
0
Concentration (mg/l)
4/19/2008
2/19/2010
12/22/2011
10/24/2013
8/26/2015
6/28/2017
4/30/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

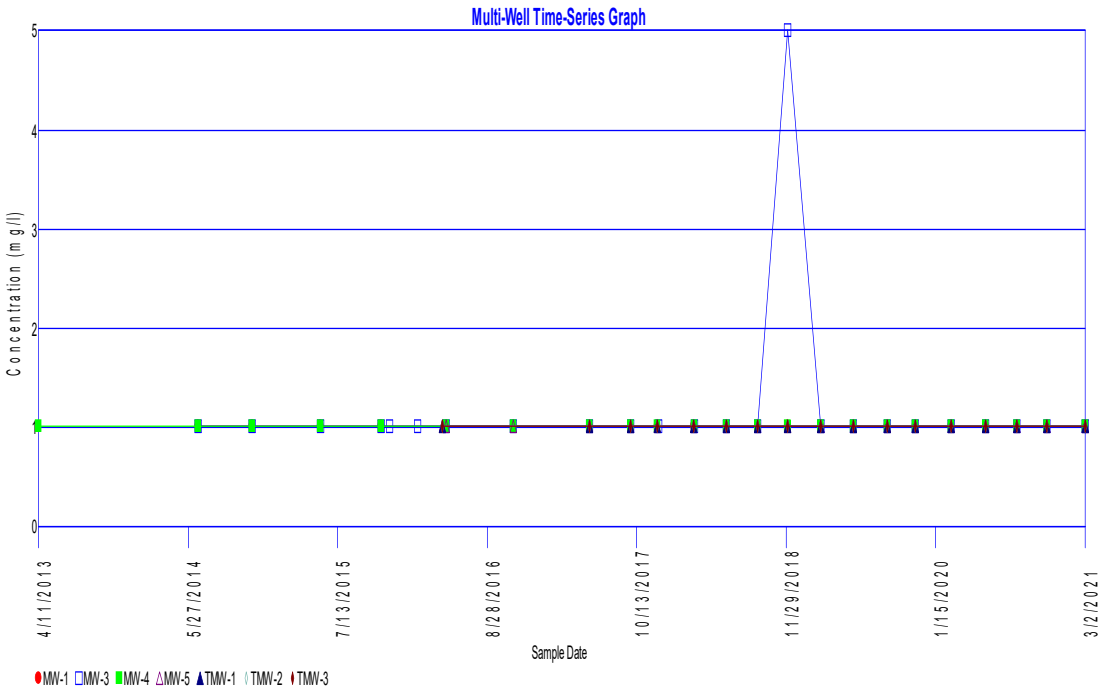
Barium



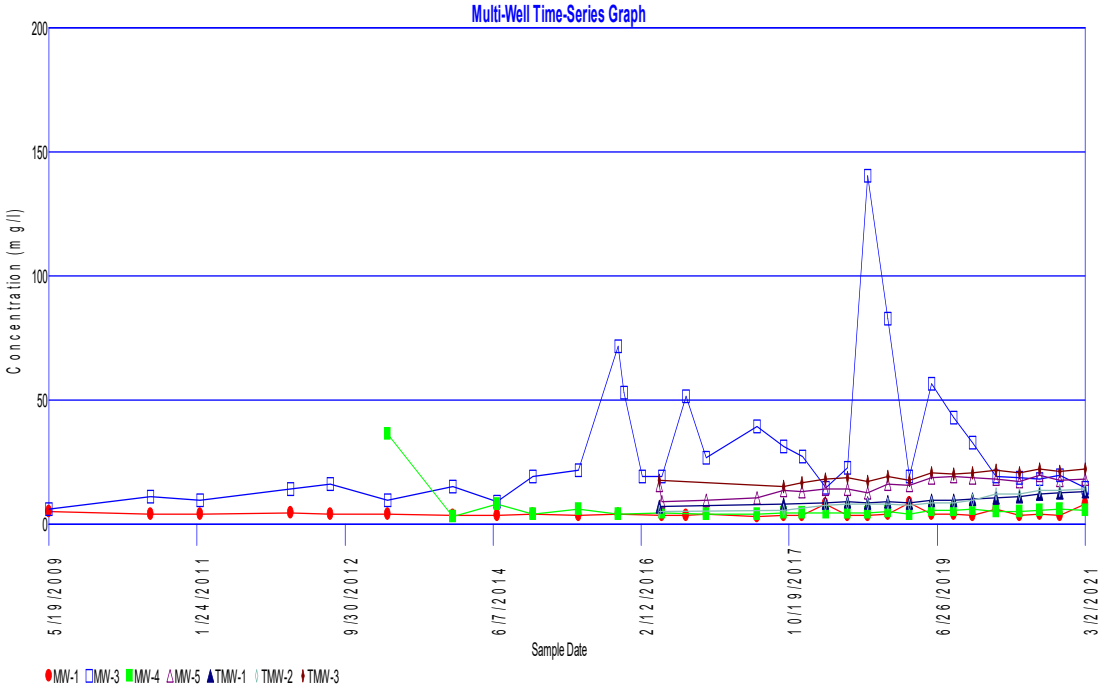
Beryllium



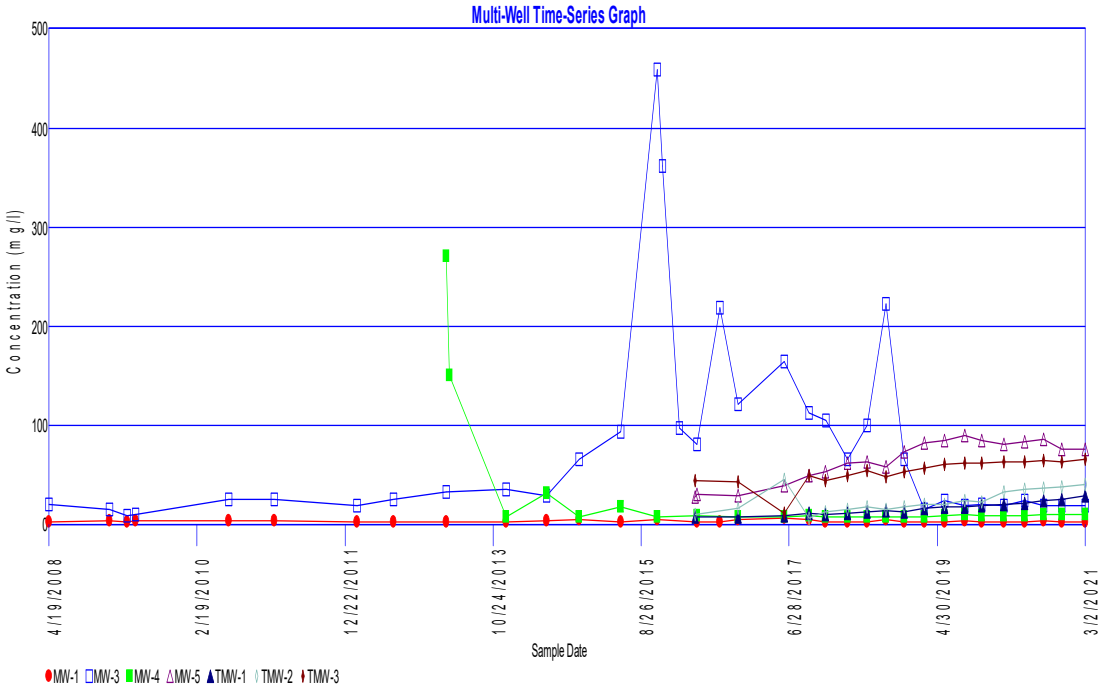
Bromide



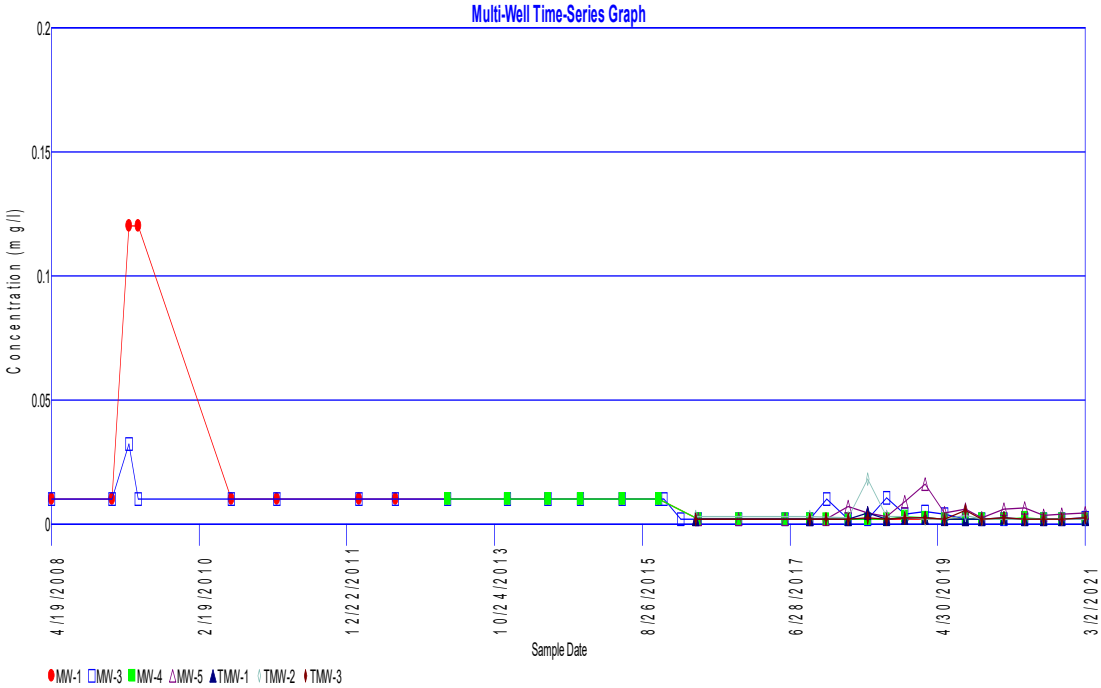
Calcium



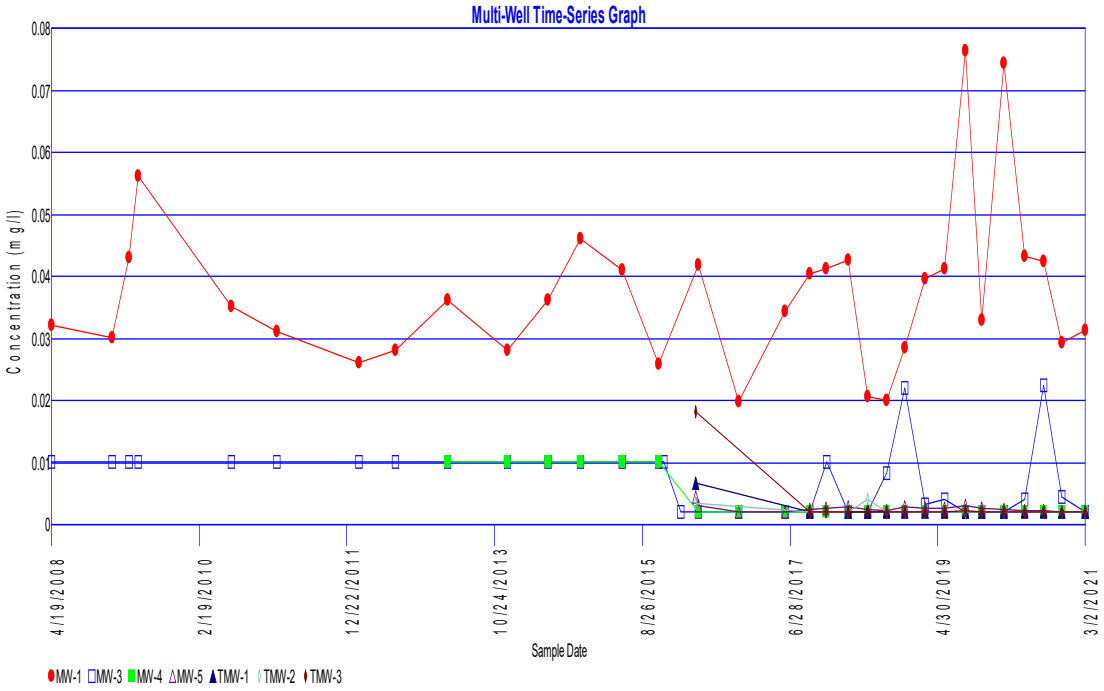
Chloride



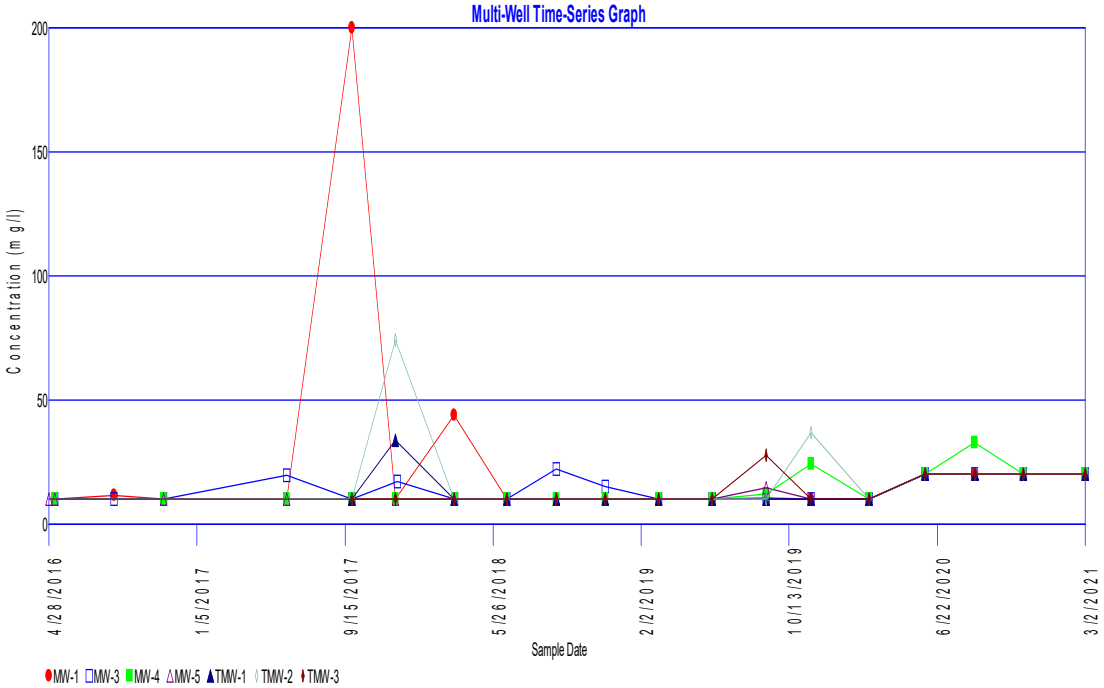
Chromium



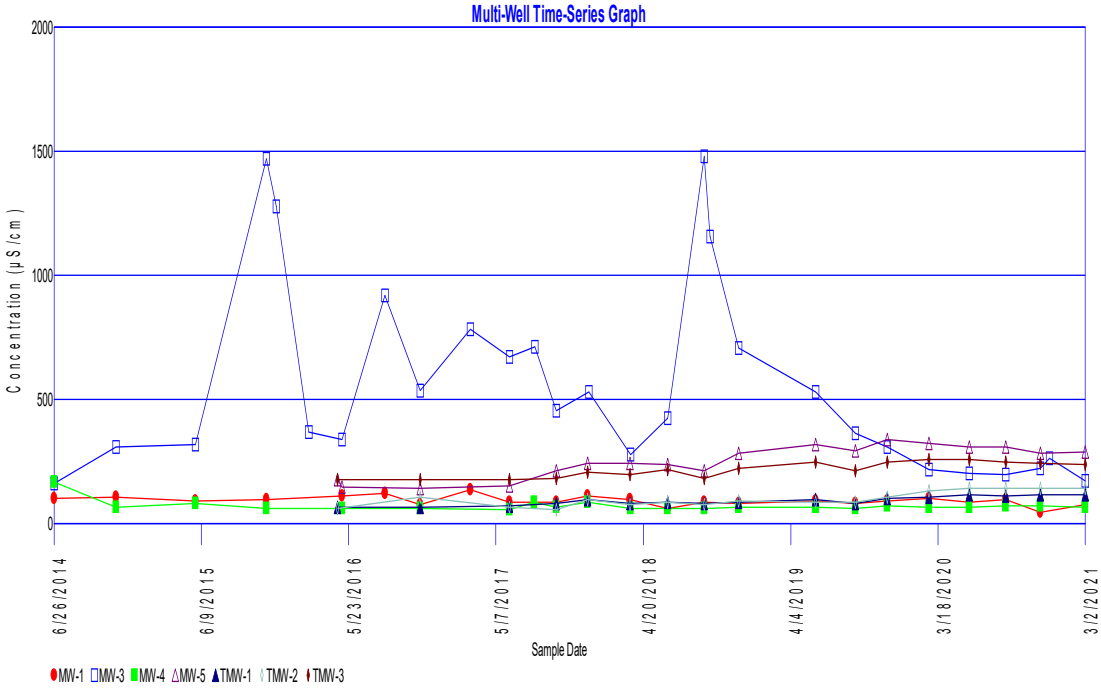
Cobalt


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
2/19/2010
12/22/2011
10/24/2013
8/26/2015
6/28/2017
4/30/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

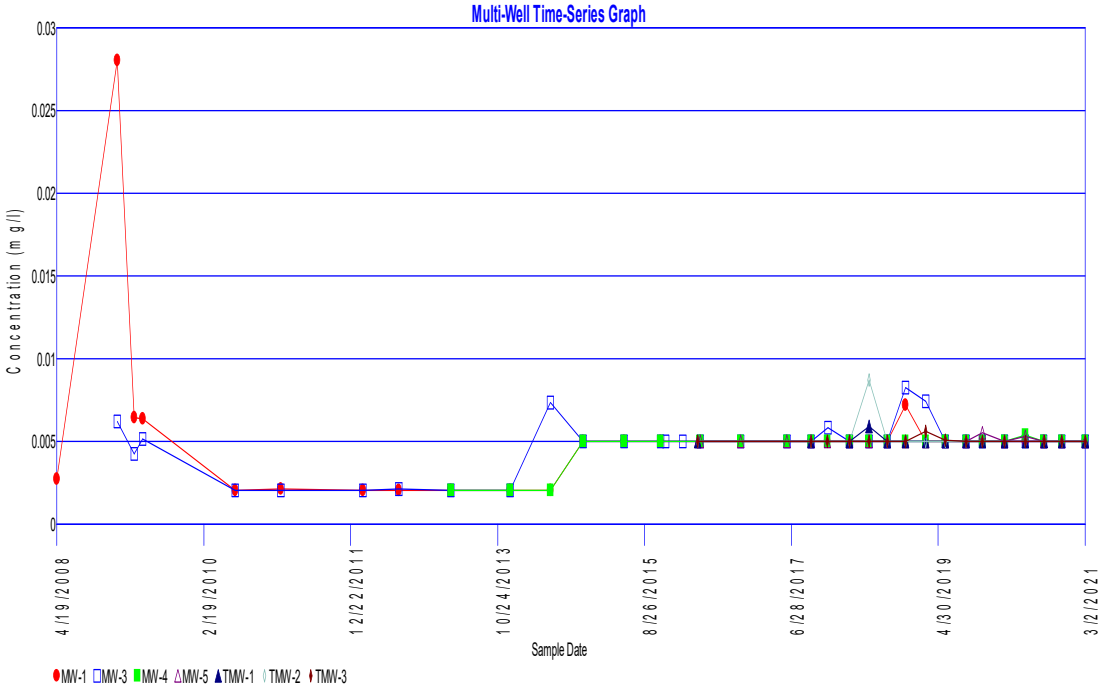
COD

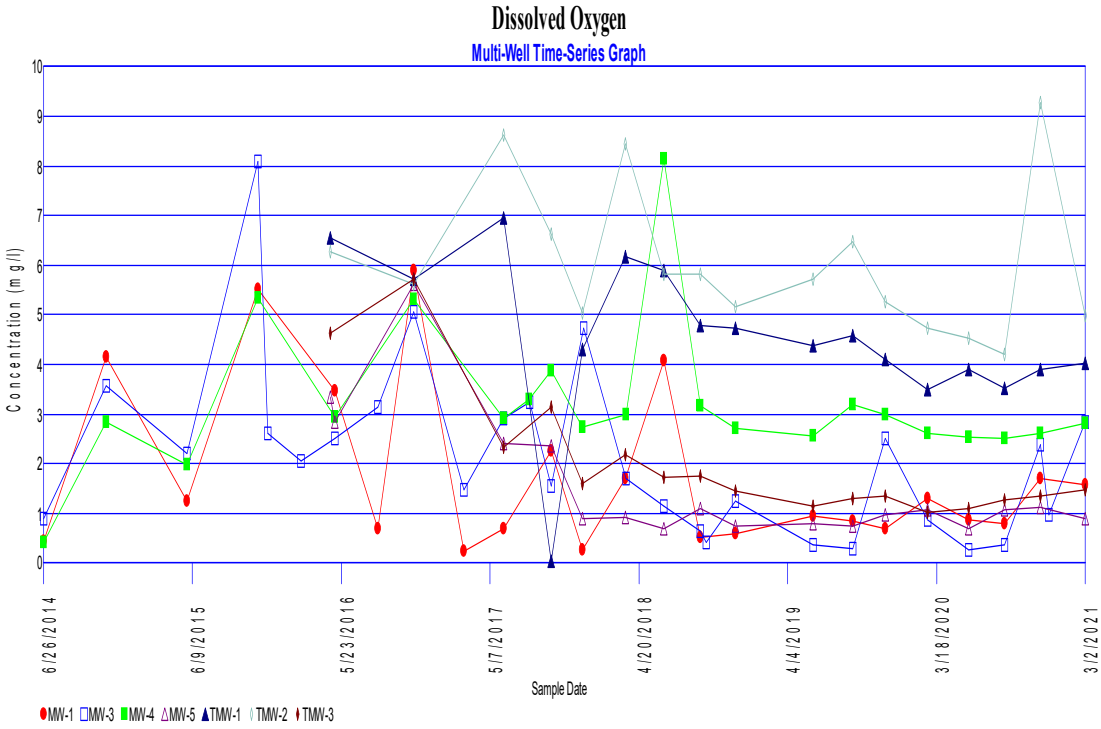

Multi-Well Time-Series Graph
200
150
100
50
0
Concentration (mg/l)
4/28/2016
1/5/2017
9/15/2017
5/26/2018
2/2/2019
10/13/2019
6/22/2020
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

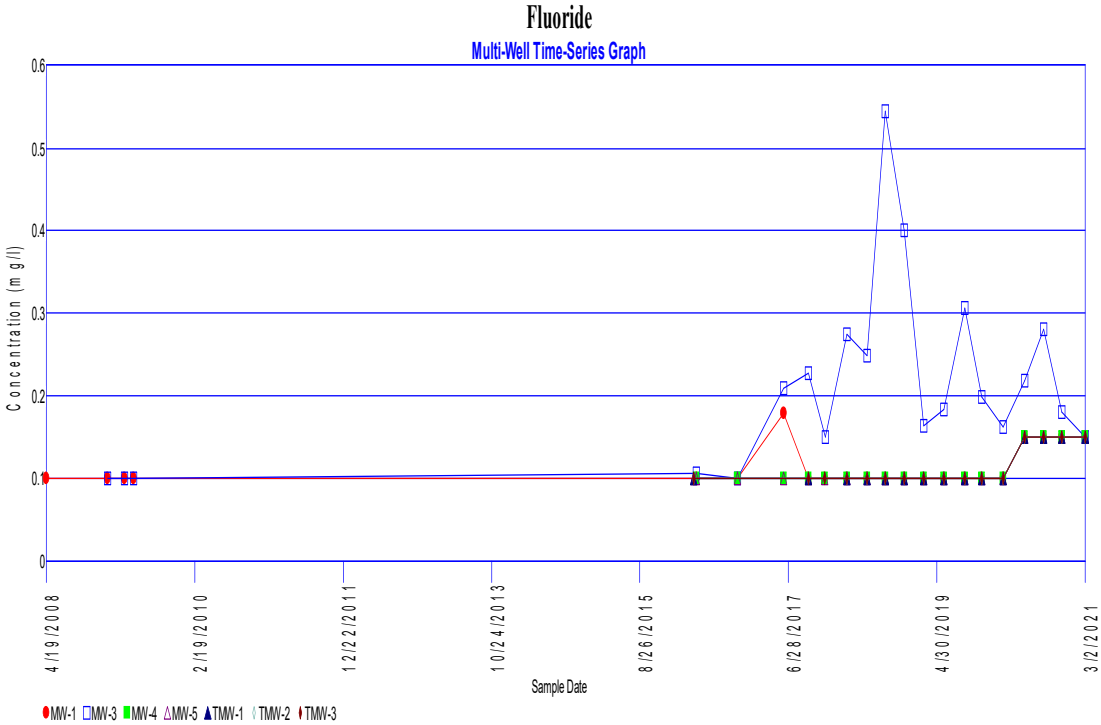
Conductivity



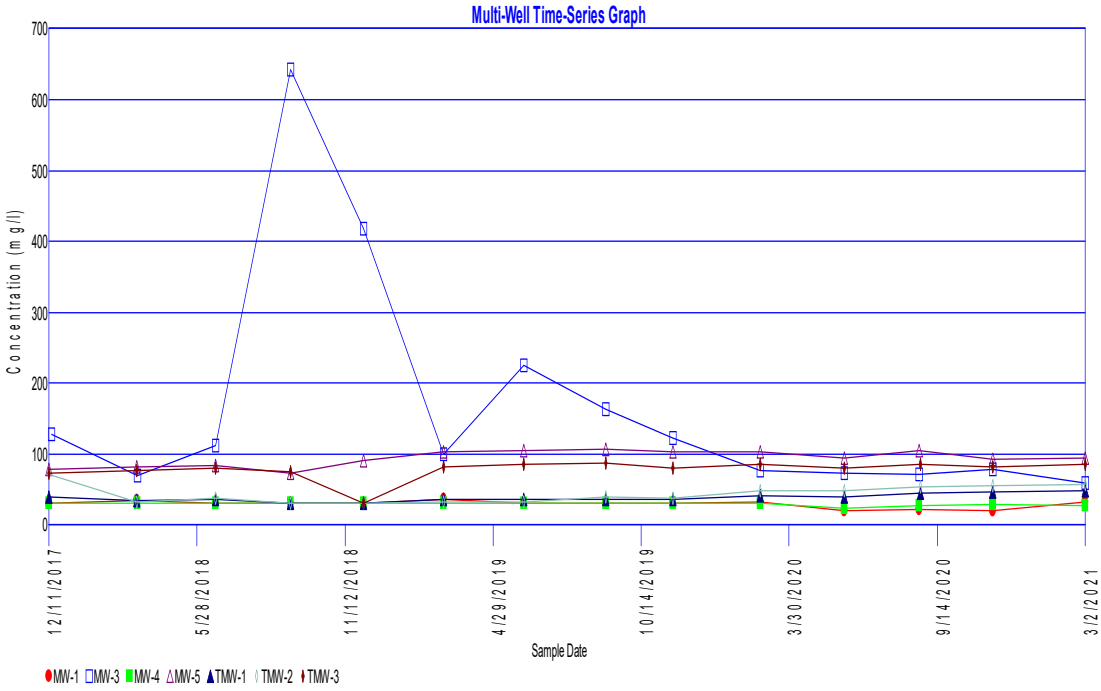
Copper



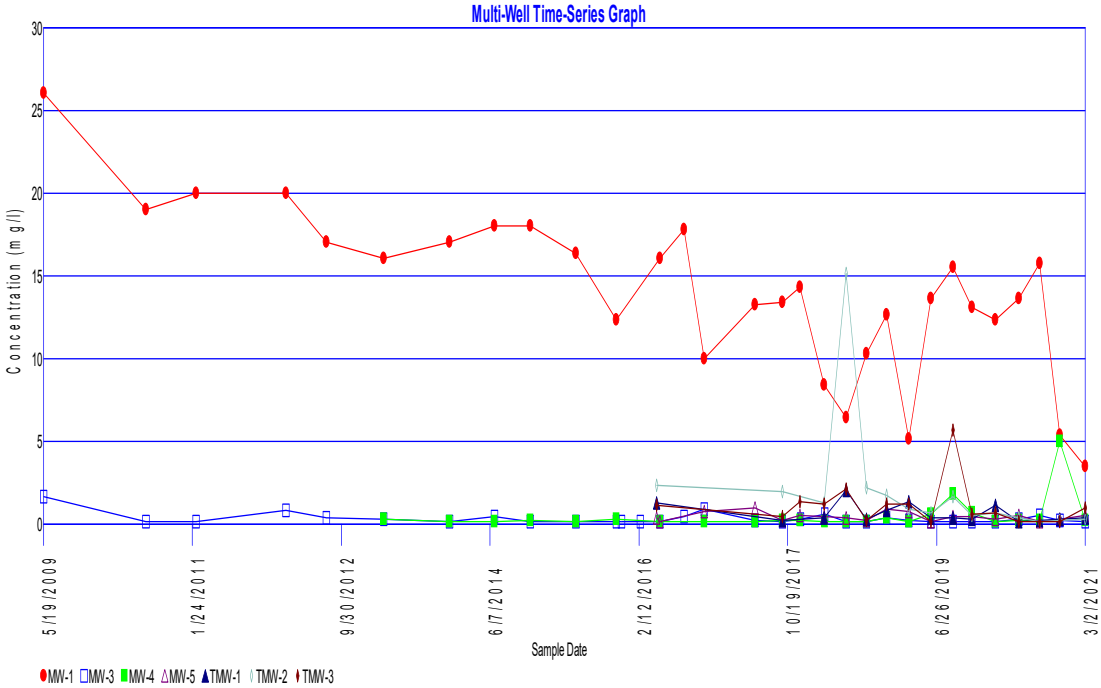

Dissolved Oxygen
Multi-Well Time-Series Graph
Concentration (mg/l)
10
9
8
7
6
5
4
3
2
1
0
6/26/2014
6/9/2015
5/23/2016
5/7/2017
4/20/2018
4/4/2019
3/18/2020
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Fluoride
Multi-Well Time-Series Graph
Concentration (mg/l)
0.6
0.5
0.4
0.3
0.2
0.1
0
4/19/2008
2/19/2010
12/22/2011
10/24/2013
8/26/2015
6/28/2017
4/30/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

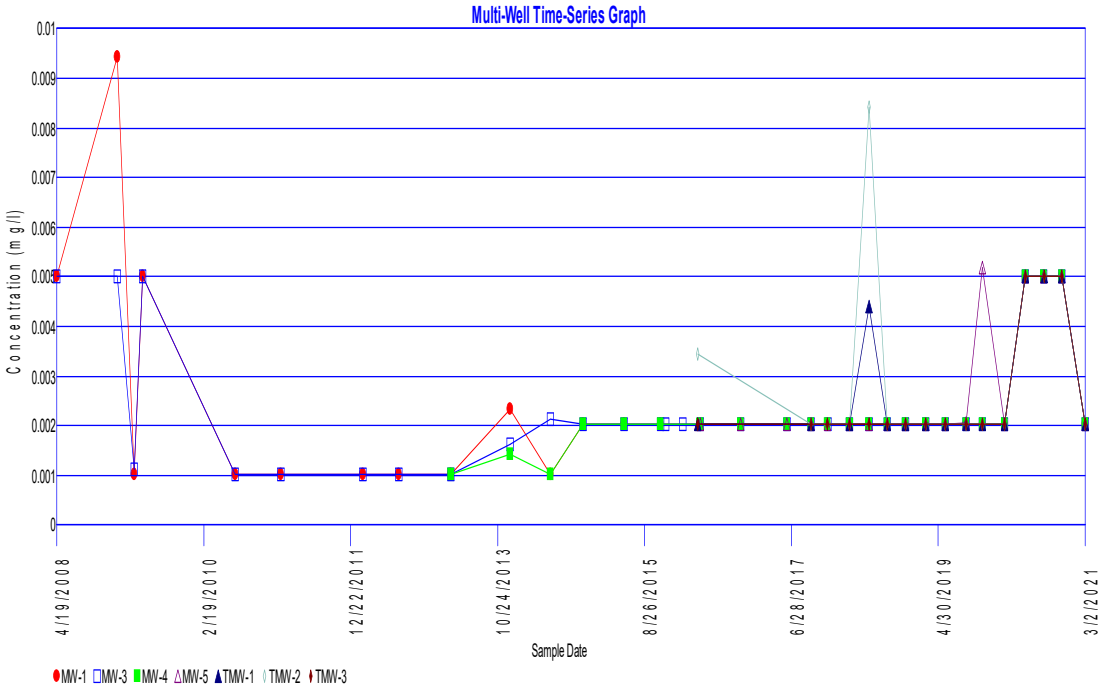
Hardness



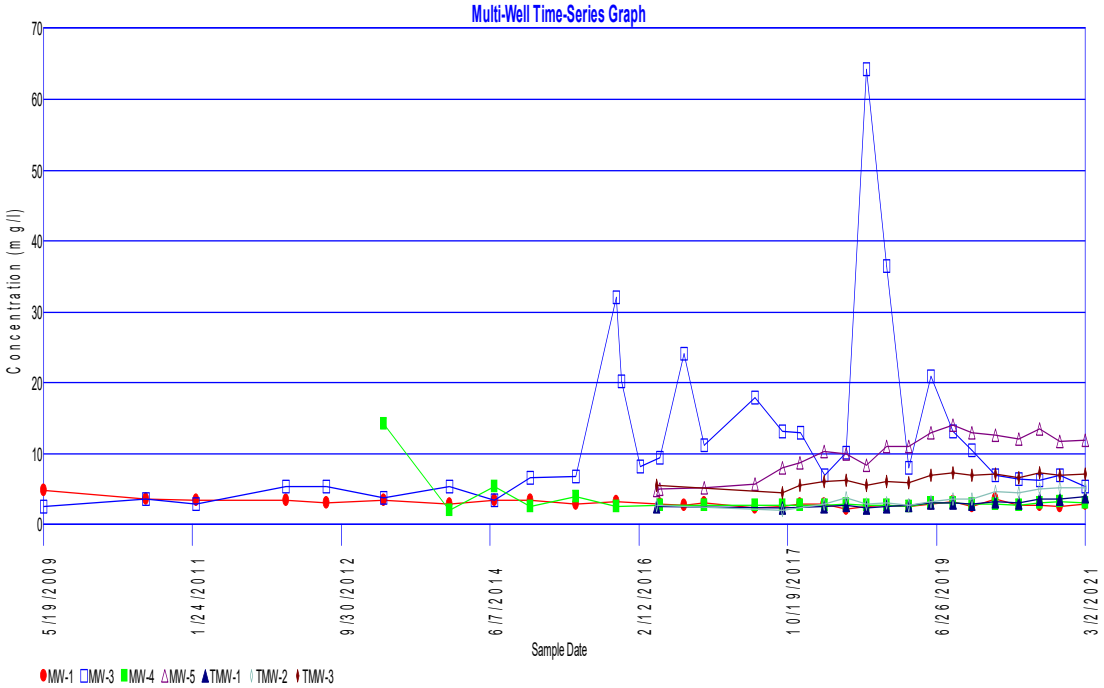
Iron



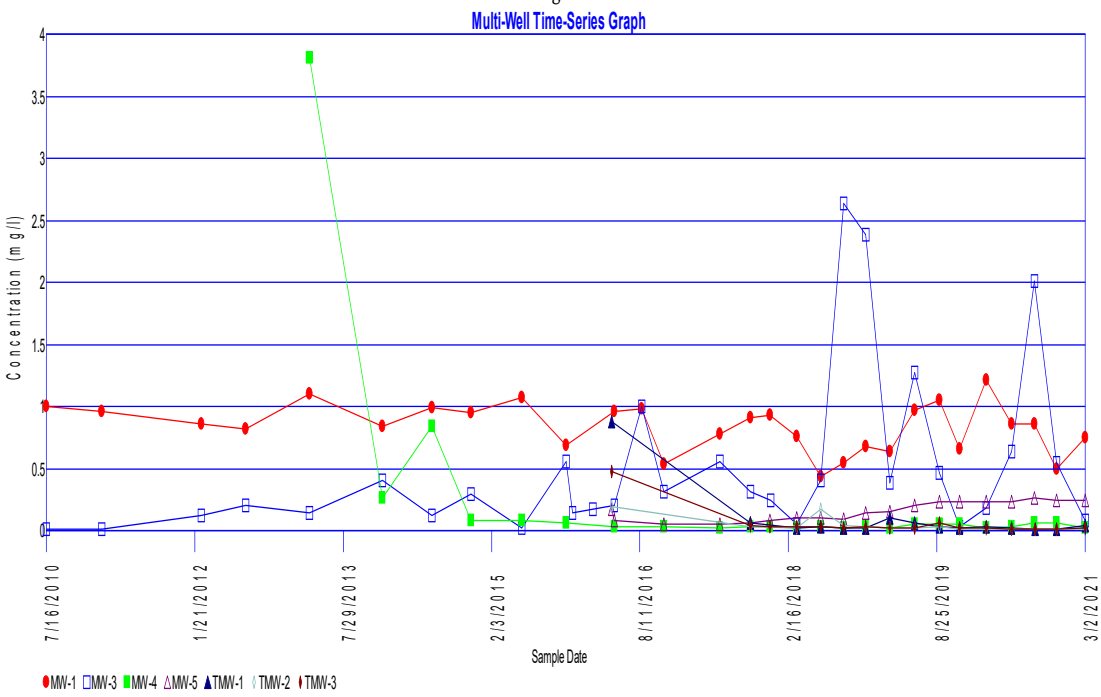
Lead



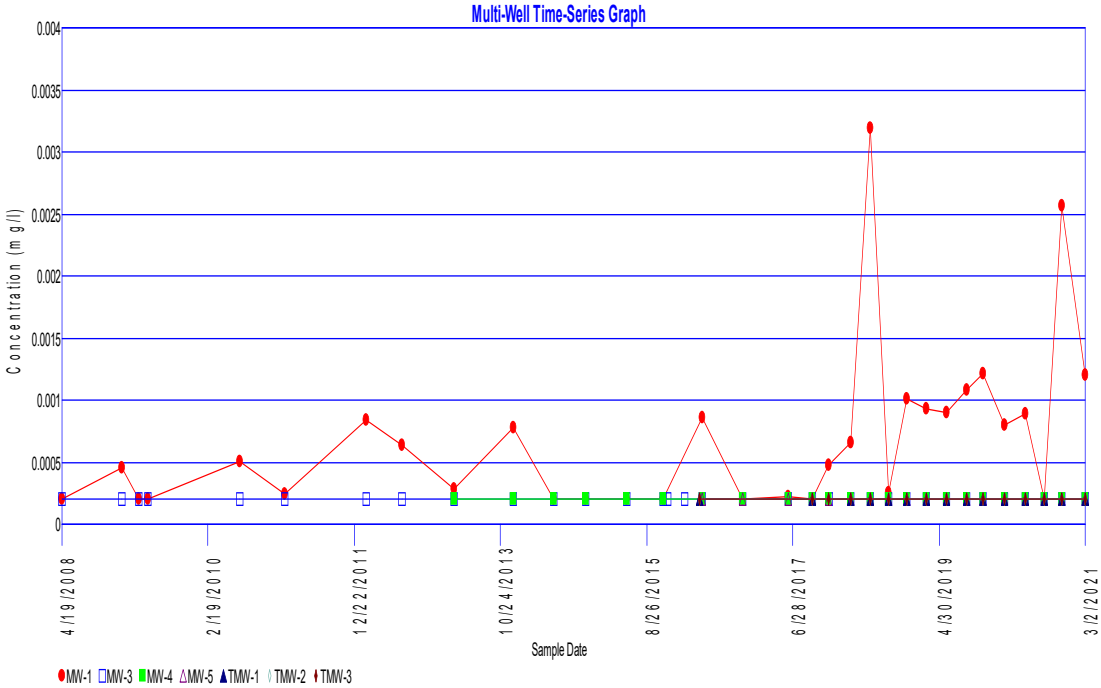
Magnesium



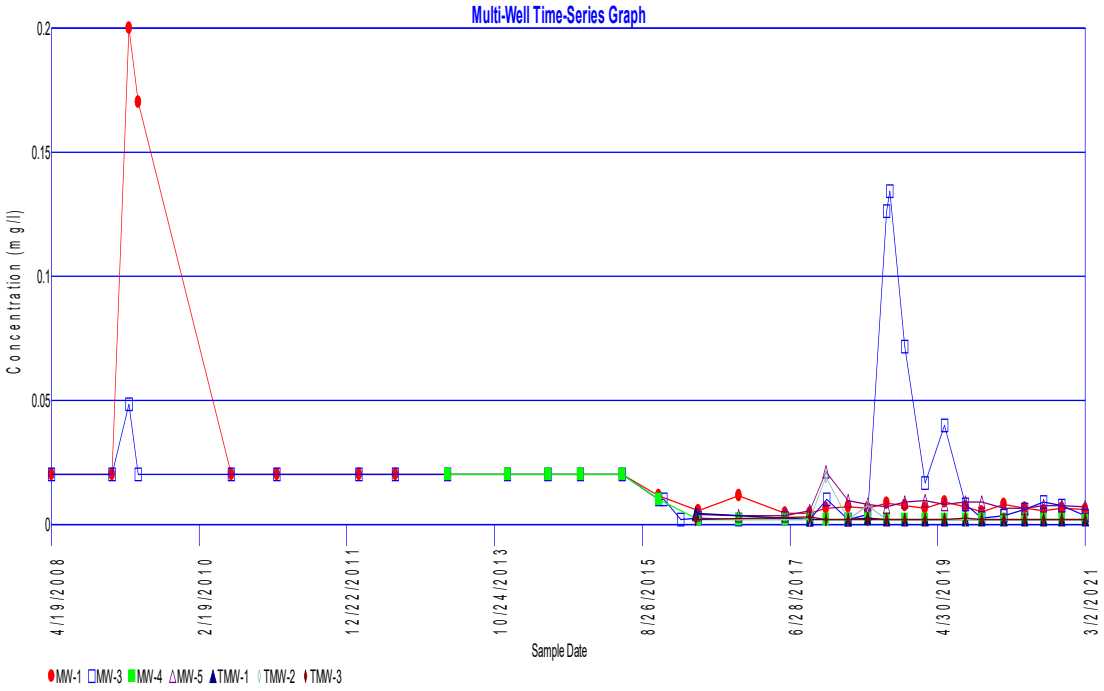
Manganese



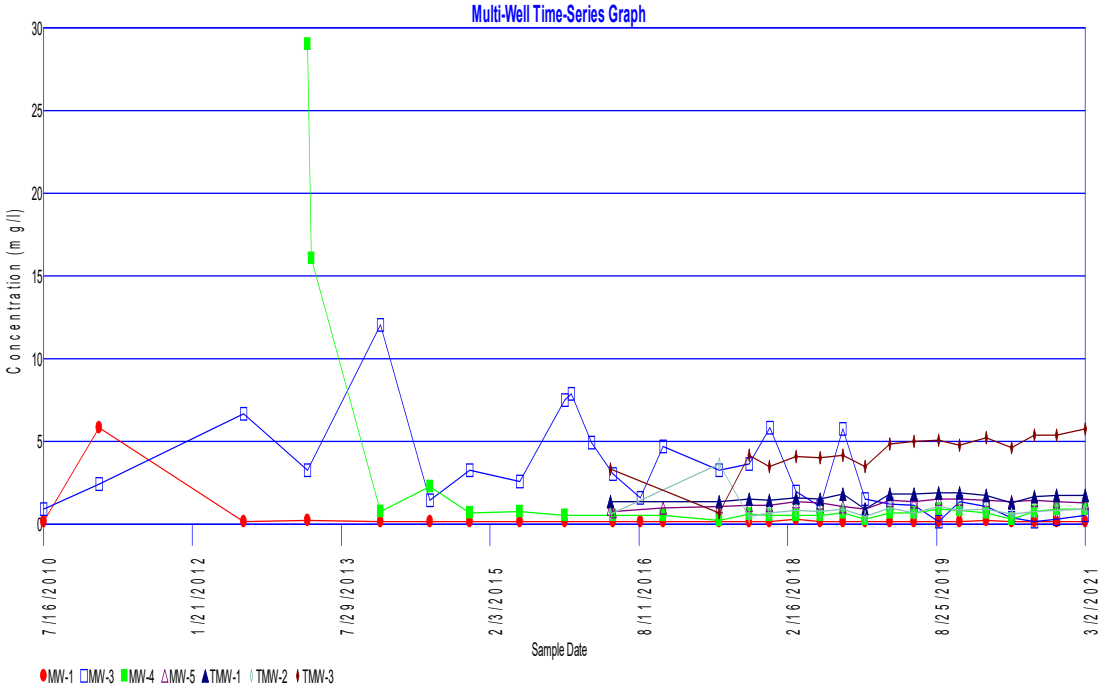
Mercury



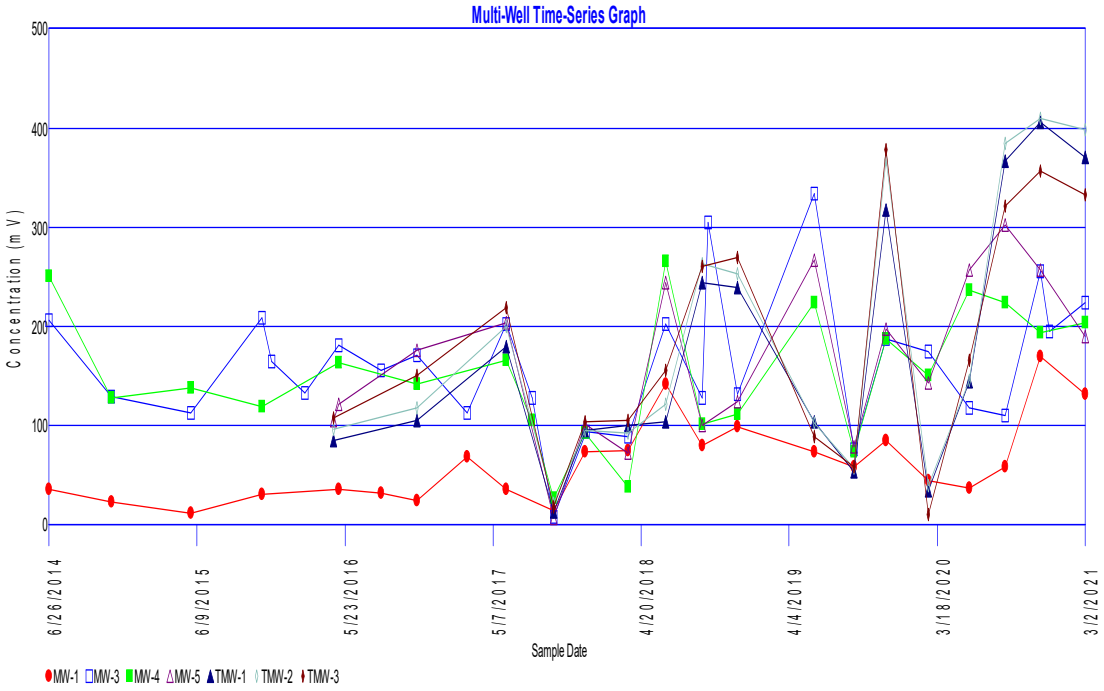
Nickel



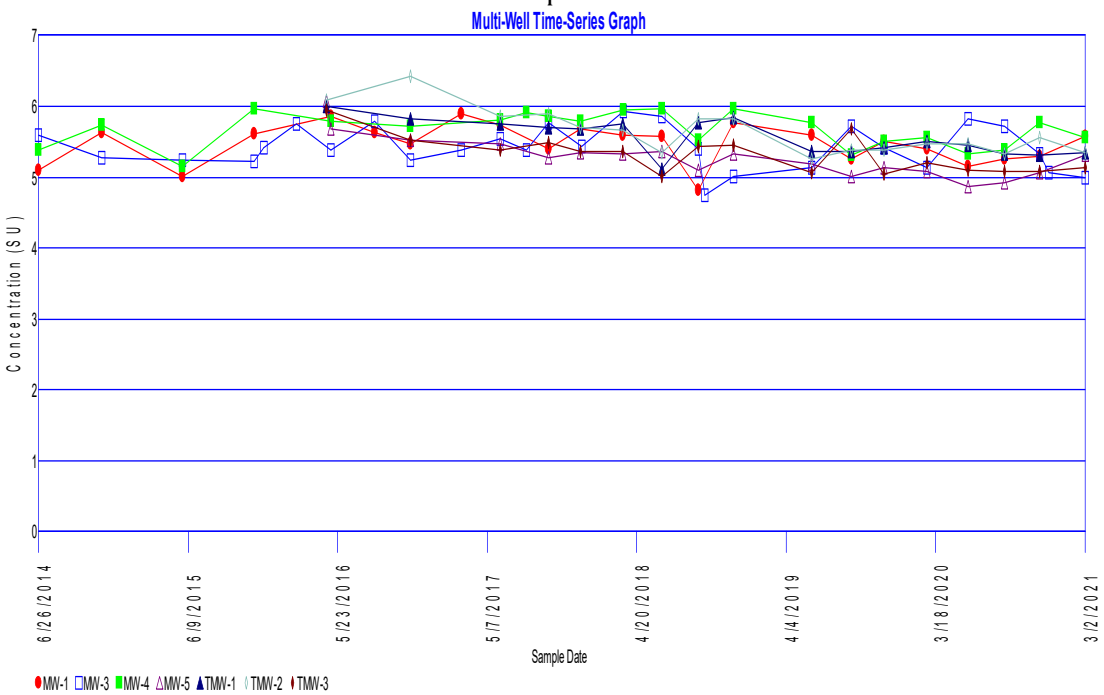
Nitrate



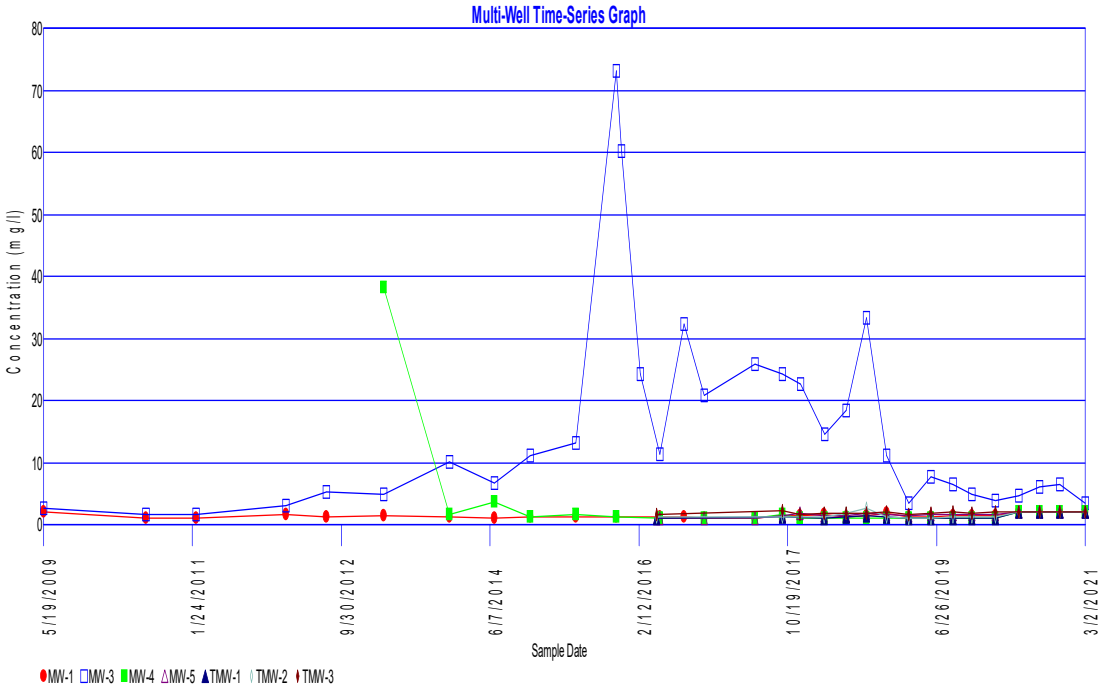
ORP


Multi-Well Time-Series Graph
500
400
300
200
100
0
Concentration (mV)
6/26/2014
6/9/2015
5/23/2016
5/7/2017
4/20/2018
4/4/2019
3/18/2020
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

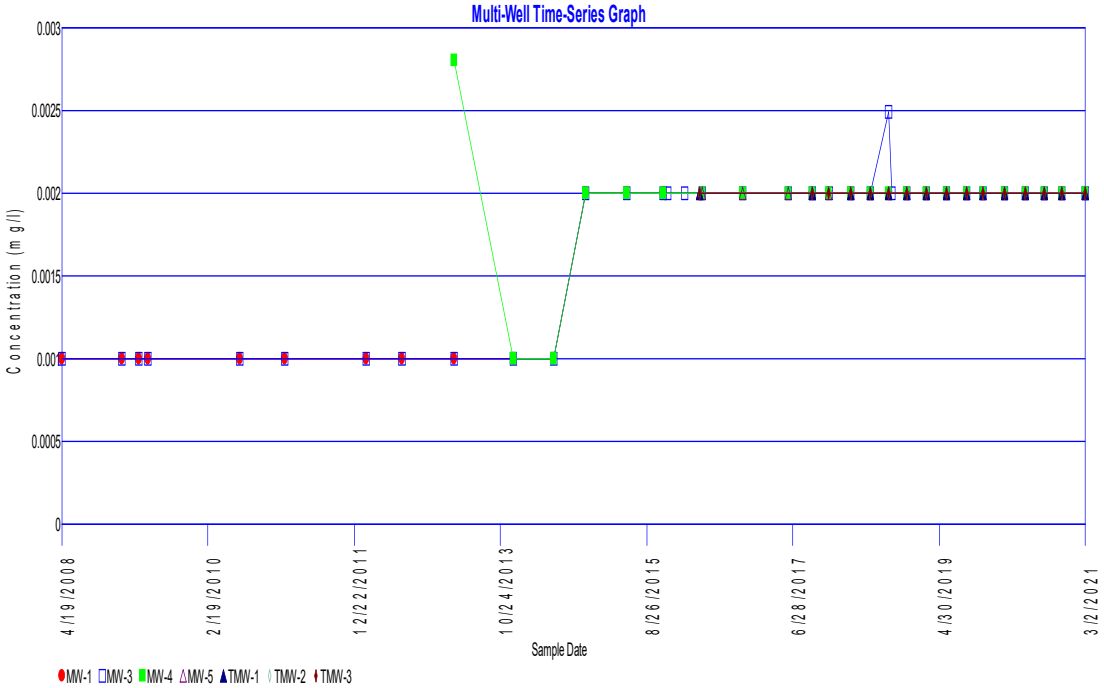
pH

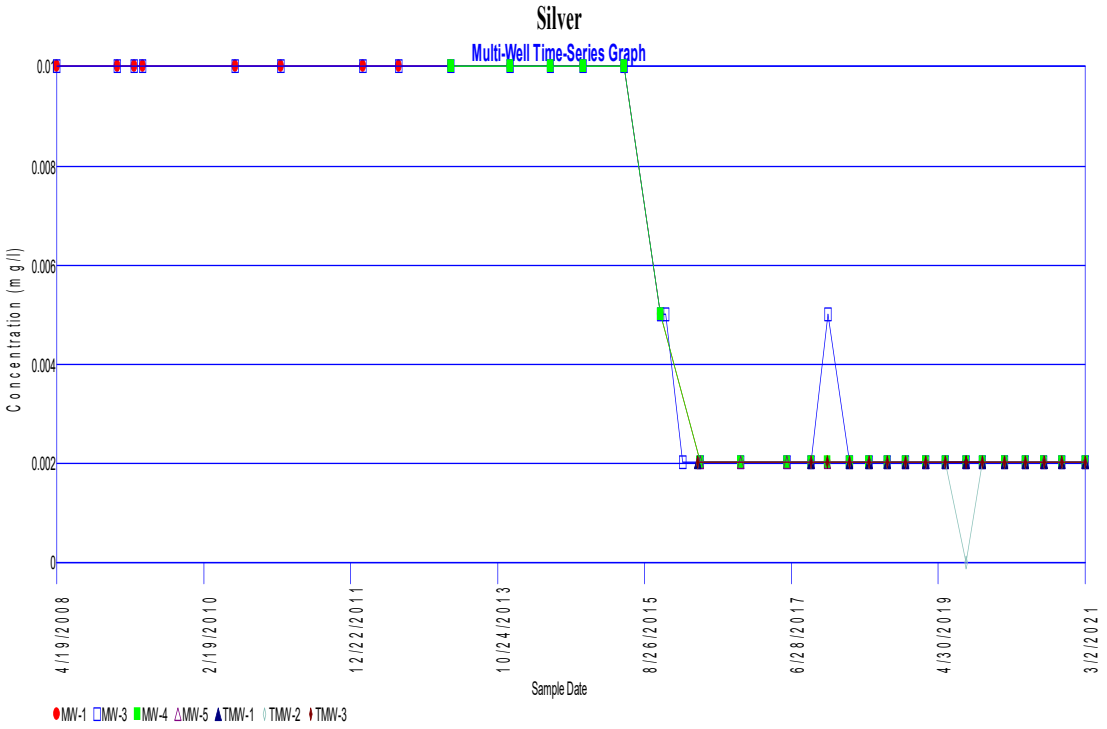

Multi-Well Time-Series Graph
7
6
5
4
3
2
1
0
Concentration (SU)
6/26/2014
6/9/2015
5/23/2016
5/7/2017
4/20/2018
4/4/2019
3/18/2020
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

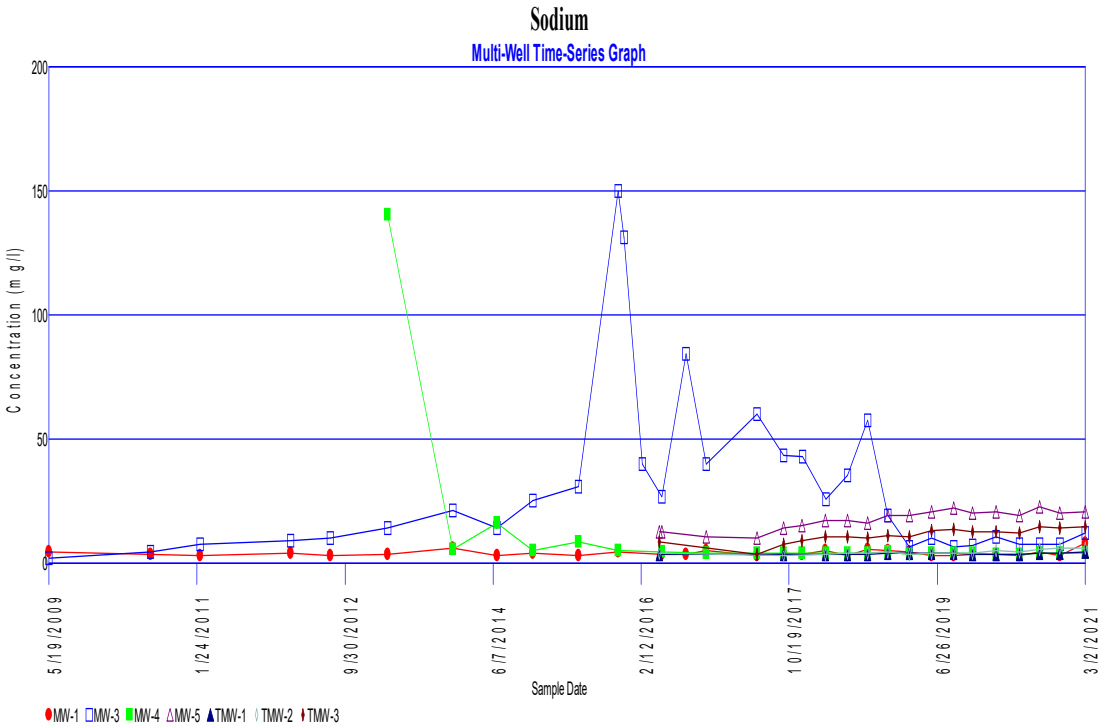
Potassium



Selenium

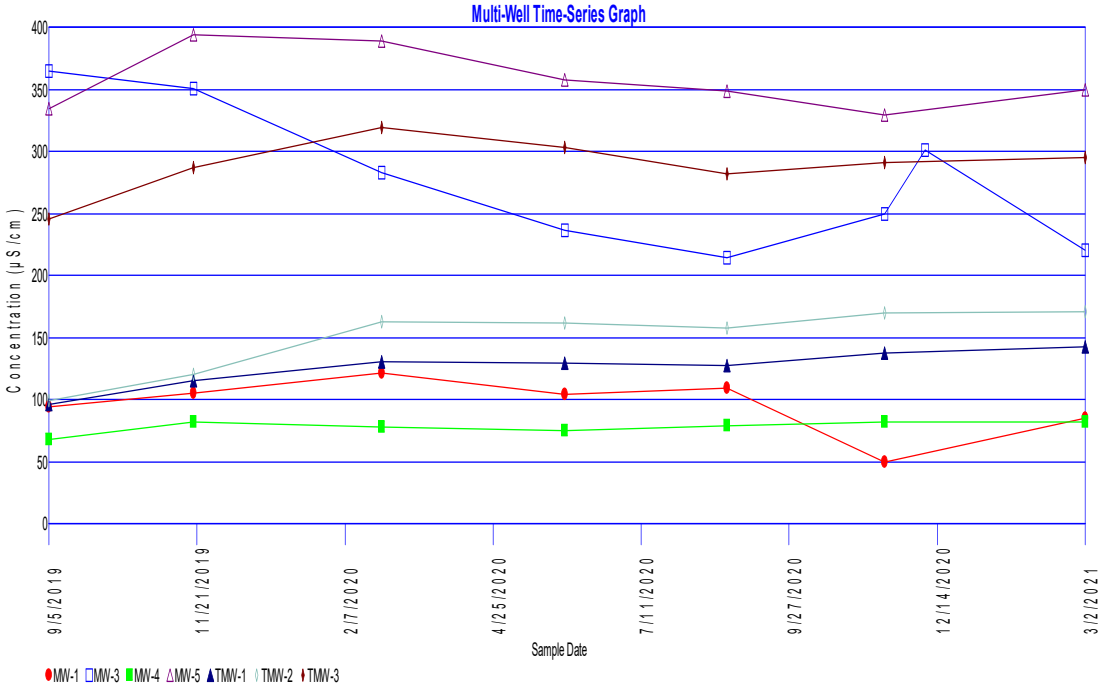



Silver
Multi-Well Time-Series Graph
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
4/19/2008
2/19/2010
12/22/2011
10/24/2013
8/26/2015
6/28/2017
4/30/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Sodium
Multi-Well Time-Series Graph
200
150
100
50
0
Concentration (mg/l)
5/19/2009
1/24/2011
9/30/2012
6/7/2014
2/12/2016
10/19/2017
6/26/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

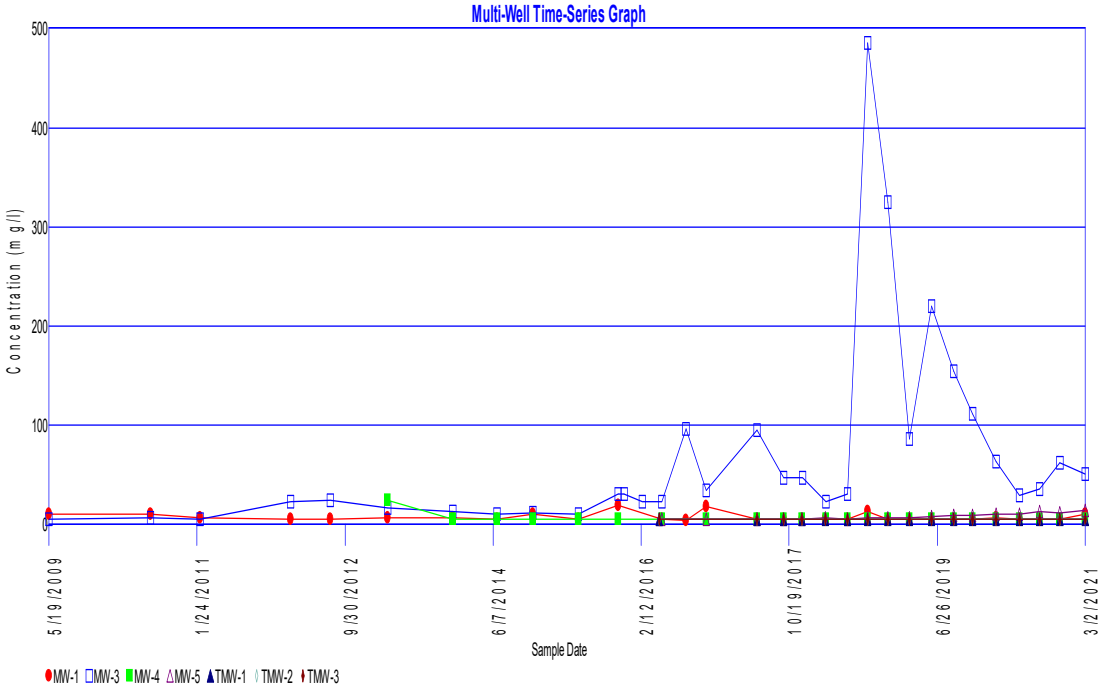
Specific Conductivity

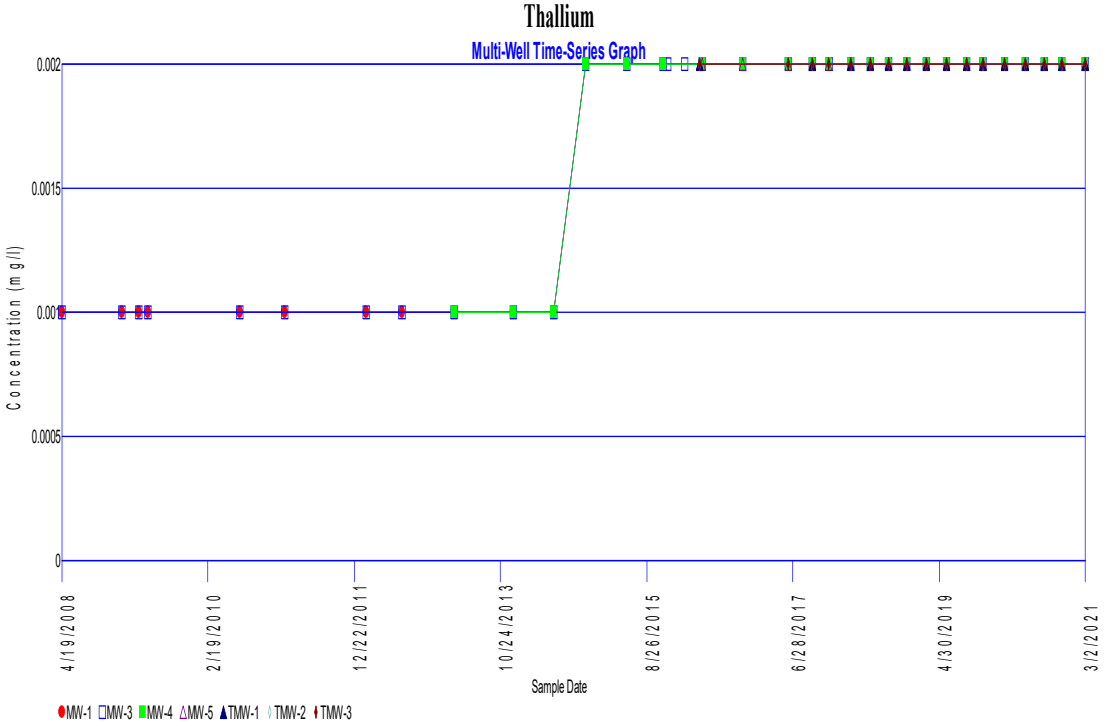
Multi-Well Time-Series Graph

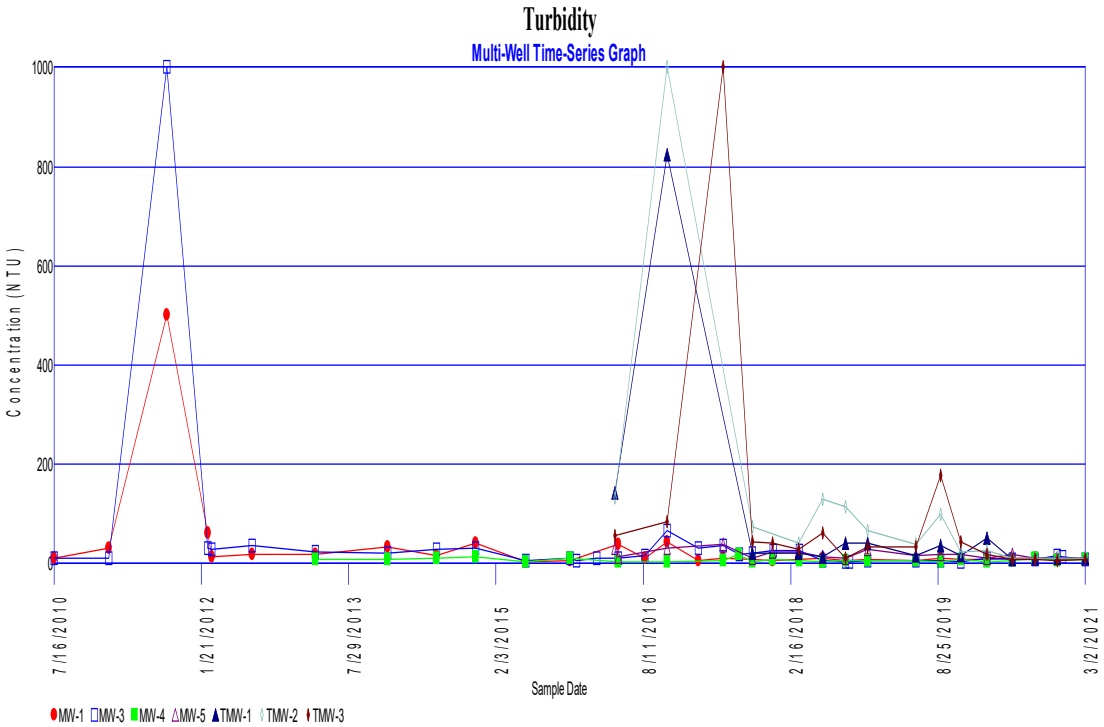


Sulfate

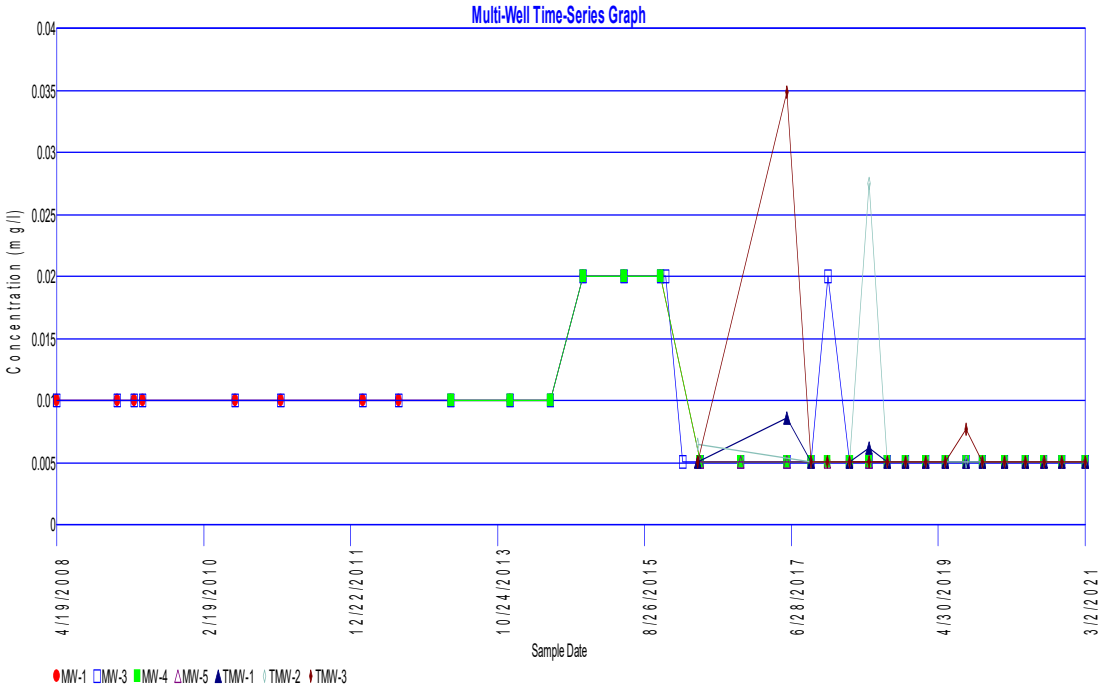
Multi-Well Time-Series Graph



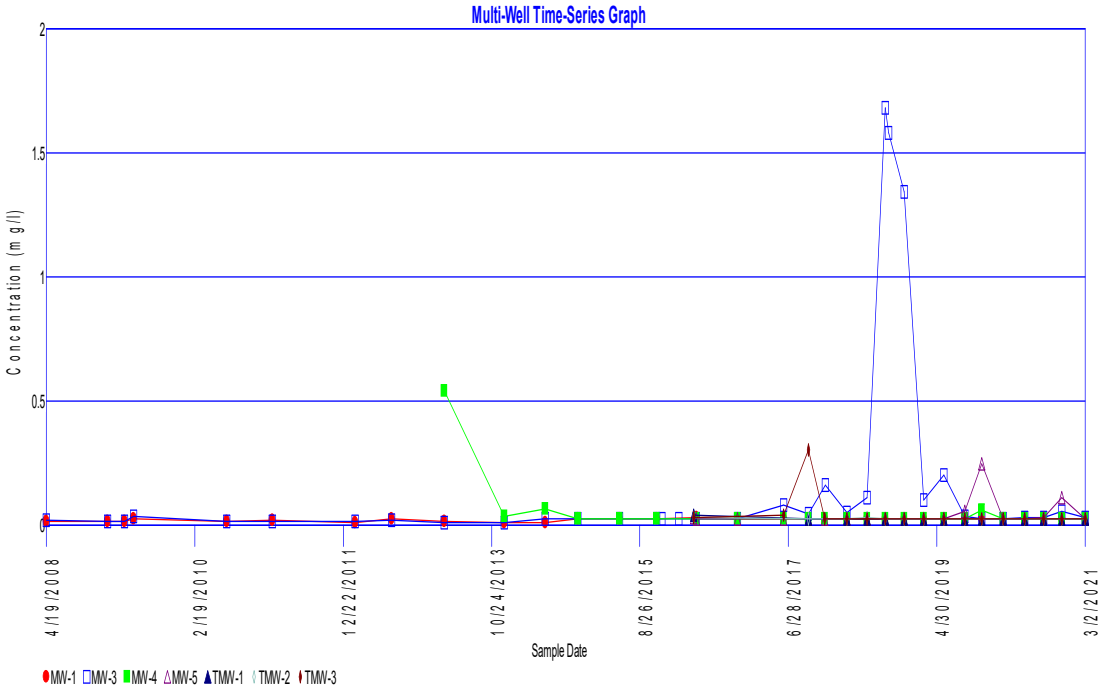

Thallium
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
2/19/2010
12/22/2011
10/24/2013
8/26/2015
6/28/2017
4/30/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Turbidity
Multi-Well Time-Series Graph
1000
800
600
400
200
0
Concentration (NTU)
7/16/2010
1/21/2012
7/29/2013
2/3/2015
8/11/2016
2/16/2018
8/25/2019
3/2/2021
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

Vanadium



Zinc



Shapiro-Wilks Test of Normality

Parameter: Arsenic

Location: MW-1

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 16 for 32 measurements

Sum of b values = 0.156086
Sample Standard Deviation = 0.0293885
W Statistic = 0.909943

5% Critical value of 0.93 exceeds 0.909943
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 is less than 0.909943
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-1

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 16 for 32 measurements

Sum of b values = 0.0431942
Sample Standard Deviation = 0.0117921
W Statistic = 0.432823

5% Critical value of 0.93 exceeds 0.432823
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.432823
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: MW-1

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 16 for 33 measurements

Sum of b values = 5.04137
Sample Standard Deviation = 0.985841
W Statistic = 0.817208

5% Critical value of 0.931 exceeds 0.817208
Evidence of non-normality at 95% level of significance

1% Critical value of 0.906 exceeds 0.817208
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 = 16 for 32 measurements

Sum of b values = 0.066663
Sample Standard Deviation = 0.0129344
W Statistic = 0.856874

5% Critical value of 0.93 exceeds 0.856874
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.856874
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 = 16 for 32 measurements

Sum of b values = 0.1513
Sample Standard Deviation = 0.0432818
W Statistic = 0.394191

5% Critical value of 0.93 exceeds 0.394191
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.394191
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 = 16 for 32 measurements

Sum of b values = 0.00315061
Sample Standard Deviation = 0.000673564
W Statistic = 0.705781

5% Critical value of 0.93 exceeds 0.705781
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.705781
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 = 16 for 32 measurements

Sum of b values = 4.95897
Sample Standard Deviation = 0.937285
W Statistic = 0.90298

5% Critical value of 0.93 exceeds 0.90298
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.90298
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

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

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 16 for 32 measurements

Sum of b values = 1.8918
Sample Standard Deviation = 0.374171
W Statistic = 0.824606

5% Critical value of 0.93 exceeds 0.824606
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.824606
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Chloride

Location: MW-1

Normality Test of Parameter Concentrations

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 16 for 33 measurements

Sum of b values = 1.71452
Sample Standard Deviation = 0.317106
W Statistic = 0.913537

5% Critical value of 0.931 exceeds 0.913537
Evidence of non-normality at 95% level of significance

1% Critical value of 0.906 is less than 0.913537
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 = 16 for 32 measurements

Sum of b values = 1.72699
Sample Standard Deviation = 0.318068
W Statistic = 0.950997

5% Critical value of 0.93 is less than 0.950997
Data is normally distributed at 95% level of significance

1% Critical value of 0.904 is less than 0.950997
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 = 16 for 32 measurements

Sum of b values = 3.58565
Sample Standard Deviation = 0.834736
W Statistic = 0.595219

5% Critical value of 0.93 exceeds 0.595219
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.595219
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 = 16 for 32 measurements

Sum of b values = 5.67164
Sample Standard Deviation = 1.08837
W Statistic = 0.875989

5% Critical value of 0.93 exceeds 0.875989
Evidence of non-normality at 95% level of significance

1% Critical value of 0.904 exceeds 0.875989
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
	6/2/2020	-3.14191
	8/26/2020	-3.16061
	11/17/2020	-3.53702

From 31 baseline samples
Baseline mean = -3.33708
Baseline std Dev = 0.322519

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 = 31 (background observations) - 1
t(0.95, 31) = 1.69726

Date	Samples	Mean	Interval	Significant
3/2/2021	1	-3.46414	[0, -2.78093]	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) = 31
Maximum Baseline Concentration = 0.1
Confidence Level = 96.9%
False Positive Rate = 3.1%

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
	6/2/2020	0.0174
	8/26/2020	0.0244
	11/17/2020	0.00513

Date	Count	Mean	Significant
3/2/2021	1	0.00576	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Barium

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

Total Percent Non-Detects = 9.67742%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 31
Maximum Baseline Concentration = 0.084
Confidence Level = 96.9%
False Positive Rate = 3.1%

Baseline Measurem	Date	Value
	4/19/2008	0.084
	1/21/2009	0.028
	4/9/2009	0.028
	5/19/2009	0.033
	7/16/2010	0.021
	2/8/2011	0.021
	2/17/2012	0.022
	7/31/2012	0.019
	3/27/2013	0.018
	12/23/2013	0.017
	6/26/2014	0.018
	11/21/2014	0.02
	5/28/2015	0.0188
	11/11/2015	0.0237
	5/9/2016	0.02
	11/10/2016	0.0207
	6/8/2017	0.0146
	9/28/2017	0.0175
	12/11/2017	0.0166
	3/21/2018	0.0212
	6/19/2018	0.0163
	9/12/2018	0.0186
	12/4/2018	0.0199
	3/5/2019	0.0184
	6/4/2019	0.0219
	9/5/2019	0.0199
	11/20/2019	0.0194
	2/27/2020	0.0241
	6/2/2020	ND<0.02
	8/26/2020	ND<0.02
	11/17/2020	ND<0.02

Date	Count	Mean	Significant
3/2/2021	1	0.0222	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) = 31
Maximum Baseline Concentration = 5.68
Confidence Level = 96.9%
False Positive Rate = 3.1%

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
	2/27/2020	1.95
	6/2/2020	2.27
	8/26/2020	2.61

Date	Count	Mean	Significant
3/2/2021	1	2.15	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 = 35.4839%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 31
Maximum Baseline Concentration = 0.2
Confidence Level = 96.9%
False Positive Rate = 3.1%

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
	6/2/2020	0.0063
	8/26/2020	0.00512
	11/17/2020	0.00632

Date	Count	Mean	Significant
3/2/2021	1	0.0057	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Mercury

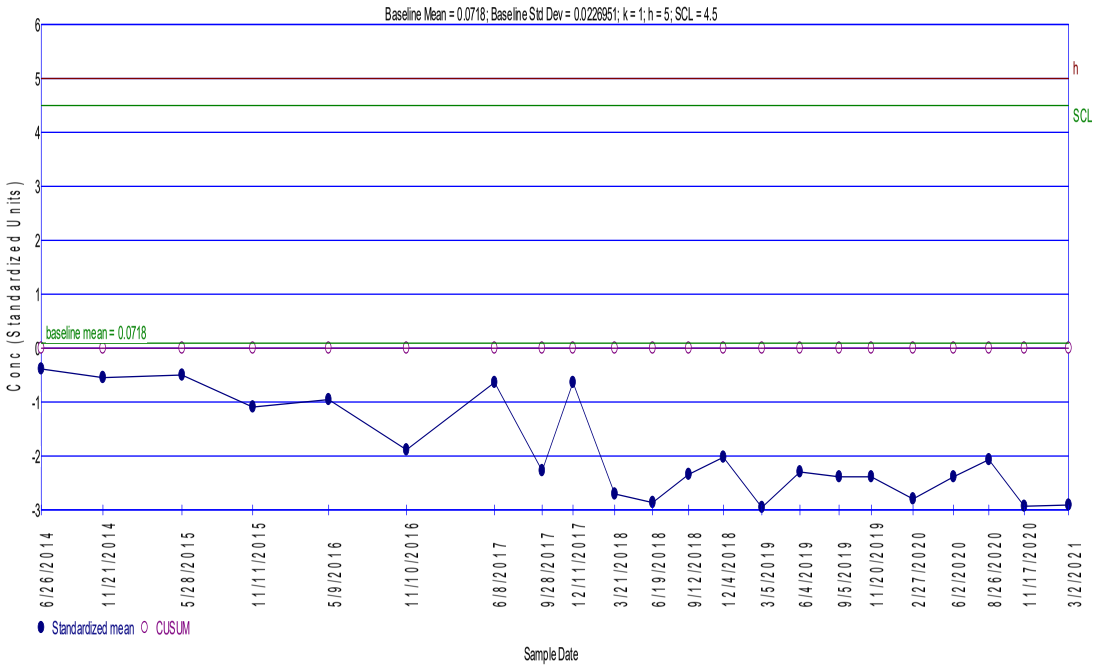
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 32.2581%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 31
Maximum Baseline Concentration = 0.00319
Confidence Level = 96.9%
False Positive Rate = 3.1%

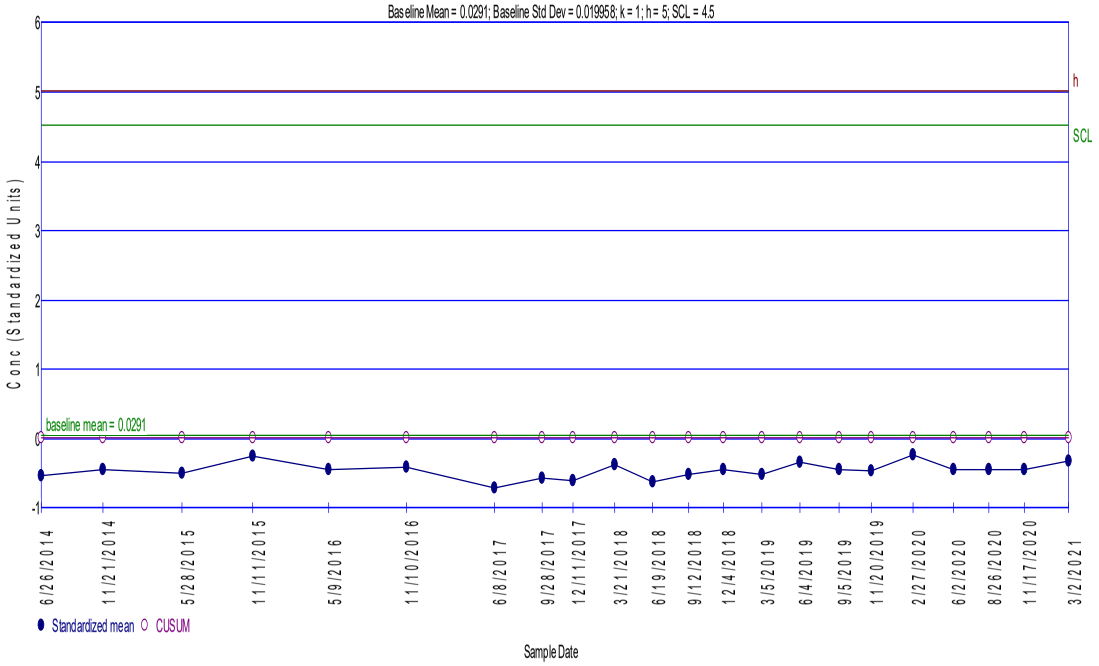
Baseline Measurem	Date	Value
	4/19/2008	ND<0.0002
	1/21/2009	0.00045
	4/9/2009	ND<0.0002
	5/19/2009	ND<0.0002
	7/16/2010	0.0005
	2/8/2011	0.00024
	2/17/2012	0.00083
	7/31/2012	0.00063
	3/27/2013	0.00028
	12/23/2013	0.00077
	6/26/2014	ND<0.0002
	11/21/2014	ND<0.0002
	5/28/2015	ND<0.0002
	11/11/2015	ND<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
	6/2/2020	0.000888
	8/26/2020	ND<0.0002
	11/17/2020	0.00256

Date	Count	Mean	Significant
3/2/2021	1	0.0012	FALSE

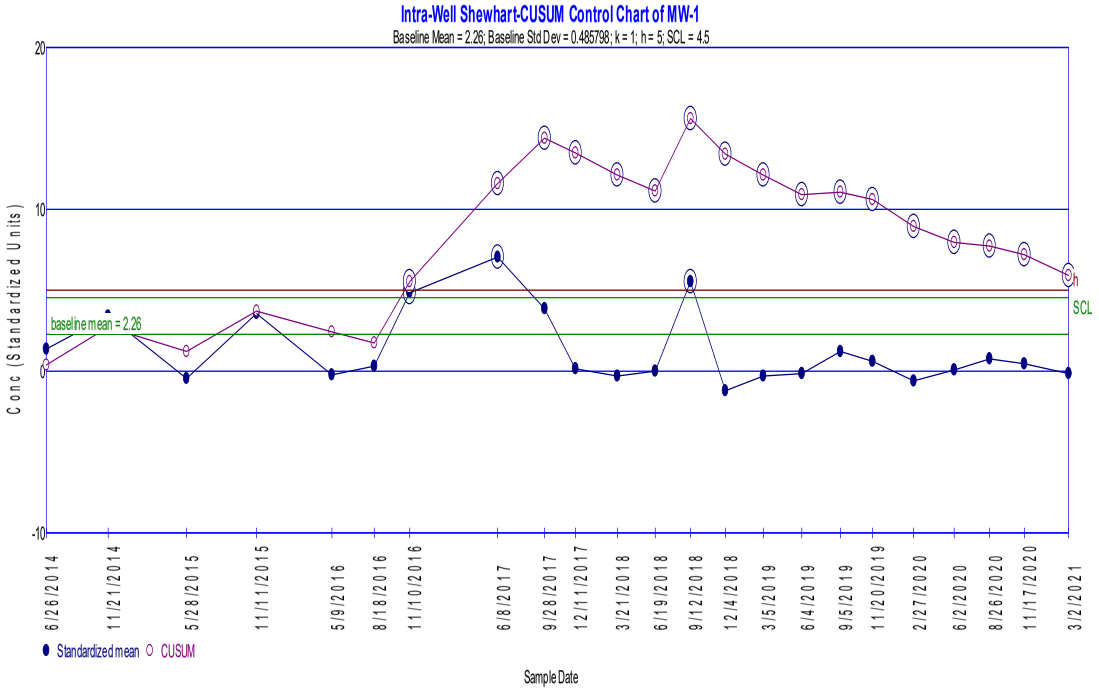
Arsenic



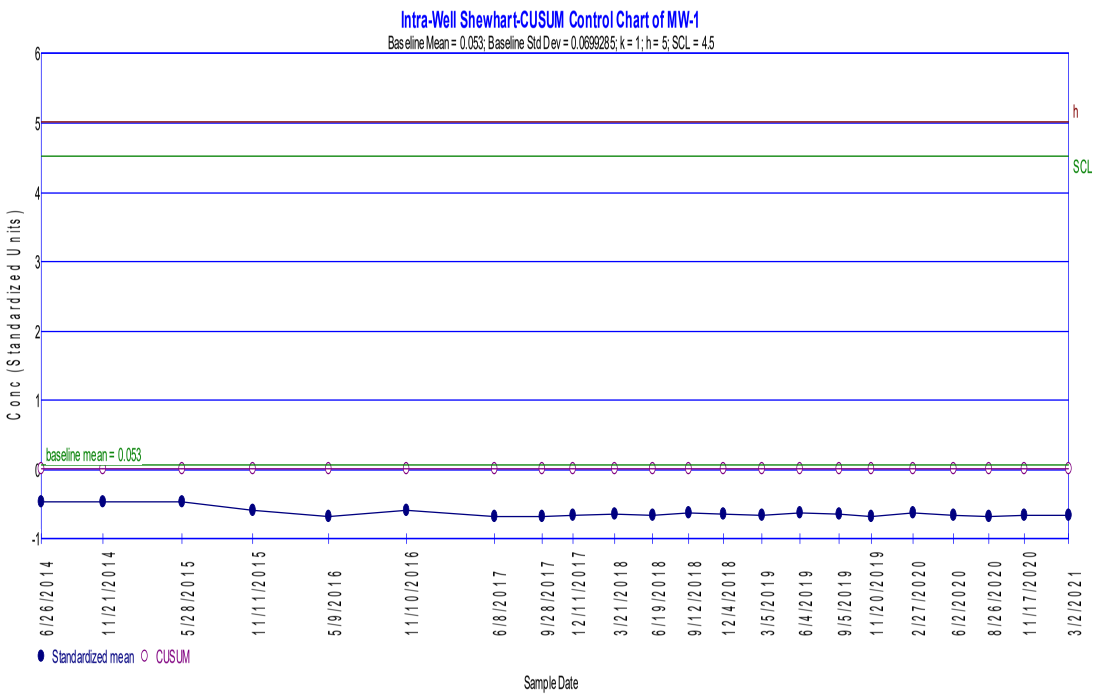
Barium



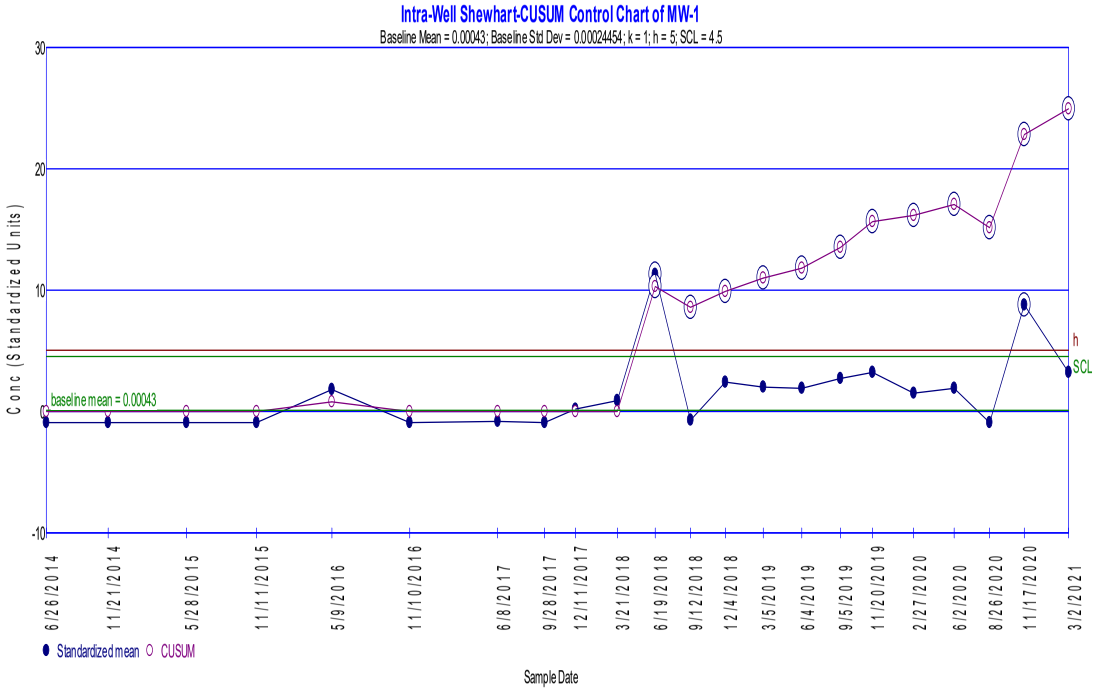
Chloride



Nickel



Mercury


Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.00043; Baseline Std Dev = 0.00024454; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
30
20
10
0
-10
h
SCL
baseline mean = 0.00043
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
12/4/2018
3/5/2019
6/4/2019
9/5/2019
11/20/2019
2/27/2020
6/2/2020
8/26/2020
11/17/2020
3/2/2021
Standardized mean
CUSUM
Sample Date

Shapiro-Francia Test of Normality

Parameter: Aluminum

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 155

Data Set Standard Deviation = 1.16063
Numerator = 9078.22
Denominator = 30619.4
W Statistic = 0.296486 = 9078.22 / 30619.4

5% Critical value of 0.976 exceeds 0.296486
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.296486
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 = 156

Data Set Standard Deviation = 0.0827132
Numerator = 66.8207
Denominator = 157.548
W Statistic = 0.424129 = 66.8207 / 157.548

5% Critical value of 0.976 exceeds 0.424129
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.424129
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 = 156

Data Set Standard Deviation = 0.0309206
Numerator = 3.11877
Denominator = 22.017
W Statistic = 0.141653 = 3.11877 / 22.017

5% Critical value of 0.976 exceeds 0.141653
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.141653
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 = 166

Data Set Standard Deviation = 58.7929
Numerator = 5.12541e+007
Denominator = 9.10048e+007
W Statistic = 0.563202 = 5.12541e+007 / 9.10048e+007

5% Critical value of 0.976 exceeds 0.563202
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.563202
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 = 155

Data Set Standard Deviation = 0.0137337
Numerator = 1.02607
Denominator = 4.28733
W Statistic = 0.239327 = 1.02607 / 4.28733

5% Critical value of 0.976 exceeds 0.239327
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.239327
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 = 157

Data Set Standard Deviation = 0.0258369
Numerator = 5.61547
Denominator = 15.5934
W Statistic = 0.360117 = 5.61547 / 15.5934

5% Critical value of 0.976 exceeds 0.360117
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.360117
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 = 156

Data Set Standard Deviation = 52.1813
Numerator = 1.66066e+007
Denominator = 6.27037e+007
W Statistic = 0.264843 = 1.66066e+007 / 6.27037e+007

5% Critical value of 0.976 exceeds 0.264843
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.264843
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 = 157

Data Set Standard Deviation = 0.213564
Numerator = 195.678
Denominator = 1065.41
W Statistic = 0.183664 = 195.678 / 1065.41

5% Critical value of 0.976 exceeds 0.183664
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.183664
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 = 155

Data Set Standard Deviation = 1.22845
Numerator = 30142.5
Denominator = 34302.4
W Statistic = 0.878726 = 30142.5 / 34302.4

5% Critical value of 0.976 exceeds 0.878726
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.878726
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 = 156

Data Set Standard Deviation = 0.920603
Numerator = 18856.7
Denominator = 19516.8
W Statistic = 0.966177 = 18856.7 / 19516.8

5% Critical value of 0.976 exceeds 0.966177
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.966177
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 = 156

Data Set Standard Deviation = 1.17326
Numerator = 12074
Denominator = 31699.6
W Statistic = 0.380887 = 12074 / 31699.6

5% Critical value of 0.976 exceeds 0.380887
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.380887
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 = 166

Data Set Standard Deviation = 1.31001
Numerator = 44227.4
Denominator = 45181.6
W Statistic = 0.978881 = 44227.4 / 45181.6

5% Critical value of 0.976 is less than 0.978881
Data is normally distributed at 95% level of significance

1% Critical value of 0.967 is less than 0.978881
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 = 155

Data Set Standard Deviation = 0.929464
Numerator = 14707.2
Denominator = 19637
W Statistic = 0.748955 = 14707.2 / 19637

5% Critical value of 0.976 exceeds 0.748955
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.748955
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 = 157

Data Set Standard Deviation = 1.23519
Numerator = 29953.1
Denominator = 35639.5
W Statistic = 0.840448 = 29953.1 / 35639.5

5% Critical value of 0.976 exceeds 0.840448
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.840448
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 = 156

Data Set Standard Deviation = 1.19654
Numerator = 22199.5
Denominator = 32970
W Statistic = 0.673323 = 22199.5 / 32970

5% Critical value of 0.976 exceeds 0.673323
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.673323
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 = 157

Data Set Standard Deviation = 0.953101
Numerator = 12103.9
Denominator = 21219.7
W Statistic = 0.57041 = 12103.9 / 21219.7

5% Critical value of 0.976 exceeds 0.57041
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.57041
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 = 33
Background Mean = 0.934503
Background Std Dev = 0.317106

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 = 33 (background observations) - 1
t(0.991667, 33) = 2.54528

Well MW-3

Date	Samples	Mean	Interval	Significant
3/2/2021	1	2.91235	[0, 1.75377]	TRUE

Well MW-4

Date	Samples	Mean	Interval	Significant
3/2/2021	1	2.24601	[0, 1.75377]	TRUE

Well MW-5

Date	Samples	Mean	Interval	Significant
3/2/2021	1	4.32678	[0, 1.75377]	TRUE

Well TMW-1

Date	Samples	Mean	Interval	Significant
3/2/2021	1	3.3322	[0, 1.75377]	TRUE

Well TMW-2

Date	Samples	Mean	Interval	Significant
3/2/2021	1	3.6763	[0, 1.75377]	TRUE

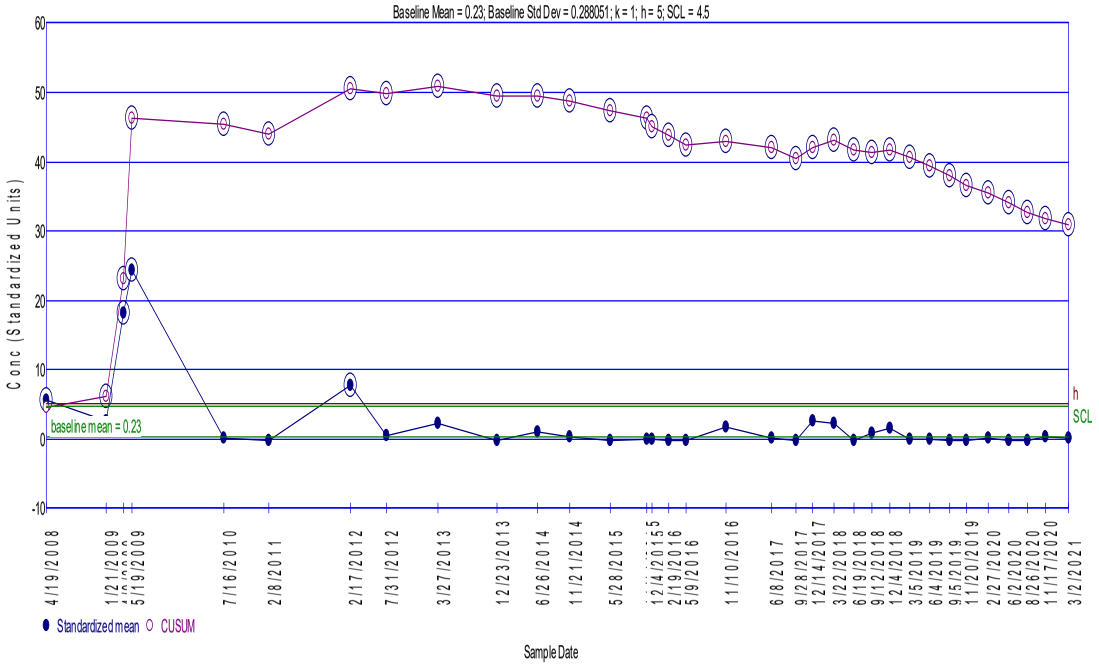
Well TMW-3

Date	Samples	Mean	Interval	Significant
3/2/2021	1	4.17592	[0, 1.75377]	TRUE

Aluminum

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

Baseline Mean = 0.23; Baseline Std Dev = 0.288051; k = 1; h = 5; SCL = 4.5

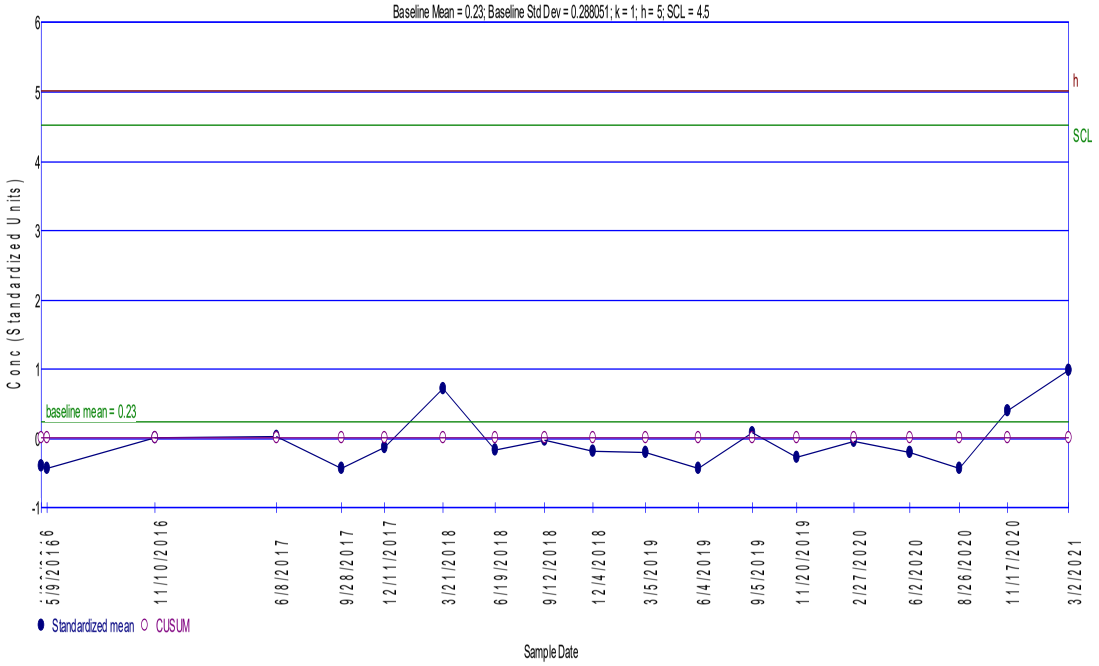


Page 1

Aluminum

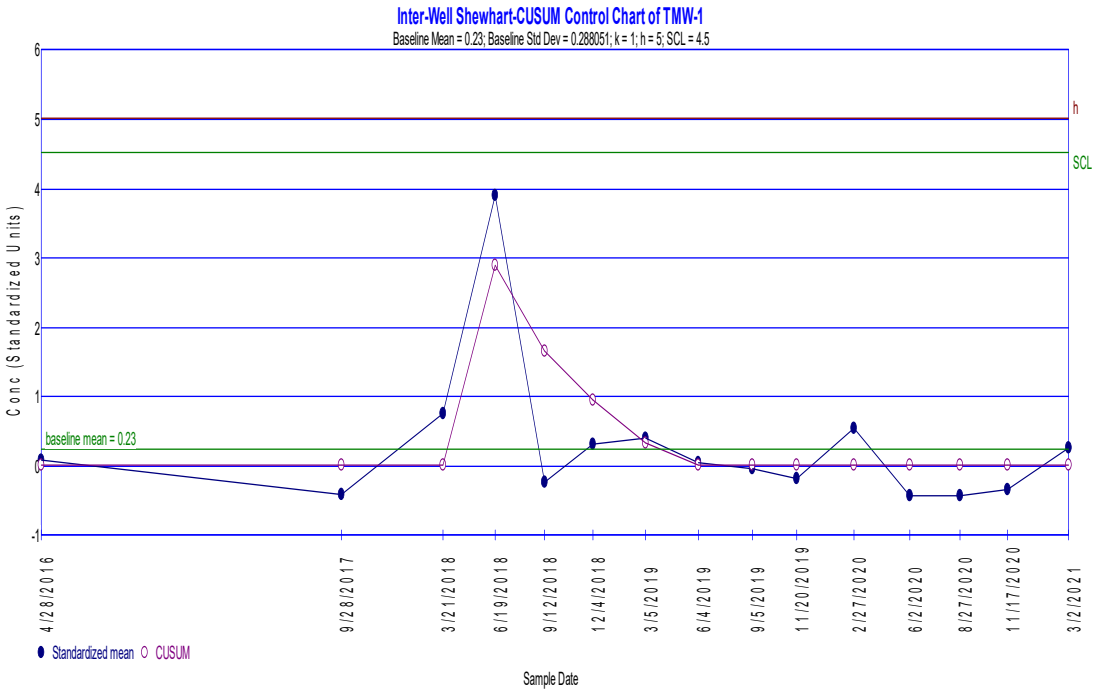
Inter-Well Shewhart-CUSUM Control Chart of MW-5

Baseline Mean = 0.23; Baseline Std Dev = 0.288051; k = 1; h = 5; SCL = 4.5

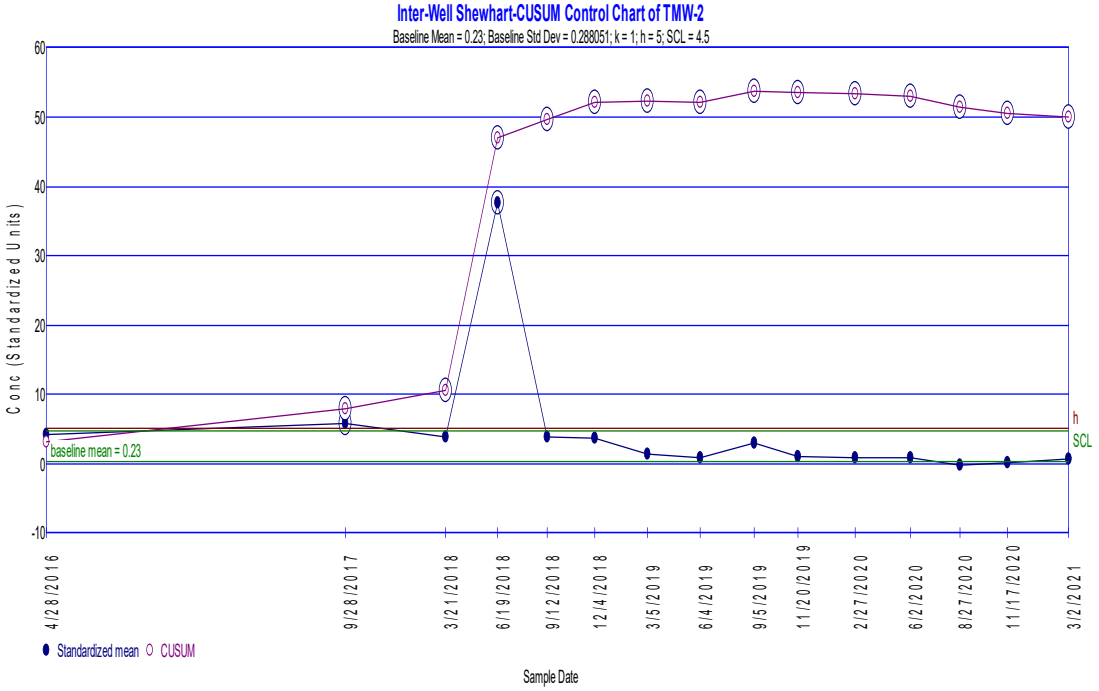


Page 2

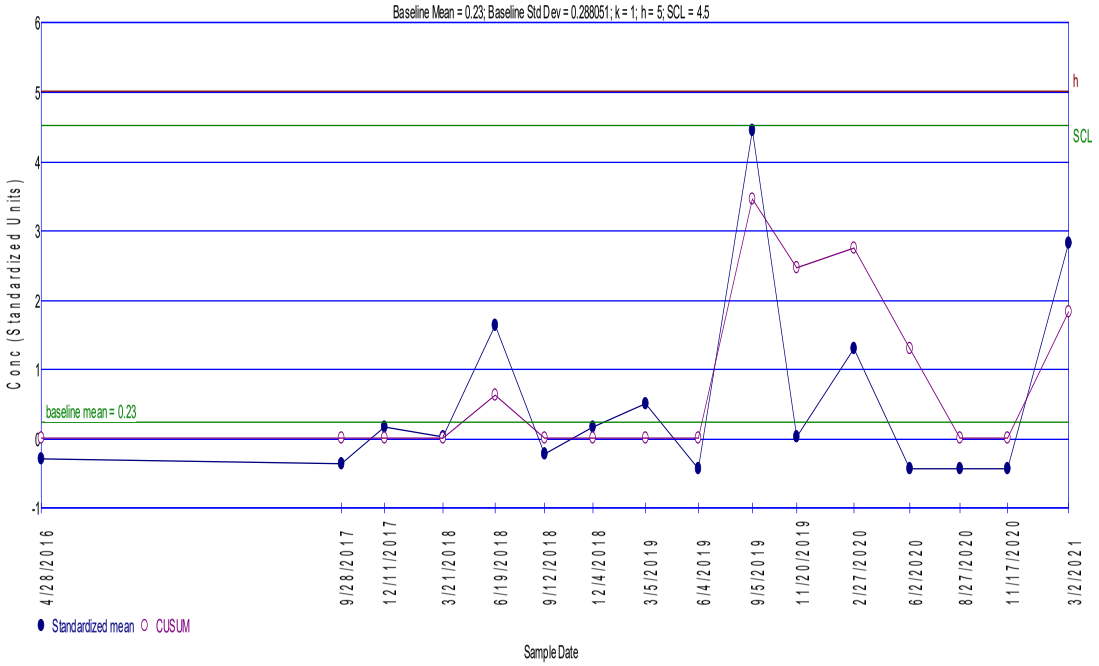
Aluminum



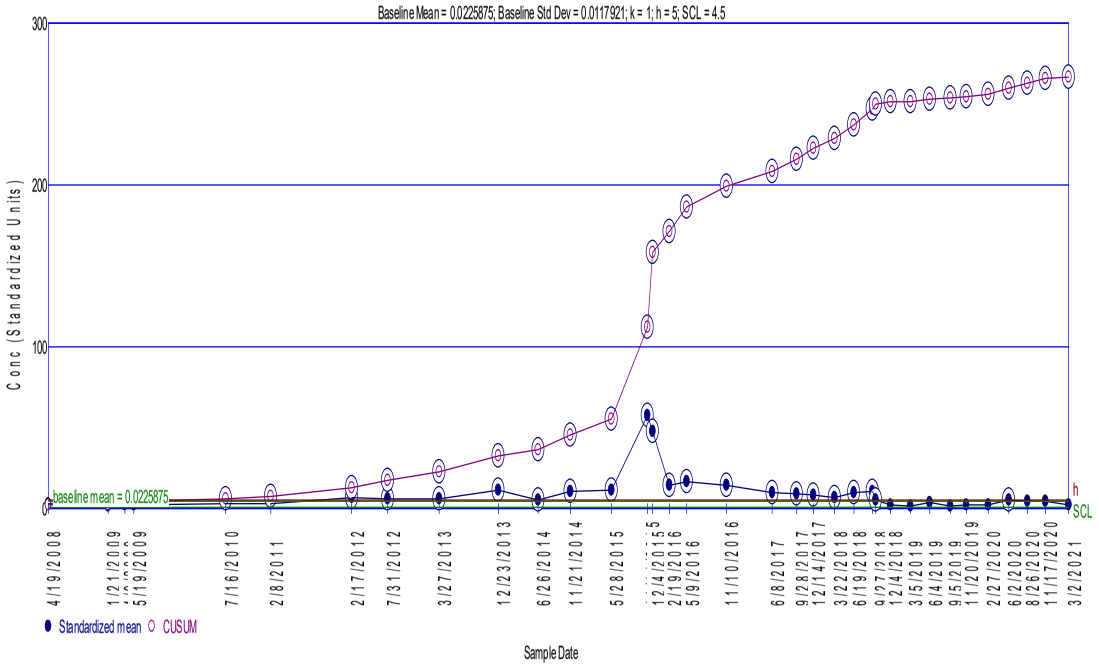
Aluminum



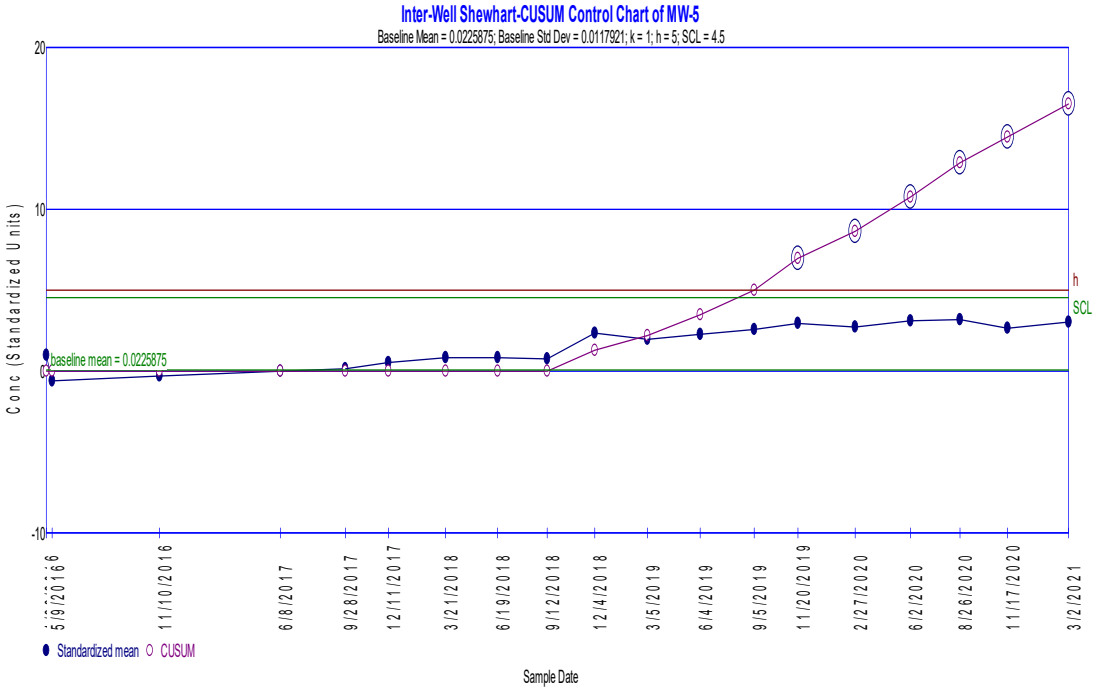
Aluminum



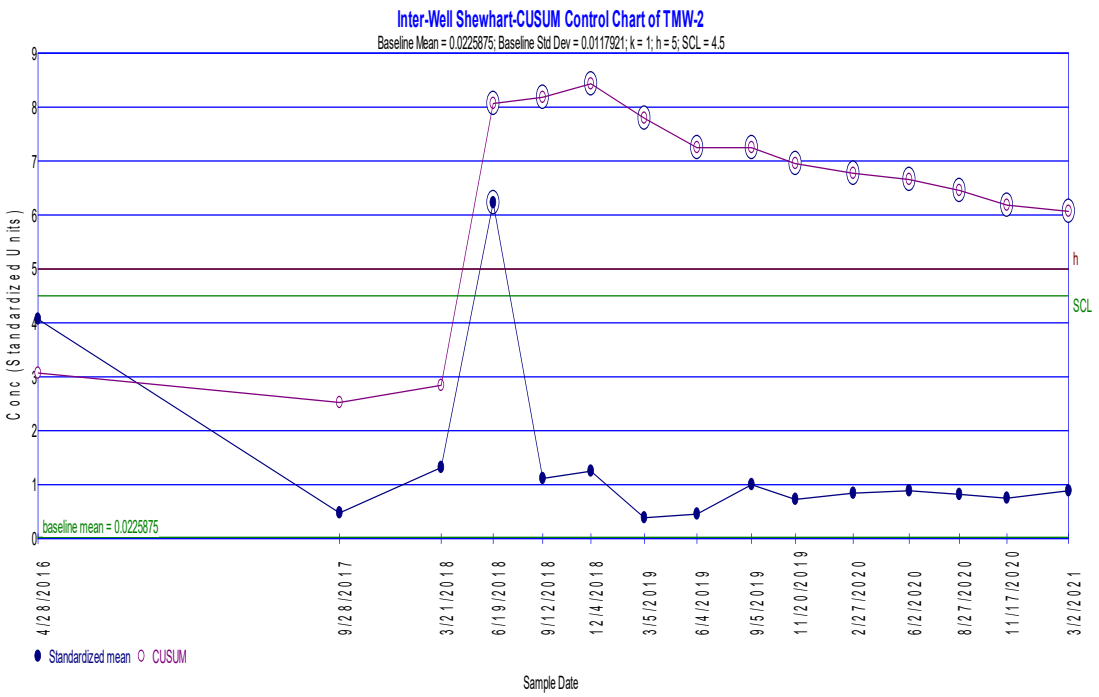
Barium



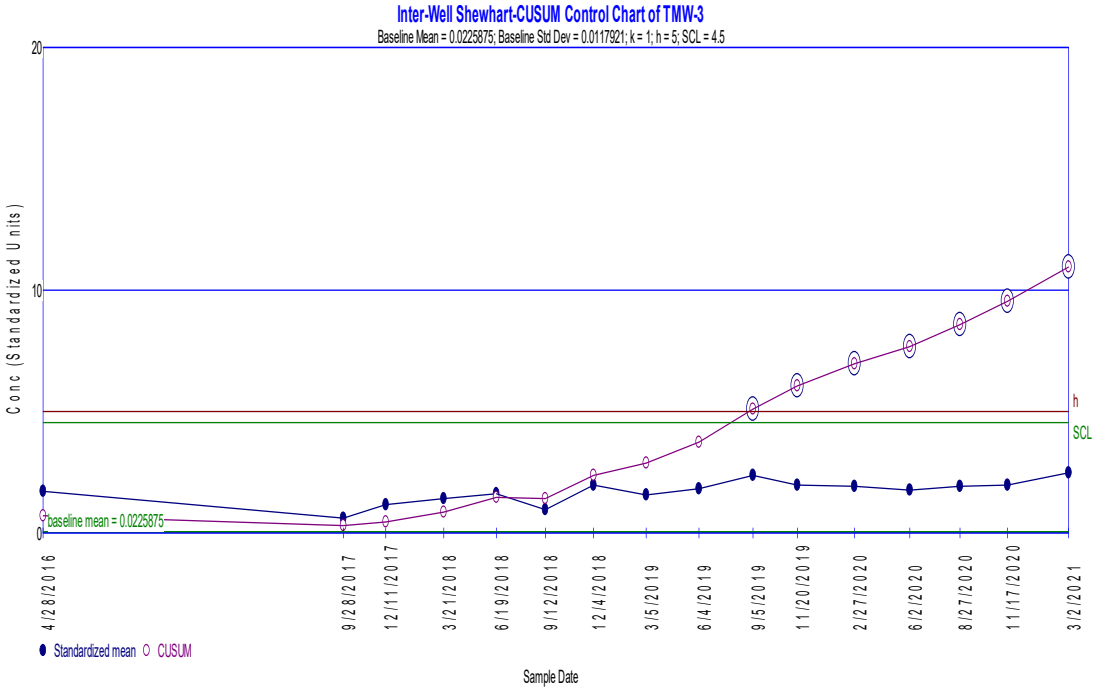
Barium



Barium



Barium


Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 0.0225875; Baseline Std Dev = 0.0117921; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
20
10
0
h
SCL
baseline mean = 0.0225875
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
8/27/2020
11/17/2020
3/2/2021
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 = 87.1795%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 31
Maximum Background Value = 0.001
Confidence Level = 83.8%
False Positive Rate = 16.2%

Location	Date	Count	Mean	Significant
MW-3	**3/2/2021**	**1**	**0.00249**	**TRUE**
MW-4	3/2/2021	1	0.001	FALSE
MW-5	3/2/2021	1	0.001	FALSE
TMW-1	3/2/2021	1	0.001	FALSE
TMW-2	3/2/2021	1	0.001	FALSE
TMW-3	3/2/2021	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 = 73.5484%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 32
Maximum Background Value = 0.12
Confidence Level = 84.2%
False Positive Rate = 15.8%

Location	Date	Count	Mean	Significant
MW-3	3/2/2021	1	0.00235	FALSE
MW-4	3/2/2021	1	0.002	FALSE
MW-5	3/2/2021	1	0.00447	FALSE
TMW-1	3/2/2021	1	0.002	FALSE
TMW-2	3/2/2021	1	0.002	FALSE
TMW-3	3/2/2021	1	0.00226	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Nickel

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

Total Percent Non-Detects = 59.8726%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 32
Maximum Background Value = 0.2
Confidence Level = 84.2%
False Positive Rate = 15.8%

Location	Date	Count	Mean	Significant
MW-3	3/2/2021	1	0.00345	FALSE
MW-4	3/2/2021	1	0.002	FALSE
MW-5	3/2/2021	1	0.00676	FALSE
TMW-1	3/2/2021	1	0.002	FALSE
TMW-2	3/2/2021	1	0.002	FALSE
TMW-3	3/2/2021	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 = 64.7436%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 30
Maximum Background Value = 18.8
Confidence Level = 83.3%
False Positive Rate = 16.7%

Location	Date	Count	Mean	Significant
MW-3	**3/2/2021**	**1**	**50.4**	**TRUE**
MW-4	3/2/2021	1	5	FALSE
MW-5	3/2/2021	1	12.9	FALSE
TMW-1	3/2/2021	1	5	FALSE
TMW-2	3/2/2021	1	5	FALSE
TMW-3	3/2/2021	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 = 68.7898%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 32
Maximum Background Value = 0.0281
Confidence Level = 84.2%
False Positive Rate = 15.8%

Location	Date	Count	Mean	Significant
MW-3	**3/2/2021**	**1**	**0.0292**	**TRUE**
MW-4	3/2/2021	1	0.025	FALSE
MW-5	3/2/2021	1	0.025	FALSE
TMW-1	3/2/2021	1	0.025	FALSE
TMW-2	3/2/2021	1	0.025	FALSE
TMW-3	3/2/2021	1	0.025	FALSE

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: MW-3

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

95% Confidence Level

S Statistic = 48 - 78 = -30

Tied GrouValue		Members
1	0.1	5

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 300
B = 0
C = 60
D = 0
E = 20
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 572.667
Z-Score = -1.21184
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.21184| <= 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 = 64 - 69 = -5

Tied GrouValue		Members
1	0.1	3

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 66
B = 0
C = 6
D = 0
E = 6
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 585.667
Z-Score = -0.165285
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.165285| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: TMW-1

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

95% Confidence Level

S Statistic = 33 - 57 = -24

Tied GrouValue		Members
1	0.1	2

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
8/27/2020	1
11/17/2020	1
3/2/2021	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 = -1.26102
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.26102| <= 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 = 10 - 81 = -71

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
8/27/2020	1
11/17/2020	1
3/2/2021	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 = -3.83214
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-3.83214 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: TMW-3

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

95% Confidence Level

S Statistic = 47 - 52 = -5

Tied GrouValue		Members
1	0.1	4

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
8/27/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 156
B = 0
C = 24
D = 0
E = 12
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 399.667
Z-Score = -0.200083
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.200083| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Barium

Location: MW-3

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

95% Confidence Level

S Statistic = 41 - 112 = -71

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 12546
b = 44064
c = 612
Group Variance = 697
Z-Score = -2.65144
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.65144 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Barium

Location: MW-5

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

95% Confidence Level

S Statistic = 124 - 12 = 112

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 589.333
Z-Score = 4.57238
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.57238 > 1.65463 indicating an upward 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 = 37 - 53 = -16

Tied GrouValue		Members
1	0.033	2

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
8/27/2020	1
11/17/2020	1
3/2/2021	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 = -0.822407
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.822407| <= 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 = 83 - 21 = 62

Tied GrouValue		Members
1	0.0451	2

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
8/27/2020	1
11/17/2020	1
3/2/2021	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 = 3.02242
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.02242 > 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 = 76 - 114 = -38

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
8/26/2020	1
11/17/2020	1
12/8/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 17100
b = 61560
c = 760
Group Variance = 950
Z-Score = -1.20044
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.20044| <= 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 = 28 - 107 = -79

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 588.333
Z-Score = -3.21575
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-3.21575 < -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 = 119 - 17 = 102

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 589.333
Z-Score = 4.16046
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.16046 > 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 = 110 - 25 = 85

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 588.333
Z-Score = 3.46312
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.46312 > 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 = 134 - 2 = 132

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
8/27/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 589.333
Z-Score = 5.39623
Comparison Level at 95% confidence level = 1.65463 (upward trend)
5.39623 > 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 = 114 - 22 = 92

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
8/27/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 589.333
Z-Score = 3.74853
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.74853 > 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 = 128 - 8 = 120

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
8/27/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 589.333
Z-Score = 4.90192
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.90192 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chromium

Location: MW-3

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

95% Confidence Level

S Statistic = 37 - 44 = -7

Tied GrouValue		Members
1	0.002	11

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 2970
B = 0
C = 990
D = 0
E = 110
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 424.333
Z-Score = -0.291271
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.291271| <= 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 = 84 - 46 = 38

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 156
B = 0
C = 24
D = 0
E = 12
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 580.667
Z-Score = 1.53546
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.53546| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chromium

Location: TMW-3

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

95% Confidence Level

S Statistic = 41 - 28 = 13

Tied GrouValue		Members
1	0.002	9

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
8/27/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 1656
B = 0
C = 504
D = 0
E = 72
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 316.333
Z-Score = 0.674697
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.674697| <= 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 = 84 - 66 = 18

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 66
B = 0
C = 6
D = 0
E = 6
F = 0
a = 12546
b = 44064
c = 612
Group Variance = 693.333
Z-Score = 0.645621
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.645621| <= 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 = 67 - 68 = -1

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 588.333
Z-Score = 0
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0| <= 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 = 66 - 69 = -3

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 588.333
Z-Score = -0.0824552
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.0824552| <= 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 = 123 - 3 = 120

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 300
B = 0
C = 60
D = 0
E = 20
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 572.667
Z-Score = 4.97274
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.97274 > 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 = 60 - 92 = -32

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
8/26/2020	1
11/17/2020	1
3/2/2021	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 12546
b = 44064
c = 612
Group Variance = 696
Z-Score = -1.17505
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.17505| <= 1.97737 indicating no evidence of a trend

APPENDIX C
LABORATORY ANALYTICAL REPORTS & FIELD INFORMATION LOGS

ANALYTICAL REPORT

March 10, 2021

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1322429
Samples Received:	03/03/2021
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:

Erica McNeese
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.

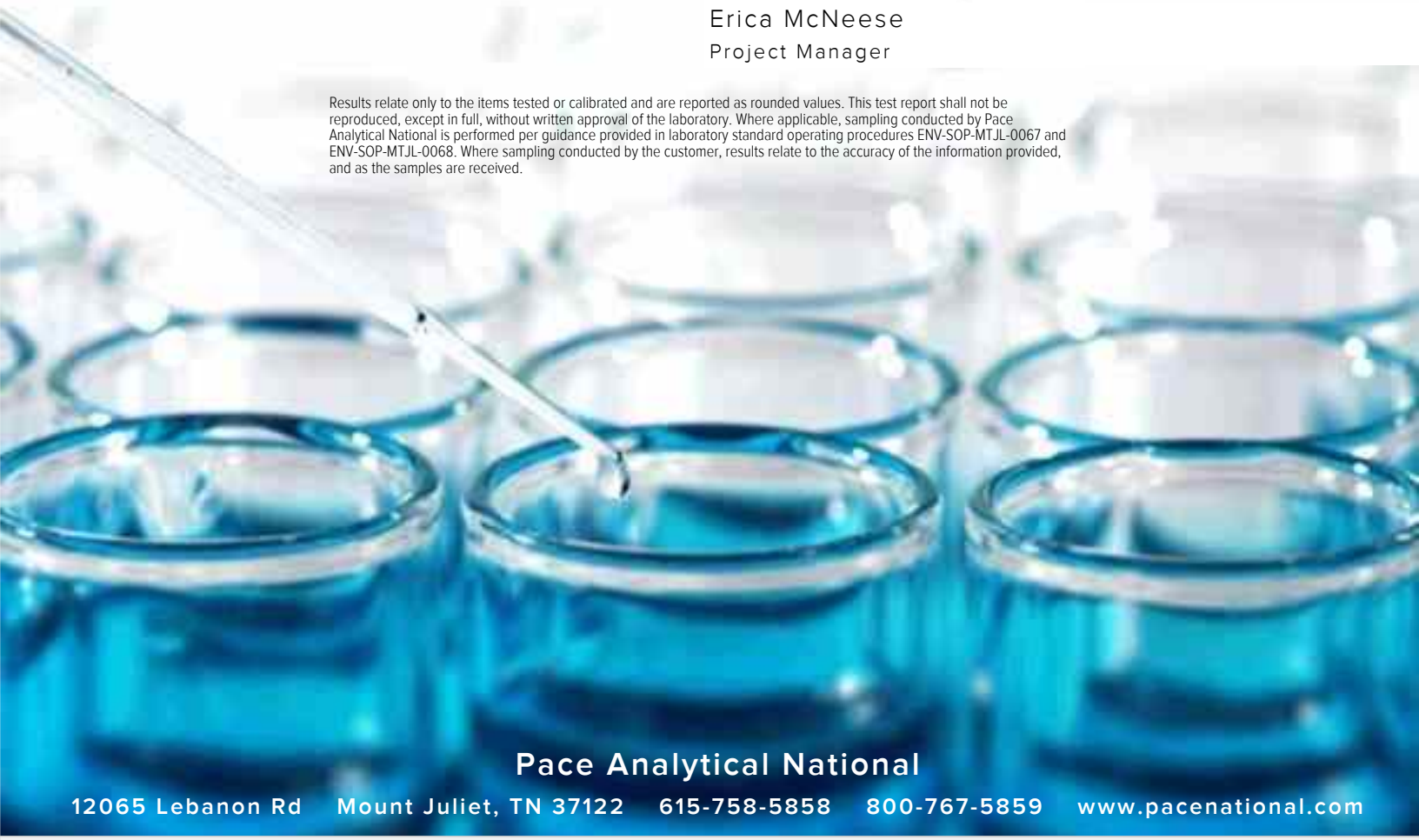


TABLE OF CONTENTS

MW-1 L1322429-01 GW

Collected by: AB/AB | Collected date/time: 03/02/21 10:20 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:12	03/08/21 13:12	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629183	1	03/04/21 12:23	03/04/21 12:23	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:40	03/04/21 13:40	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:49	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 18:33	03/03/21 18:33	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:29	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:21	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:12	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 21:13	03/05/21 21:13	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 11:31	HMH	Mt. Juliet, TN

MW-3 L1322429-02 GW

Collected by: AB/AB | Collected date/time: 03/02/21 12:55 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:22	03/08/21 13:22	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629183	1	03/04/21 12:30	03/04/21 12:30	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:44	03/04/21 13:44	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:49	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 19:06	03/03/21 19:06	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:31	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:24	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:22	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 21:33	03/05/21 21:33	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 11:07	HMH	Mt. Juliet, TN

MW-4 L1322429-03 GW

Collected by: AB/AB | Collected date/time: 03/02/21 12:15 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:25	03/08/21 13:25	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629183	1	03/04/21 12:36	03/04/21 12:36	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:45	03/04/21 13:45	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:50	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 19:56	03/03/21 19:56	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:33	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:27	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:25	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 21:54	03/05/21 21:54	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 14:08	HMH	Mt. Juliet, TN

MW-5 L1322429-04 GW

Collected by: AB/AB | Collected date/time: 03/02/21 11:20 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:28	03/08/21 13:28	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629824	1	03/05/21 05:21	03/05/21 05:21	SL	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:47	03/04/21 13:47	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:50	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 20:12	03/03/21 20:12	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:35	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:29	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:28	TM	Mt. Juliet, TN

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

MW-5 L1322429-04 GW

Collected by: AB/AB | Collected date/time: 03/02/21 11:20 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 22:15	03/05/21 22:15	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 14:20	HMH	Mt. Juliet, TN

TMW-1 L1322429-05 GW

Collected by: AB/AB | Collected date/time: 03/02/21 13:35 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:32	03/08/21 13:32	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629824	1	03/05/21 05:28	03/05/21 05:28	SL	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:54	03/04/21 13:54	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:50	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 21:01	03/03/21 21:01	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:37	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:32	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:32	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 22:35	03/05/21 22:35	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 14:33	HMH	Mt. Juliet, TN

TMW-2 L1322429-06 GW

Collected by: AB/AB | Collected date/time: 03/02/21 12:45 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:35	03/08/21 13:35	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629824	1	03/05/21 05:38	03/05/21 05:38	SL	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:56	03/04/21 13:56	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:51	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 21:18	03/03/21 21:18	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:39	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:35	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:35	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 22:56	03/05/21 22:56	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 14:45	HMH	Mt. Juliet, TN

TMW-3 L1322429-07 GW

Collected by: AB/AB | Collected date/time: 03/02/21 10:35 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:38	03/08/21 13:38	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629824	1	03/05/21 05:46	03/05/21 05:46	SL	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:57	03/04/21 13:57	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:51	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 21:34	03/03/21 21:34	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:41	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:37	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:38	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/06/21 00:39	03/06/21 00:39	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 14:57	HMH	Mt. Juliet, TN

DUPLICATE L1322429-08 GW

Collected by: AB/AB | Collected date/time: 03/02/21 00:00 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:41	03/08/21 13:41	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629824	1	03/05/21 05:54	03/05/21 05:54	SL	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 13:59	03/04/21 13:59	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:51	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 21:50	03/03/21 21:50	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:43	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:40	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:41	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/06/21 01:00	03/06/21 01:00	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 15:10	HMH	Mt. Juliet, TN

FIELD BLANK L1322429-09 GW

Collected by: AB/AB | Collected date/time: 03/02/21 13:15 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1629886	1	03/08/21 13:45	03/08/21 13:45	TM	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1629824	1	03/05/21 06:01	03/05/21 06:01	SL	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1629103	1	03/04/21 14:01	03/04/21 14:01	SL	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1631764	1	03/09/21 18:46	03/10/21 01:52	LDT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1628945	1	03/03/21 22:07	03/03/21 22:07	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1629898	1	03/05/21 10:32	03/06/21 22:45	SD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1629875	1	03/08/21 17:27	03/09/21 11:43	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1629886	1	03/08/21 10:36	03/08/21 13:45	TM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 20:31	03/05/21 20:31	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1629212	1	03/04/21 08:08	03/05/21 15:58	HMH	Mt. Juliet, TN

TRIP BLANK L1322429-10 GW

Collected by: AB/AB | Collected date/time: 03/02/21 00:00 | Received date/time: 03/03/21 14:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1630185	1	03/05/21 20:52	03/05/21 20:52	BMB	Mt. Juliet, TN

CASE NARRATIVE

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.

Erica McNeese
Project Manager

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	30.2		2.50	1	03/08/2021 13:12	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	44.1		20.0	1	03/04/2021 12:23	WG1629183

Sample Narrative:
L1322429-01 WG1629183: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:40	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:49	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 18:33	WG1628945
Chloride	2.15		1.00	1	03/03/2021 18:33	WG1628945
Fluoride	ND		0.150	1	03/03/2021 18:33	WG1628945
Nitrate	ND		0.100	1	03/03/2021 18:33	WG1628945
Sulfate	8.91		5.00	1	03/03/2021 18:33	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	0.00131		0.000200	1	03/06/2021 22:29	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:21	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.152		0.100	1	03/08/2021 13:12	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:12	WG1629886
Arsenic	0.00577		0.00200	1	03/08/2021 13:12	WG1629886
Barium	0.0222		0.0200	1	03/08/2021 13:12	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:12	WG1629886
Cadmium	ND		0.00100	1	03/08/2021 13:12	WG1629886
Calcium	7.63		1.00	1	03/08/2021 13:12	WG1629886
Chromium	ND		0.00200	1	03/08/2021 13:12	WG1629886
Cobalt	0.0313		0.00200	1	03/08/2021 13:12	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:12	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	3.43		0.100	1	03/08/2021 13:12	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:12	WG1629886
Magnesium	2.70		1.00	1	03/08/2021 13:12	WG1629886
Manganese	0.741		0.00500	1	03/08/2021 13:12	WG1629886
Nickel	0.00570		0.00200	1	03/08/2021 13:12	WG1629886
Potassium	ND		2.00	1	03/08/2021 13:12	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:12	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:12	WG1629886
Sodium	7.59		2.00	1	03/08/2021 13:12	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:12	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:12	WG1629886
Zinc	ND		0.0250	1	03/08/2021 13:12	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 21:13	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 21:13	WG1630185
Benzene	ND		0.00100	1	03/05/2021 21:13	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 21:13	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 21:13	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 21:13	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 21:13	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 21:13	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 21:13	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 21:13	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 21:13	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 21:13	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 21:13	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 21:13	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 21:13	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 21:13	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 21:13	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 21:13	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 21:13	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 21:13	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 21:13	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 21:13	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 21:13	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 21:13	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 21:13	WG1630185
Styrene	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 21:13	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 21:13	WG1630185
Toluene	ND		0.00100	1	03/05/2021 21:13	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 21:13	WG1630185

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	03/05/2021 21:13	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 21:13	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 21:13	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 21:13	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 21:13	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 21:13	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 21:13	WG1630185
(S) Toluene-d8	*107*		*80.0-120*		*03/05/2021 21:13*	WG1630185
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*03/05/2021 21:13*	WG1630185
(S) 1,2-Dichloroethane-d4	*97.3*		*70.0-130*		*03/05/2021 21:13*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 11:31	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 11:31	WG1629212

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	56.8		2.50	1	03/08/2021 13:22	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/04/2021 12:30	WG1629183

Sample Narrative:
L1322429-02 WG1629183: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:44	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:49	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 19:06	WG1628945
Chloride	18.4		1.00	1	03/03/2021 19:06	WG1628945
Fluoride	ND		0.150	1	03/03/2021 19:06	WG1628945
Nitrate	0.459		0.100	1	03/03/2021 19:06	WG1628945
Sulfate	50.4		5.00	1	03/03/2021 19:06	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:31	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:24	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.250		0.100	1	03/08/2021 13:22	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:22	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:22	WG1629886
Barium	0.0467		0.0200	1	03/08/2021 13:22	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:22	WG1629886
Cadmium	0.00249		0.00100	1	03/08/2021 13:22	WG1629886
Calcium	14.2		1.00	1	03/08/2021 13:22	WG1629886
Chromium	0.00235	B	0.00200	1	03/08/2021 13:22	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:22	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:22	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.122		0.100	1	03/08/2021 13:22	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:22	WG1629886
Magnesium	5.21		1.00	1	03/08/2021 13:22	WG1629886
Manganese	0.0808		0.00500	1	03/08/2021 13:22	WG1629886
Nickel	0.00347		0.00200	1	03/08/2021 13:22	WG1629886
Potassium	3.27		2.00	1	03/08/2021 13:22	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:22	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:22	WG1629886
Sodium	11.9		2.00	1	03/08/2021 13:22	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:22	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:22	WG1629886
Zinc	0.0292	B	0.0250	1	03/08/2021 13:22	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 21:33	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 21:33	WG1630185
Benzene	ND		0.00100	1	03/05/2021 21:33	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 21:33	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 21:33	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 21:33	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 21:33	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 21:33	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 21:33	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 21:33	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 21:33	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 21:33	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 21:33	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 21:33	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 21:33	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 21:33	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 21:33	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 21:33	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 21:33	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 21:33	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 21:33	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 21:33	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 21:33	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 21:33	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 21:33	WG1630185
Styrene	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 21:33	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 21:33	WG1630185
Toluene	ND		0.00100	1	03/05/2021 21:33	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 21:33	WG1630185

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	03/05/2021 21:33	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 21:33	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 21:33	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 21:33	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 21:33	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 21:33	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 21:33	WG1630185
(S) Toluene-d8	*107*		*80.0-120*		*03/05/2021 21:33*	WG1630185
(S) 4-Bromofluorobenzene	*94.7*		*77.0-126*		*03/05/2021 21:33*	WG1630185
(S) 1,2-Dichloroethane-d4	*95.6*		*70.0-130*		*03/05/2021 21:33*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 11:07	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 11:07	WG1629212

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

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	26.1		2.50	1	03/08/2021 13:25	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	21.0		20.0	1	03/04/2021 12:36	WG1629183

Sample Narrative:
L1322429-03 WG1629183: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:45	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:50	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 19:56	WG1628945
Chloride	9.45		1.00	1	03/03/2021 19:56	WG1628945
Fluoride	ND		0.150	1	03/03/2021 19:56	WG1628945
Nitrate	0.847		0.100	1	03/03/2021 19:56	WG1628945
Sulfate	ND		5.00	1	03/03/2021 19:56	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:33	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:27	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	03/08/2021 13:25	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:25	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:25	WG1629886
Barium	ND		0.0200	1	03/08/2021 13:25	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:25	WG1629886
Cadmium	ND		0.00100	1	03/08/2021 13:25	WG1629886
Calcium	5.50		1.00	1	03/08/2021 13:25	WG1629886
Chromium	ND		0.00200	1	03/08/2021 13:25	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:25	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:25	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.177		0.100	1	03/08/2021 13:25	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:25	WG1629886
Magnesium	3.00		1.00	1	03/08/2021 13:25	WG1629886
Manganese	0.0127		0.00500	1	03/08/2021 13:25	WG1629886
Nickel	ND		0.00200	1	03/08/2021 13:25	WG1629886
Potassium	ND		2.00	1	03/08/2021 13:25	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:25	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:25	WG1629886
Sodium	3.68		2.00	1	03/08/2021 13:25	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:25	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:25	WG1629886
Zinc	ND		0.0250	1	03/08/2021 13:25	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 21:54	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 21:54	WG1630185
Benzene	ND		0.00100	1	03/05/2021 21:54	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 21:54	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 21:54	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 21:54	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 21:54	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 21:54	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 21:54	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 21:54	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 21:54	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 21:54	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 21:54	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 21:54	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 21:54	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 21:54	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 21:54	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 21:54	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 21:54	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 21:54	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 21:54	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 21:54	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 21:54	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 21:54	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 21:54	WG1630185
Styrene	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 21:54	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 21:54	WG1630185
Toluene	ND		0.00100	1	03/05/2021 21:54	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 21:54	WG1630185

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	03/05/2021 21:54	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 21:54	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 21:54	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 21:54	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 21:54	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 21:54	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 21:54	WG1630185
(S) Toluene-d8	*107*		*80.0-120*		*03/05/2021 21:54*	WG1630185
(S) 4-Bromofluorobenzene	*103*		*77.0-126*		*03/05/2021 21:54*	WG1630185
(S) 1,2-Dichloroethane-d4	*94.4*		*70.0-130*		*03/05/2021 21:54*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 14:08	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 14:08	WG1629212

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	92.5		2.50	1	03/08/2021 13:28	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/05/2021 05:21	WG1629824

Sample Narrative:

L1322429-04 WG1629824: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:47	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:50	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 20:12	WG1628945
Chloride	75.7		1.00	1	03/03/2021 20:12	WG1628945
Fluoride	ND		0.150	1	03/03/2021 20:12	WG1628945
Nitrate	1.27		0.100	1	03/03/2021 20:12	WG1628945
Sulfate	12.9		5.00	1	03/03/2021 20:12	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:35	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:29	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.510		0.100	1	03/08/2021 13:28	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:28	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:28	WG1629886
Barium	0.0582		0.0200	1	03/08/2021 13:28	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:28	WG1629886
Cadmium	ND		0.00100	1	03/08/2021 13:28	WG1629886
Calcium	17.8		1.00	1	03/08/2021 13:28	WG1629886
Chromium	0.00448	B	0.00200	1	03/08/2021 13:28	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:28	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:28	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.480		0.100	1	03/08/2021 13:28	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:28	WG1629886
Magnesium	11.7		1.00	1	03/08/2021 13:28	WG1629886
Manganese	0.242		0.00500	1	03/08/2021 13:28	WG1629886
Nickel	0.00676		0.00200	1	03/08/2021 13:28	WG1629886
Potassium	ND		2.00	1	03/08/2021 13:28	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:28	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:28	WG1629886
Sodium	20.3		2.00	1	03/08/2021 13:28	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:28	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:28	WG1629886
Zinc	ND		0.0250	1	03/08/2021 13:28	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 22:15	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 22:15	WG1630185
Benzene	ND		0.00100	1	03/05/2021 22:15	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 22:15	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 22:15	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 22:15	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 22:15	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 22:15	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 22:15	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 22:15	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 22:15	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 22:15	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 22:15	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 22:15	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 22:15	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 22:15	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 22:15	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 22:15	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 22:15	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 22:15	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 22:15	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 22:15	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 22:15	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 22:15	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 22:15	WG1630185
Styrene	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 22:15	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 22:15	WG1630185
Toluene	ND		0.00100	1	03/05/2021 22:15	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 22:15	WG1630185

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	03/05/2021 22:15	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 22:15	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 22:15	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 22:15	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 22:15	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 22:15	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 22:15	WG1630185
(S) Toluene-d8	*106*		*80.0-120*		*03/05/2021 22:15*	WG1630185
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*03/05/2021 22:15*	WG1630185
(S) 1,2-Dichloroethane-d4	*95.4*		*70.0-130*		*03/05/2021 22:15*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 14:20	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 14:20	WG1629212

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	47.7		2.50	1	03/08/2021 13:32	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/05/2021 05:28	WG1629824

Sample Narrative:
L1322429-05 WG1629824: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:54	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:50	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 21:01	WG1628945
Chloride	28.0		1.00	1	03/03/2021 21:01	WG1628945
Fluoride	ND		0.150	1	03/03/2021 21:01	WG1628945
Nitrate	1.72		0.100	1	03/03/2021 21:01	WG1628945
Sulfate	ND		5.00	1	03/03/2021 21:01	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:37	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:32	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.303		0.100	1	03/08/2021 13:32	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:32	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:32	WG1629886
Barium	ND		0.0200	1	03/08/2021 13:32	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:32	WG1629886
Cadmium	ND		0.00100	1	03/08/2021 13:32	WG1629886
Calcium	13.0		1.00	1	03/08/2021 13:32	WG1629886
Chromium	ND		0.00200	1	03/08/2021 13:32	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:32	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:32	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.307		0.100	1	03/08/2021 13:32	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:32	WG1629886
Magnesium	3.73		1.00	1	03/08/2021 13:32	WG1629886
Manganese	0.0350		0.00500	1	03/08/2021 13:32	WG1629886
Nickel	ND		0.00200	1	03/08/2021 13:32	WG1629886
Potassium	ND		2.00	1	03/08/2021 13:32	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:32	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:32	WG1629886
Sodium	4.40		2.00	1	03/08/2021 13:32	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:32	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:32	WG1629886
Zinc	ND		0.0250	1	03/08/2021 13:32	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 22:35	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 22:35	WG1630185
Benzene	ND		0.00100	1	03/05/2021 22:35	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 22:35	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 22:35	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 22:35	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 22:35	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 22:35	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 22:35	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 22:35	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 22:35	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 22:35	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 22:35	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 22:35	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 22:35	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 22:35	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 22:35	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 22:35	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 22:35	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 22:35	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 22:35	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 22:35	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 22:35	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 22:35	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 22:35	WG1630185
Styrene	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 22:35	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 22:35	WG1630185
Toluene	ND		0.00100	1	03/05/2021 22:35	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 22:35	WG1630185

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	03/05/2021 22:35	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 22:35	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 22:35	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 22:35	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 22:35	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 22:35	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 22:35	WG1630185
(S) Toluene-d8	*104*		*80.0-120*		*03/05/2021 22:35*	WG1630185
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*03/05/2021 22:35*	WG1630185
(S) 1,2-Dichloroethane-d4	*95.3*		*70.0-130*		*03/05/2021 22:35*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 14:33	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 14:33	WG1629212

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	55.3		2.50	1	03/08/2021 13:35	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/05/2021 05:38	WG1629824

Sample Narrative:

L1322429-06 WG1629824: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:56	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:51	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 21:18	WG1628945
Chloride	39.5		1.00	1	03/03/2021 21:18	WG1628945
Fluoride	ND		0.150	1	03/03/2021 21:18	WG1628945
Nitrate	0.878		0.100	1	03/03/2021 21:18	WG1628945
Sulfate	ND		5.00	1	03/03/2021 21:18	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:39	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:35	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.371		0.100	1	03/08/2021 13:35	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:35	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:35	WG1629886
Barium	0.0330		0.0200	1	03/08/2021 13:35	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:35	WG1629886
Cadmium	ND		0.00100	1	03/08/2021 13:35	WG1629886
Calcium	13.9		1.00	1	03/08/2021 13:35	WG1629886
Chromium	ND		0.00200	1	03/08/2021 13:35	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:35	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:35	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.284		0.100	1	03/08/2021 13:35	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:35	WG1629886
Magnesium	5.02		1.00	1	03/08/2021 13:35	WG1629886
Manganese	0.00573		0.00500	1	03/08/2021 13:35	WG1629886
Nickel	ND		0.00200	1	03/08/2021 13:35	WG1629886
Potassium	ND		2.00	1	03/08/2021 13:35	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:35	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:35	WG1629886
Sodium	5.56		2.00	1	03/08/2021 13:35	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:35	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:35	WG1629886
Zinc	ND		0.0250	1	03/08/2021 13:35	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 22:56	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 22:56	WG1630185
Benzene	ND		0.00100	1	03/05/2021 22:56	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 22:56	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 22:56	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 22:56	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 22:56	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 22:56	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 22:56	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 22:56	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 22:56	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 22:56	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 22:56	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 22:56	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 22:56	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 22:56	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 22:56	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 22:56	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 22:56	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 22:56	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 22:56	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 22:56	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 22:56	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 22:56	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 22:56	WG1630185
Styrene	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 22:56	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 22:56	WG1630185
Toluene	ND		0.00100	1	03/05/2021 22:56	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 22:56	WG1630185

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	03/05/2021 22:56	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 22:56	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 22:56	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 22:56	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 22:56	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 22:56	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 22:56	WG1630185
(S) Toluene-d8	*107*		*80.0-120*		*03/05/2021 22:56*	WG1630185
(S) 4-Bromofluorobenzene	*99.8*		*77.0-126*		*03/05/2021 22:56*	WG1630185
(S) 1,2-Dichloroethane-d4	*95.4*		*70.0-130*		*03/05/2021 22:56*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 14:45	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 14:45	WG1629212

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	84.0		2.50	1	03/08/2021 13:38	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/05/2021 05:46	WG1629824

Sample Narrative:
L1322429-07 WG1629824: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:57	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:51	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 21:34	WG1628945
Chloride	65.1		1.00	1	03/03/2021 21:34	WG1628945
Fluoride	ND		0.150	1	03/03/2021 21:34	WG1628945
Nitrate	5.70		0.100	1	03/03/2021 21:34	WG1628945
Sulfate	ND		5.00	1	03/03/2021 21:34	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:41	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:37	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	1.04		0.100	1	03/08/2021 13:38	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:38	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:38	WG1629886
Barium	0.0514		0.0200	1	03/08/2021 13:38	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:38	WG1629886
Cadmium	ND		0.00100	1	03/08/2021 13:38	WG1629886
Calcium	22.0		1.00	1	03/08/2021 13:38	WG1629886
Chromium	0.00228	B	0.00200	1	03/08/2021 13:38	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:38	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:38	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.966		0.100	1	03/08/2021 13:38	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:38	WG1629886
Magnesium	7.05		1.00	1	03/08/2021 13:38	WG1629886
Manganese	0.0181		0.00500	1	03/08/2021 13:38	WG1629886
Nickel	ND		0.00200	1	03/08/2021 13:38	WG1629886
Potassium	ND		2.00	1	03/08/2021 13:38	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:38	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:38	WG1629886
Sodium	14.3		2.00	1	03/08/2021 13:38	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:38	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:38	WG1629886
Zinc	ND		0.0250	1	03/08/2021 13:38	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/06/2021 00:39	WG1630185
Acrylonitrile	ND		0.0100	1	03/06/2021 00:39	WG1630185
Benzene	ND		0.00100	1	03/06/2021 00:39	WG1630185
Bromochloromethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
Bromodichloromethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
Bromoform	ND		0.00100	1	03/06/2021 00:39	WG1630185
Bromomethane	ND		0.00500	1	03/06/2021 00:39	WG1630185
Carbon disulfide	ND		0.00100	1	03/06/2021 00:39	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/06/2021 00:39	WG1630185
Chlorobenzene	ND		0.00100	1	03/06/2021 00:39	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
Chloroethane	ND		0.00500	1	03/06/2021 00:39	WG1630185
Chloroform	ND		0.00500	1	03/06/2021 00:39	WG1630185
Chloromethane	ND		0.00250	1	03/06/2021 00:39	WG1630185
Dibromomethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/06/2021 00:39	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/06/2021 00:39	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/06/2021 00:39	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/06/2021 00:39	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/06/2021 00:39	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/06/2021 00:39	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/06/2021 00:39	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/06/2021 00:39	WG1630185
Ethylbenzene	ND		0.00100	1	03/06/2021 00:39	WG1630185
2-Hexanone	ND		0.0100	1	03/06/2021 00:39	WG1630185
Iodomethane	ND		0.0100	1	03/06/2021 00:39	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/06/2021 00:39	WG1630185
Methylene Chloride	ND		0.00500	1	03/06/2021 00:39	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/06/2021 00:39	WG1630185
Styrene	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/06/2021 00:39	WG1630185
Tetrachloroethene	ND		0.00100	1	03/06/2021 00:39	WG1630185
Toluene	ND		0.00100	1	03/06/2021 00:39	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/06/2021 00:39	WG1630185

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	03/06/2021 00:39	WG1630185
Trichloroethene	ND		0.00100	1	03/06/2021 00:39	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/06/2021 00:39	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/06/2021 00:39	WG1630185
Vinyl acetate	ND		0.0100	1	03/06/2021 00:39	WG1630185
Vinyl chloride	ND		0.00100	1	03/06/2021 00:39	WG1630185
Xylenes, Total	ND		0.00300	1	03/06/2021 00:39	WG1630185
(S) Toluene-d8	*106*		*80.0-120*		*03/06/2021 00:39*	WG1630185
(S) 4-Bromofluorobenzene	*106*		*77.0-126*		*03/06/2021 00:39*	WG1630185
(S) 1,2-Dichloroethane-d4	*95.0*		*70.0-130*		*03/06/2021 00:39*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 14:57	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 14:57	WG1629212

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

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	56.6		2.50	1	03/08/2021 13:41	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/05/2021 05:54	WG1629824

Sample Narrative:

L1322429-08 WG1629824: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 13:59	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:51	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 21:50	WG1628945
Chloride	17.9		1.00	1	03/03/2021 21:50	WG1628945
Fluoride	ND		0.150	1	03/03/2021 21:50	WG1628945
Nitrate	0.482		0.100	1	03/03/2021 21:50	WG1628945
Sulfate	50.7		5.00	1	03/03/2021 21:50	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:43	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:40	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.218		0.100	1	03/08/2021 13:41	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:41	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:41	WG1629886
Barium	0.0464		0.0200	1	03/08/2021 13:41	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:41	WG1629886
Cadmium	0.00252		0.00100	1	03/08/2021 13:41	WG1629886
Calcium	14.1		1.00	1	03/08/2021 13:41	WG1629886
Chromium	0.00207	B	0.00200	1	03/08/2021 13:41	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:41	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:41	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	0.113		0.100	1	03/08/2021 13:41	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:41	WG1629886
Magnesium	5.23		1.00	1	03/08/2021 13:41	WG1629886
Manganese	0.0780		0.00500	1	03/08/2021 13:41	WG1629886
Nickel	0.00332		0.00200	1	03/08/2021 13:41	WG1629886
Potassium	3.26		2.00	1	03/08/2021 13:41	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:41	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:41	WG1629886
Sodium	12.1		2.00	1	03/08/2021 13:41	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:41	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:41	WG1629886
Zinc	0.0284	B	0.0250	1	03/08/2021 13:41	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/06/2021 01:00	WG1630185
Acrylonitrile	ND		0.0100	1	03/06/2021 01:00	WG1630185
Benzene	ND		0.00100	1	03/06/2021 01:00	WG1630185
Bromochloromethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
Bromodichloromethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
Bromoform	ND		0.00100	1	03/06/2021 01:00	WG1630185
Bromomethane	ND		0.00500	1	03/06/2021 01:00	WG1630185
Carbon disulfide	ND		0.00100	1	03/06/2021 01:00	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/06/2021 01:00	WG1630185
Chlorobenzene	ND		0.00100	1	03/06/2021 01:00	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
Chloroethane	ND		0.00500	1	03/06/2021 01:00	WG1630185
Chloroform	ND		0.00500	1	03/06/2021 01:00	WG1630185
Chloromethane	ND		0.00250	1	03/06/2021 01:00	WG1630185
Dibromomethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/06/2021 01:00	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/06/2021 01:00	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/06/2021 01:00	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/06/2021 01:00	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/06/2021 01:00	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/06/2021 01:00	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/06/2021 01:00	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/06/2021 01:00	WG1630185
Ethylbenzene	ND		0.00100	1	03/06/2021 01:00	WG1630185
2-Hexanone	ND		0.0100	1	03/06/2021 01:00	WG1630185
Iodomethane	ND		0.0100	1	03/06/2021 01:00	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/06/2021 01:00	WG1630185
Methylene Chloride	ND		0.00500	1	03/06/2021 01:00	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/06/2021 01:00	WG1630185
Styrene	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/06/2021 01:00	WG1630185
Tetrachloroethene	ND		0.00100	1	03/06/2021 01:00	WG1630185
Toluene	ND		0.00100	1	03/06/2021 01:00	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/06/2021 01:00	WG1630185

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	03/06/2021 01:00	WG1630185
Trichloroethene	ND		0.00100	1	03/06/2021 01:00	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/06/2021 01:00	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/06/2021 01:00	WG1630185
Vinyl acetate	ND		0.0100	1	03/06/2021 01:00	WG1630185
Vinyl chloride	ND		0.00100	1	03/06/2021 01:00	WG1630185
Xylenes, Total	ND		0.00300	1	03/06/2021 01:00	WG1630185
(S) Toluene-d8	*106*		*80.0-120*		*03/06/2021 01:00*	WG1630185
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*03/06/2021 01:00*	WG1630185
(S) 1,2-Dichloroethane-d4	*95.5*		*70.0-130*		*03/06/2021 01:00*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 15:10	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 15:10	WG1629212

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	ND		2.50	1	03/08/2021 13:45	WG1629886

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/05/2021 06:01	WG1629824

Sample Narrative:

L1322429-09 WG1629824: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	03/04/2021 14:01	WG1629103

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	03/10/2021 01:52	WG1631764

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/03/2021 22:07	WG1628945
Chloride	ND		1.00	1	03/03/2021 22:07	WG1628945
Fluoride	ND		0.150	1	03/03/2021 22:07	WG1628945
Nitrate	ND		0.100	1	03/03/2021 22:07	WG1628945
Sulfate	ND		5.00	1	03/03/2021 22:07	WG1628945

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/06/2021 22:45	WG1629898

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/09/2021 11:43	WG1629875

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	03/08/2021 13:45	WG1629886
Antimony	ND		0.00400	1	03/08/2021 13:45	WG1629886
Arsenic	ND		0.00200	1	03/08/2021 13:45	WG1629886
Barium	ND		0.0200	1	03/08/2021 13:45	WG1629886
Beryllium	ND		0.00200	1	03/08/2021 13:45	WG1629886
Cadmium	ND		0.00100	1	03/08/2021 13:45	WG1629886
Calcium	ND		1.00	1	03/08/2021 13:45	WG1629886
Chromium	ND		0.00200	1	03/08/2021 13:45	WG1629886
Cobalt	ND		0.00200	1	03/08/2021 13:45	WG1629886
Copper	ND		0.00500	1	03/08/2021 13:45	WG1629886

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	03/08/2021 13:45	WG1629886
Lead	ND		0.00200	1	03/08/2021 13:45	WG1629886
Magnesium	ND		1.00	1	03/08/2021 13:45	WG1629886
Manganese	ND		0.00500	1	03/08/2021 13:45	WG1629886
Nickel	ND		0.00200	1	03/08/2021 13:45	WG1629886
Potassium	ND		2.00	1	03/08/2021 13:45	WG1629886
Selenium	ND		0.00200	1	03/08/2021 13:45	WG1629886
Silver	ND		0.00200	1	03/08/2021 13:45	WG1629886
Sodium	ND		2.00	1	03/08/2021 13:45	WG1629886
Thallium	ND		0.00200	1	03/08/2021 13:45	WG1629886
Vanadium	ND		0.00500	1	03/08/2021 13:45	WG1629886
Zinc	ND		0.0250	1	03/08/2021 13:45	WG1629886

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 20:31	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 20:31	WG1630185
Benzene	ND		0.00100	1	03/05/2021 20:31	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 20:31	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 20:31	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 20:31	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 20:31	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 20:31	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 20:31	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 20:31	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 20:31	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 20:31	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 20:31	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 20:31	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 20:31	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 20:31	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 20:31	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 20:31	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 20:31	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 20:31	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 20:31	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 20:31	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 20:31	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 20:31	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 20:31	WG1630185
Styrene	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 20:31	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 20:31	WG1630185
Toluene	ND		0.00100	1	03/05/2021 20:31	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 20:31	WG1630185

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	03/05/2021 20:31	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 20:31	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 20:31	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 20:31	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 20:31	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 20:31	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 20:31	WG1630185
(S) Toluene-d8	*104*		*80.0-120*		*03/05/2021 20:31*	WG1630185
(S) 4-Bromofluorobenzene	*104*		*77.0-126*		*03/05/2021 20:31*	WG1630185
(S) 1,2-Dichloroethane-d4	*91.3*		*70.0-130*		*03/05/2021 20:31*	WG1630185

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000200	1	03/05/2021 15:58	WG1629212
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/05/2021 15:58	WG1629212

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

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/05/2021 20:52	WG1630185
Acrylonitrile	ND		0.0100	1	03/05/2021 20:52	WG1630185
Benzene	ND		0.00100	1	03/05/2021 20:52	WG1630185
Bromochloromethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
Bromodichloromethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
Bromoform	ND		0.00100	1	03/05/2021 20:52	WG1630185
Bromomethane	ND		0.00500	1	03/05/2021 20:52	WG1630185
Carbon disulfide	ND		0.00100	1	03/05/2021 20:52	WG1630185
Carbon tetrachloride	ND		0.00100	1	03/05/2021 20:52	WG1630185
Chlorobenzene	ND		0.00100	1	03/05/2021 20:52	WG1630185
Chlorodibromomethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
Chloroethane	ND		0.00500	1	03/05/2021 20:52	WG1630185
Chloroform	ND		0.00500	1	03/05/2021 20:52	WG1630185
Chloromethane	ND		0.00250	1	03/05/2021 20:52	WG1630185
Dibromomethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/05/2021 20:52	WG1630185
1,2-Dibromoethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,2-Dichlorobenzene	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,4-Dichlorobenzene	ND		0.00100	1	03/05/2021 20:52	WG1630185
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/05/2021 20:52	WG1630185
1,1-Dichloroethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,2-Dichloroethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,1-Dichloroethene	ND		0.00100	1	03/05/2021 20:52	WG1630185
cis-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 20:52	WG1630185
trans-1,2-Dichloroethene	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,2-Dichloropropane	ND		0.00100	1	03/05/2021 20:52	WG1630185
cis-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 20:52	WG1630185
trans-1,3-Dichloropropene	ND		0.00100	1	03/05/2021 20:52	WG1630185
Ethylbenzene	ND		0.00100	1	03/05/2021 20:52	WG1630185
2-Hexanone	ND		0.0100	1	03/05/2021 20:52	WG1630185
Iodomethane	ND		0.0100	1	03/05/2021 20:52	WG1630185
2-Butanone (MEK)	ND		0.0100	1	03/05/2021 20:52	WG1630185
Methylene Chloride	ND		0.00500	1	03/05/2021 20:52	WG1630185
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/05/2021 20:52	WG1630185
Styrene	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
Tetrachloroethene	ND		0.00100	1	03/05/2021 20:52	WG1630185
Toluene	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,1,1-Trichloroethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
1,1,2-Trichloroethane	ND		0.00100	1	03/05/2021 20:52	WG1630185
Trichloroethene	ND		0.00100	1	03/05/2021 20:52	WG1630185
Trichlorofluoromethane	ND		0.00500	1	03/05/2021 20:52	WG1630185
1,2,3-Trichloropropane	ND		0.00250	1	03/05/2021 20:52	WG1630185
Vinyl acetate	ND		0.0100	1	03/05/2021 20:52	WG1630185
Vinyl chloride	ND		0.00100	1	03/05/2021 20:52	WG1630185
Xylenes, Total	ND		0.00300	1	03/05/2021 20:52	WG1630185
(S) Toluene-d8	*108*		*80.0-120*		*03/05/2021 20:52*	WG1630185
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*03/05/2021 20:52*	WG1630185
(S) 1,2-Dichloroethane-d4	*94.0*		*70.0-130*		*03/05/2021 20:52*	WG1630185

Method Blank (MB)

(MB) R3627559-1 03/04/21 09:16

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

L1322068-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1322068-03 03/04/21 09:30 • (DUP) R3627559-2 03/04/21 09:40

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	165	176	1	5.88		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

L1322380-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1322380-02 03/04/21 12:03 • (DUP) R3627559-4 03/04/21 12:13

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	74.9	76.2	1	1.74		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3627559-3 03/04/21 11:00

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	95.0	95.0	90.0-110	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3627767-1 03/05/21 03:38

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) R3627767-3 03/05/21 06:09

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	103	103	90.0-110	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3627456-1 03/04/21 13:32

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

L1322429-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1322429-01 03/04/21 13:40 • (DUP) R3627456-5 03/04/21 13:42

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

L1322465-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1322465-02 03/04/21 14:06 • (DUP) R3627456-7 03/04/21 14:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	1.22	1.21	1	0.825		10

Laboratory Control Sample (LCS)

(LCS) R3627456-2 03/04/21 13:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7.50	7.63	102	90.0-110	

L1321674-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1321674-01 03/04/21 13:35 • (MS) R3627456-3 03/04/21 13:37 • (MSD) R3627456-4 03/04/21 13:39

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	5.17	5.25	103	105	1	90.0-110			1.57	10

L1322459-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1322459-01 03/04/21 14:02 • (MS) R3627456-6 03/04/21 14:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5.00	1.95	7.05	102	1	90.0-110	

Method Blank (MB)

(MB) R3629024-1 03/10/21 01:48

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

L1322429-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1322429-01 03/10/21 01:49 • (DUP) R3629024-3 03/10/21 01:49

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

L1322567-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1322567-01 03/10/21 01:53 • (DUP) R3629024-6 03/10/21 01:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	35.6	37.3	1	4.85		20

Laboratory Control Sample (LCS)

(LCS) R3629024-2 03/10/21 01:48

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	500	515	103	90.0-110	

L1322429-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1322429-08 03/10/21 01:51 • (MS) R3629024-4 03/10/21 01:51 • (MSD) R3629024-5 03/10/21 01:51

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	500	ND	509	513	102	103	1	80.0-120			0.820	20

Method Blank (MB)

(MB) R3627324-1 03/03/21 16:18

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

L1322429-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1322429-01 03/03/21 18:33 • (DUP) R3627324-3 03/03/21 18:50

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	2.15	2.03	1	5.69		15
Fluoride	ND	ND	1	0.000		15
Nitrate	ND	ND	1	11.9		15
Sulfate	8.91	8.85	1	0.634		15

L1321478-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1321478-01 03/03/21 22:56 • (DUP) R3627324-6 03/03/21 23:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	ND	20	0.000		15
Chloride	903	917	20	1.52		15
Fluoride	ND	ND	20	0.000		15
Nitrate	ND	ND	20	0.000		15
Sulfate	ND	ND	20	0.713		15

Laboratory Control Sample (LCS)

(LCS) R3627324-2 03/03/21 16:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromide	40.0	40.2	101	80.0-120	
Chloride	40.0	40.1	100	80.0-120	
Fluoride	8.00	8.06	101	80.0-120	
Nitrate	8.00	8.03	100	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3627324-2 03/03/21 16:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	40.5	101	80.0-120	

L1322429-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1322429-02 03/03/21 19:06 • (MS) R3627324-4 03/03/21 19:23 • (MSD) R3627324-5 03/03/21 19:39

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	47.4	47.6	94.8	95.2	1	80.0-120			0.440	15
Chloride	50.0	18.4	67.1	67.5	97.4	98.1	1	80.0-120			0.469	15
Fluoride	5.00	ND	5.12	5.14	99.9	100	1	80.0-120			0.374	15
Nitrate	5.00	0.459	5.38	5.44	98.5	99.6	1	80.0-120			1.03	15
Sulfate	50.0	50.4	96.3	96.4	91.7	92.0	1	80.0-120			0.162	15

L1321478-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1321478-06 03/04/21 00:51 • (MS) R3627324-7 03/04/21 01:07 • (MSD) R3627324-8 03/04/21 01:24

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	51.6	52.4	101	103	1	80.0-120			1.59	15
Chloride	50.0	342	376	378	69.3	71.7	1	80.0-120	E V	E V	0.312	15
Fluoride	5.00	0.650	5.87	5.95	104	106	1	80.0-120			1.36	15
Nitrate	5.00	ND	5.11	5.19	102	104	1	80.0-120			1.64	15
Sulfate	50.0	ND	50.9	51.7	102	103	1	80.0-120			1.46	15

Method Blank (MB)

(MB) R3628055-1 03/06/21 22:06

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) R3628055-2 03/06/21 22:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00288	96.0	80.0-120	

L1322808-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1322808-01 03/06/21 22:10 • (MS) R3628055-3 03/06/21 22:12 • (MSD) R3628055-4 03/06/21 22:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00265	0.00122	88.2	40.8	1	75.0-125		J3 J6	73.5	20

Method Blank (MB)

(MB) R3628906-1 03/09/21 10:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0200	0.200

Laboratory Control Sample (LCS)

(LCS) R3628906-2 03/09/21 10:52

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron	1.00	0.958	95.8	80.0-120	

L1322448-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1322448-02 03/09/21 10:54 • (MS) R3628906-4 03/09/21 11:00 • (MSD) R3628906-5 03/09/21 11:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron	1.00	ND	1.02	1.03	97.6	98.1	1	75.0-125			0.558	20

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

Method Blank (MB)

(MB) R3628421-1 03/08/21 12:43

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	U		0.0185	0.100
Antimony	U		0.00103	0.00400
Arsenic	U		0.000180	0.00200
Barium	U		0.000381	0.0200
Beryllium	U		0.000190	0.00200
Cadmium	U		0.000150	0.00100
Calcium	U		0.0936	1.00
Chromium	0.00163	J	0.00124	0.00200
Copper	U		0.00151	0.00500
Cobalt	U		0.0000596	0.00200
Iron	U		0.0281	0.100
Lead	U		0.000849	0.00200
Magnesium	U		0.0735	1.00
Manganese	U		0.000704	0.00500
Nickel	U		0.000816	0.00200
Potassium	U		0.108	2.00
Selenium	U		0.000300	0.00200
Silver	U		0.0000700	0.00200
Sodium	U		0.376	2.00
Thallium	U		0.000121	0.00200
Vanadium	U		0.000664	0.00500
Zinc	0.00451	J	0.00302	0.0250

Laboratory Control Sample (LCS)

(LCS) R3628421-2 03/08/21 12:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Aluminum	5.00	4.97	99.3	80.0-120	
Antimony	0.0500	0.0533	107	80.0-120	
Arsenic	0.0500	0.0489	97.9	80.0-120	
Barium	0.0500	0.0485	97.0	80.0-120	
Beryllium	0.0500	0.0451	90.3	80.0-120	
Cadmium	0.0500	0.0530	106	80.0-120	
Calcium	5.00	5.09	102	80.0-120	
Chromium	0.0500	0.0513	103	80.0-120	
Copper	0.0500	0.0479	95.9	80.0-120	
Cobalt	0.0500	0.0510	102	80.0-120	
Iron	5.00	5.04	101	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3628421-2 03/08/21 12:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Lead	0.0500	0.0498	99.6	80.0-120	
Magnesium	5.00	4.93	98.6	80.0-120	
Manganese	0.0500	0.0506	101	80.0-120	
Nickel	0.0500	0.0517	103	80.0-120	
Potassium	5.00	4.81	96.2	80.0-120	
Selenium	0.0500	0.0512	102	80.0-120	
Silver	0.0500	0.0505	101	80.0-120	
Sodium	5.00	5.16	103	80.0-120	
Thallium	0.0500	0.0485	97.0	80.0-120	
Vanadium	0.0500	0.0498	99.6	80.0-120	
Zinc	0.500	0.489	97.7	80.0-120	

Method Blank (MB)

(MB) R3628060-2 03/05/21 20:11

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) R3628060-2 03/05/21 20:11

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	*106*			*80.0-120*
(S) 4-Bromofluorobenzene	*100*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*93.4*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3628060-1 03/05/21 19:30

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	0.0250	0.0289	116	19.0-160	
Acrylonitrile	0.0250	0.0285	114	55.0-149	
Benzene	0.00500	0.00498	99.6	70.0-123	
Bromodichloromethane	0.00500	0.00455	91.0	75.0-120	
Bromochloromethane	0.00500	0.00483	96.6	76.0-122	
Bromoform	0.00500	0.00382	76.4	68.0-132	
Bromomethane	0.00500	0.00414	82.8	10.0-160	
Carbon disulfide	0.00500	0.00454	90.8	61.0-128	
Carbon tetrachloride	0.00500	0.00488	97.6	68.0-126	
Chlorobenzene	0.00500	0.00454	90.8	80.0-121	
Chlorodibromomethane	0.00500	0.00433	86.6	77.0-125	
Chloroethane	0.00500	0.00483	96.6	47.0-150	
Chloroform	0.00500	0.00492	98.4	73.0-120	
Chloromethane	0.00500	0.00438	87.6	41.0-142	
1,2-Dibromo-3-Chloropropane	0.00500	0.00405	81.0	58.0-134	
1,2-Dibromoethane	0.00500	0.00477	95.4	80.0-122	
Dibromomethane	0.00500	0.00478	95.6	80.0-120	
1,2-Dichlorobenzene	0.00500	0.00478	95.6	79.0-121	
1,4-Dichlorobenzene	0.00500	0.00453	90.6	79.0-120	
trans-1,4-Dichloro-2-butene	0.00500	0.00397	79.4	33.0-144	
1,1-Dichloroethane	0.00500	0.00500	100	70.0-126	
1,2-Dichloroethane	0.00500	0.00471	94.2	70.0-128	
1,1-Dichloroethene	0.00500	0.00507	101	71.0-124	

Laboratory Control Sample (LCS)

(LCS) R3628060-1 03/05/21 19:30

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
cis-1,2-Dichloroethene	0.00500	0.00484	96.8	73.0-120	
trans-1,2-Dichloroethene	0.00500	0.00480	96.0	73.0-120	
1,2-Dichloropropane	0.00500	0.00492	98.4	77.0-125	
cis-1,3-Dichloropropene	0.00500	0.00453	90.6	80.0-123	
trans-1,3-Dichloropropene	0.00500	0.00430	86.0	78.0-124	
Ethylbenzene	0.00500	0.00462	92.4	79.0-123	
2-Hexanone	0.0250	0.0252	101	67.0-149	
Iodomethane	0.0250	0.0252	101	33.0-147	
2-Butanone (MEK)	0.0250	0.0271	108	44.0-160	
Methylene Chloride	0.00500	0.00499	99.8	67.0-120	
4-Methyl-2-pentanone (MIBK)	0.0250	0.0257	103	68.0-142	
Styrene	0.00500	0.00446	89.2	73.0-130	
1,1,1,2-Tetrachloroethane	0.00500	0.00476	95.2	75.0-125	
1,1,2,2-Tetrachloroethane	0.00500	0.00471	94.2	65.0-130	
Tetrachloroethene	0.00500	0.00457	91.4	72.0-132	
Toluene	0.00500	0.00456	91.2	79.0-120	
1,1,1-Trichloroethane	0.00500	0.00477	95.4	73.0-124	
1,1,2-Trichloroethane	0.00500	0.00486	97.2	80.0-120	
Trichloroethene	0.00500	0.00485	97.0	78.0-124	
Trichlorofluoromethane	0.00500	0.00443	88.6	59.0-147	
1,2,3-Trichloropropane	0.00500	0.00453	90.6	73.0-130	
Vinyl acetate	0.0250	0.0222	88.8	11.0-160	
Vinyl chloride	0.00500	0.00413	82.6	67.0-131	
Xylenes, Total	0.0150	0.0141	94.0	79.0-123	
(S) Toluene-d8			*103*	*80.0-120*	
(S) 4-Bromofluorobenzene			*104*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*95.8*	*70.0-130*	

Method Blank (MB)

(MB) R3627932-1 03/05/21 10:42

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

L1322429-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1322429-01 03/05/21 11:31 • (DUP) R3627932-3 03/05/21 11:19

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) R3627932-4 03/05/21 12:55 • (LCSD) R3627932-5 03/05/21 15:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylene Dibromide	0.000250	0.000260	0.000257	104	103	60.0-140			1.16	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000280	0.000281	112	112	60.0-140			0.356	20

L1322429-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1322429-02 03/05/21 11:07 • (MS) R3627932-2 03/05/21 10:54

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	0.000108	108	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.000100	ND	0.000121	121	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
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
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	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
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

* 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 Analytical.

Company Name/Address:
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/A. Baugh

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

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		3/2/21	1020	11	X	X	X	X	X	X	X					-01
MW-3		GW			1255	11	X	X	X	X	X	X	X					-02
MW-4		GW			1215	11	X	X	X	X	X	X	X					-03
MW-5		GW			1120	11	X	X	X	X	X	X	X					-04
TMW-1		GW			1335	11	X	X	X	X	X	X	X					-05
TMW-2		GW			1245	11	X	X	X	X	X	X	X					-06
TMW-3		GW			1035	11	X	X	X	X	X	X	X					-07
DUPLICATE		GW			—	11	X	X	X	X	X	X	X					-08
FIELD BLANK		GW			1315	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

12065 Lebanon Road Mt Juliet, TN 37122
Phone: 615-758-5858 Alt: 800-767-5859
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1322429
B146

Acctnum: **CEC**
Template: **T133579**
Prelogin: **P831460**
PM: **526 - Chris McCord**
PB: 2-26-2021 6m
Shipped Via: **Courier**

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

Remarks: WetChem** = *NITRATE*(48hr hold),CHLORIDE,BROMIDE,SULFATE,FLUORIDE Tot/Diss Metals=M6020AP1+Al,Ca,Fe,K,Mg,Mn,Na(6020/7470),and B(6010).**

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier ✓

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: ✓NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3/3/21	09:30		2 0	
~~Relinquished by : (Signature)~~	~~Date:~~	~~Time:~~	~~Received by: (Signature)~~	Temp: °C Bottles Received:	
	3-3-21	15:00		1.0-3=.97 90	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK
				3/3/21 1450	

Company Name/Address:
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

No. of Cntrs

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)
TRIP BLANK	–	GW	–	3/2/21	–	1								X				-10

Chain of Custody Page ___ of ___

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SDG # L1322429

Table #

Acctnum: **CEC**

Template: **T133579**

Prelogin: **P831460**

PM: **526 - Chris McCord**

PB: 2-26-2021 GM

Shipped Via: **Courier**

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

Remarks: WetChem** = *NITRATE*(48hr hold),CHLORIDE,BROMIDE,SULFATE,FLUORIDE Tot/Diss Metals=M6020AP1+Al,Ca,Fe,K,Mg,Mn,Na(6020/7470),and B(6010).**

pH _____ Temp _____

Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier ✓

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: ___NP ___Y ___N
COC Signed/Accurate: ___Y ___N
Bottles arrive intact: ___Y ___N
Correct bottles used: ___Y ___N
Sufficient volume sent: ___Y ___N
If Applicable
VOA Zero Headspace: ___Y ___N
Preservation Correct/Checked: ___Y ___N
RAD Screen <0.5 mR/hr: ___Y ___N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	3/3/21	09:30		2
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.2 °C Bottles Received:
	3-3-21	15:00		1.6 3=07 90
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
				3/3/21 1950

If preservation required by Login: Date/Time

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**	40s P.C.
DATE & TIME	3/2/21 950	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Baugh
TOTAL WELL DEPTH (feet)	30.5	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	20.10	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	10.4	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	1.25	**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	20.10	1001	13.0	5.59	62.4	48.0	5.99	213.7	14.7
.5	20.31	1005	14.3	5.46	65.8	52.4	3.91	180.3	8.53
.75	20.31	1009	14.3	5.50	76.7	66.8	3.11	170.1	7.48
1	20.31	1013	14.3	5.54	87.2	69.9	2.79	159.8	6.54
1.25	20.31	1017	14.4	5.56	94.5	74.9	1.56	130.4	5.97

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
1.25	20.31	1020	14.4	5.56	94.5	74.9	1.56	130.4	5.97

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

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?**	Yes

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	40s P.C.
DATE & TIME	3/2/21 1146	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	NA, parameters only	**FIELD REPRESENTATIVE**	Bang G
TOTAL WELL DEPTH (feet)	10	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	4.90	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	5.1	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	—	**EQUIPMENT BLANK COLLECTED?**	N

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
—	4.90	1140	9.3	5.96	280.0	196.6	3.36	193.6	8.61

Preservatives Used	—	**Sample Charateristics (Odor, Color)**	—
Number of Containers	—	**Sampler Signature**	Bang G

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	40s Cloudy
DATE & TIME	3/2/21 1230	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Baugh
TOTAL WELL DEPTH (feet)	27	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	8.63	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	yes
WATER COLUMN (feet)	18.37	**FIELD BLANK COLLECTED?**	~~Yes~~ No
PURGE VOLUME (gallons)	1.9	**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	8.63	1240	12.6	5.35	249.7	191.8	4.62	213.4	12.58
.5	8.90	1244	12.8	4.95	220.2	169.1	2.85	219.3	6.08
1.0	8.99	1248	12.8	4.97	220.6	169.1	2.82	221.6	5.23
1.9	9.01	1252	12.7	4.98	219.5	168.1	2.81	223.0	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
1.9	9.01	1255	12.7	4.98	219.5	168.1	2.81	223.0	5.38

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

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-4
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	40s cloudy
DATE & TIME	3/2/21	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Baugh
TOTAL WELL DEPTH (feet)	23.1	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	7.60	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	15.5	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	1.6	**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
Ø	7.60	1207	13.2	5.81	84.4	65.5	3.83	206.1	460
.65	7.62	1206	13.3	5.53	82.9	64.3	3.30	205.5	48.9
1.1	7.62	1210	13.3	5.54	82.2	63.9	2.92	203.2	7.31
1.6	7.62	1214	13.3	5.55	81.7	63.4	2.80	202.2	5.11

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
1.6	7.62	1218	13.3	5.55	81.7	63.4	2.80	202.2	5.11
Preservatives Used	See COC			**Sample Charateristics (Odor, Color)**			orange solids at start of purging		
Number of Containers	See COC			**Sampler Signature**			A. Baugh		

WELL DATA

Number of Baffles	Ø	**Well Cap Dedicated/in Place?**	Y
Lock Condition	good	**Fittings/Well Head Condition**	Sample tubing loose air in line
Pad/Casing Quality	fair	**Well Clear of Weeds/Accessible?**	tree down on path

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-5
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	40s, sunny
DATE & TIME	3/2/21	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	Baugh
TOTAL WELL DEPTH (feet)	33.85	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	7.54	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	26.31	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	2.0	**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	7.54	1052	13.5	5.48	365.3	287.5	2.12	171.8	12.3
.5	8.03	1056	15.2	5.16	372.4	302.9	.63	181.6	16.2
1	8.31	1100	15.3	5.20	364.1	297.9	.71	182.1	16.3
1.25	8.44	1104	15.3	5.26	359.0	292.4	.78	183.3	16.3
1.5	8.5	1108	15.3	5.30	354.5	289.0	.74	184.9	15.7
1.75	8.55	1112	15.4	5.30	352.9	287.1	.88	186.9	14.2
2.0	8.55	1116	15.4	5.30	349.1	285.2	.88	188.8	12.9

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.0	8.55	1120	15.4	5.30	349.1	285.2	.88	188.8	9.7 @ metals

Preservatives Used	see COC	**Sample Charaterlstics (Odor, Color)**	moderate tannish color
Number of Containers	see COC	**Sampler Signature**	A Baugh

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	TMW-1
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	40s Sunny
DATE & TIME	3/2/21 1255	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	A. Black / A. Baugh
TOTAL WELL DEPTH (feet)	32.50	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	3.60	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	28.9	**FIELD BLANK COLLECTED?**	Y 1315
PURGE VOLUME (gallons)	2.25	**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	3.60	1302	13.2	5.41	147.7	114.8	7.02	390.2	36.0
1.0	7.55	1312	14.8	5.31	143.1	115.0	4.11	367.4	100
1.75	7.55	1322	14.8	5.33	143.4	115.1	4.03	369.4	21.9
2.25	7.80	1332	14.9	5.33	142.2	115.0	4.00	369.7	9.56

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.25	7.80	1335	14.9	5.33	142.2	115.0	4.00	369.7	9.56

Preservatives Used	Sic 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	good	**Fittings/Well Head Condition**	good
Pad/Casing Quality	No pad / casing good	**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**	40s, Sunny
DATE & TIME	3/2/21 1045	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	A. Black / A. Baugh
TOTAL WELL DEPTH (feet)	27.50	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	7.32	**IS SAMPLE EQUIPMENT DEDICATED?**	~~Yes~~ No
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	20.18	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	10.0	**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	7.32	1052	12.8	5.40	147.9	144.0	8.12	392.1	77.0
1.25	10.95	1102	14.5	5.35	172.5	138.6	5.42	384.1	34.8
2.0	10.73	1112	14.5	5.35	174.3	143.2	5.22	380.4	69.0
2.5	10.90	1122	14.5	5.36	173.1	138.9	5.00	381.3	46.5
3.25	11.00	1132	14.6	5.34	173.8	139.0	4.98	382.8	29.3
4.0	11.00	1142	14.6	5.34	174.5	140.4	4.91	384.4	13.1
5.0	~~11.00~~ 11.60	1152	14.9	5.35	170.1	137.0	5.23	384.9	18.1
6.0	11.85	1202	14.8	5.36	170.0	137.0	4.98	386.4	68.3
7.0	12.01	1212	14.9	5.34	170.6	138.1	4.97	388.0	37.7
8.0	12.04	1222	14.8	5.34	170.4	137.3	4.95	3930	18.0
9.0	12.05	1232	14.8	5.33	169.7	136.6	4.92	395.9	15.4
10.0	12.05	1242	14.9	5.33	170.3	137.1	4.95	397.1	10.2

SAMPLE DATA

Gallons Purged	DTW (ft)	Time (00:00)	°C	pH	Specific Cond (µs/cm)	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
10.0	12.05	~~1155~~ 1245	14.9	5.33	170.3	137.1	4.95	397.1	8.53 (9 mm beads)
Preservatives Used	Sec COC			**Sample Charateristics (Odor, Color)**			Cloudy to clear @ sample		
Number of Containers	10			**Sampler Signature**					

WELL DATA

Number of Baffles	0	**Well Cap Dedicated/In Place?**	Yes
Lock Condition	good	**Fittings/Well Head Condition**	good
Pad/Casing Quality	No pad / casing good	**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-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	40s, Sunny
DATE & TIME	7/2/21 0940	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Low-flow	**FIELD REPRESENTATIVE**	A. Black / A. Baugh
TOTAL WELL DEPTH (feet)	28.00	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	5.34 *	**IS SAMPLE EQUIPMENT DEDICATED?**	Yes
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	22.66	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	2.5	**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	5.34	1000	13.2	4.75	338.5	214.4	1.29	414.3	78.7
1.0	6.80	1010	13.9	5.07	304.1	240.6	1.49	368.1	22.2
1.75	6.95	1020	14.1	5.11	297.7	235.5	1.51	342.1	8.99
2.5	7.15	1030	14.4	5.11	294.4	234.5	1.46	331.1	7.25

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	7.15	1035	14.4	5.11	294.4	234.5	1.46	331.1	7.25

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

WELL DATA

Number of Baffles	0	**Well Cap Dedicated/In Place?**	YES
Lock Condition	good	**Fittings/Well Head Condition**	good
Pad/Casing Quality	No pad / casing (PVC) broken at ground level	**Well Clear of Weeds/Accessible?**	YES

* DTW measured at top of broken PVC casing by holding up casing on top of where broken.

EQUIPMENT CALIBRATION LOG

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

EQUIPMENT CALIBRATION FORM

NAME OF REPRESENTATIVE	Alex Black
LOCATION	former EWS
DATE AND TIME	3/1/21 1015
Equipment and Model # (ex. YSI Pro Plus 556)	YSI PRO DO
Equipment Serial #	YSI PRO #1

pH Calibration							
pH buffer Calibration Standard	Buffer solution exp. date	Pre-Cal Reading (S.U.)	ph mV Value	Accepted Range mV	Within Range? (Yes or No)	Post-Cal Reading (S.U.)	Calibrated? (yes/no)
4	10/22	4.00	145.2	160 to 180	N	4.00	Y
7	10/22	7.02	-28.1	+/-50	Y	7.06	Y
10	10/22	10.04	-195.7	-160 to -180	N	10.01	Y

Temperature Calibration Check	
Cert. Thermometer Value (deg C)	Meter Value (deg C)
21.7	21.4

DO Calibration				
Actual Barometric Pressure	Barometric Pressure (mm Hg)	D.O. Value (% Saturated)	Unit reading (%)	% DO accepted?
767.5	747.6	98.4	98.5	Y

Specific Conductivity Calibration			
Sp. Conductivity Calibration Standard buffer solution	Buffer solution exp. date	Pre Cal Reading (umhos)	Post Cal Reading (umhos)
1413	9/21	1422	1421

ORP Calibration			
ORP Calibration (mV)	Buffer solution exp. date	Pre Cal Reading (mV)	Post Cal Reading (mV)
240	2 8/21	228.4	227.9

Hach Model 2100P Turbidimeter Calibration					
Calibration verification Test performed and passed?	NTU Standard	Within Range? (Yes/No)	Measured Value	Stored?	Final Verification test passed? (Yes/No)
Yes	20				
No	100				
Note: if verification passed, calibration not required	800				

EQUIPMENT CALIBRATION LOG

Civil & Environmental Consultants, Inc. 117 Seaboard Lane Suite E-100 Franklin, Tennessee 37067 - 800-763-2326 - www.cecinc.com

EQUIPMENT CALIBRATION FORM

NAME OF REPRESENTATIVE	A. Black
LOCATION	Former EWS
DATE AND TIME	9/1/21 0915
Equipment and Model # (ex. YSI Pro Plus 556)	YSI Pro Plus / HACH 2100Q
Equipment Serial #	YSI H2 / HACH #7

pH Calibration							
pH buffer Calibration Standard	Buffer solution exp. date	Pre-Cal Reading (S.U.)	ph mV Value	Accepted Range mV	Within Range? (Yes or No)	Post-Cal Reading (S.U.)	Calibrated? (yes/no)
4	10/22	4.00	100.9	160 to 180	N	4.01	Y
7	10/22	7.02	-65.7	+/-50	N	7.04	Y
10	10/22	10.04	-224.0	-160 to -180	N	10.03	Y

Temperature Calibration Check	
Cert. Thermometer Value (deg C)	Meter Value (deg C)
22.2 21.7	21.4

DO Calibration				
Actual Barometric Pressure	Barometric Pressure (mm Hg)	D.O. Value (% Saturated)	Unit reading (%)	% DO accepted?
767.5	766.9	101.3	101.0	Y

Specific Conductivity Calibration				ORP Calibration			
Sp. Conductivity Calibration Standard buffer solution	Buffer solution exp. date	Pre Cal Reading (umhos)	Post Cal Reading (umhos)	ORP Calibration (mV)	Buffer solution exp. date	Pre Cal Reading (mV)	Post Cal Reading (mV)
1413	9/21	1427	1427	240	8/21	236.3	236.4

Hach Model 2100P Turbidimeter Calibration					
Calibration verification Test performed and passed?	NTU Standard	Within Range? (Yes/No)	Measured Value	Stored?	Final Verification test passed? (Yes/No)
(Yes)	20				
No	100				
Note: if verification passed, calibration not required	800				

APPENDIX D
CEC STANDARD OPERATING PROCEDURES

03-02-01 MONITORING WELLS USING CONVENTIONAL PURGING

I. SCOPE AND APPLICABILITY: This procedure is applicable to the sampling of monitoring wells which do not contain free product using conventional purge methodology.

II. PROJECT-SPECIFIC REQUIREMENTS

A. SAMPLE LOCATIONS AND NUMBERING SYSTEM:

B. ANALYTICAL PARAMETERS AND SAMPLE FREQUENCY:

C. FIELD SCREENING AND ANALYSES: *Reference appropriate SOPs.*

D. QUALITY ASSURANCE SAMPLES: *Number and type of blanks and duplicates. Reference SOPs 04-01-01, 04-01-02, and 04-02-01 as appropriate.*

E. FILTRATION:

F. PURGE CRITERION AND DISPOSAL OF PURGE WATER:

G. WELL KEYS: *Indicate whether wells use CEC's standard key*

H. DEDICATED EQUIPMENT: *Indicate whether dedicated pumps or bailers have been installed.*

I. OTHER REQUIREMENTS:

III. METHODOLOGY: Monitoring wells should be sampled progressing from least contaminated to most contaminated to reduce the chances of cross contamination between samples. If a bailer is employed, use new rope for each well.

A. PURGING: Purging is performed to remove static water standing in the well bore, thereby allowing collection of a sample representative of water in the aquifer. Unless otherwise specified in Section II.F., well development may suffice for the purge, so long as the sample is collected immediately following development.

1. Measure the water level from the top of the riser pipe at the pre-marked reference point (SOP 06-01-01).

2. Calculate the purge volume using the data presented in Exhibit 03-02-01 and the criterion presented in Section II.F.

3. Remove the required volume of water using one of the following methods. If the well goes dry, the purge can be considered complete unless otherwise specified in Section II.F. However, attempts should be made to prevent the well from going dry during purging, drying the well disrupts the flow regime and can result in the loss of volatile compounds. Therefore:

≅ If a well is known to have a low yield, it should be purged by bailing.

≅ If a pump is used for purging, adjust the pumping rate to maintain a water column in the well, if possible.

≅ Do not attempt to purge a well to dryness unless it is infeasible to maintain water in the well at a reasonable purge rate.

METHOD A: If the purge criterion is specified on volume of water to be removed:

a. Remove the required volume of water using a submersible pump or bailer. If a pump is used, a check valve must be installed on the pump to prevent pumped water from returning to the well. Begin purging at the top of the water column. Minimize aeration of the water during purging by pumping at a low rate or lowering the bailer gently into the water.

b. Lower the pump or bailer as necessary to continue purging until the well volume criterion is met.

METHOD B: If the purge criteria are specified on stabilization of field analyses:

a. Measure initial water quality by retrieving a sample from the top of the water column using a bailer. Conduct the field analyses specified in Section II.F. Record these results on the Groundwater Monitoring Data Sheet (SOP 07-02-01).

b. Remove one well volume of water by submersible pump or bailer. If a pump is used, a check valve must be installed to prevent water from returning to the well. Begin purging at the top of the water column. Minimize aeration of the water during purging by pumping at a low rate or lowering the bailer gently into the water.

c. After one well volume has been removed, conduct field analyses on the groundwater being discharged. Record results on the Monitoring Sampling Data Sheet.

d. Repeat steps b and c until the purge criteria have been met.

B. SAMPLE COLLECTION: Groundwater samples should be collected immediately after purging , if the well will yield sufficiently. Some low-yielding wells may require time to recover prior to sampling. If the well will not yield a sample immediately after purging, a maximum of 24 hours between purging and sampling is permitted.

1. Collect water from the well by slowly lowering a decontaminated bailer into the water column.

2. Transfer the samples which do not require filtering directly into sample bottles in the following order:

Volatile Organic Compounds
Semi-Volatile Organic Compounds
Pesticides and PCBs
Cations and Anions
Radionuclides
Bacteria.

3. If indicated in Section II.E., filter the required aliquots (SOP 05-03-02 or 05-03-03) and fill those sample bottles.

4. Preserve the samples immediately in accordance with SOP 07-01-02.

5. Conduct field analyses: pH (SOP 05-04-01 or 05-04-04), temperature, specific conductance (SOP 05-04-02), dissolved oxygen (SOP 05-04-03), Eh (SOP 05-04-08), and any other parameters listed in Section II.C.

6. If a dedicated sample bailer was used, return it to the well head. Otherwise, decontaminate the bailer as specified in SOP 01-01-00.

7. Replace the well cap and lock the protective casing.

8. Collect quality-assurance samples specified in Section II.D in accordance with SOP 04-01-01, 04-01-02, and 04-02-01.

9. Decontaminate samples in accordance with SOP 01-01-00.

10. Pack and ship the samples in accordance with SOP 07-01-03. Samples should be shipped on a daily basis and such that holding time requirements (SOP 07-01-02) can be met.

IV. PRECAUTIONS AND COMMON PROBLEMS

A. When using a bailer, do not allow the rope to drag on the ground. If necessary, lay out plastic sheeting to catch the rope.

B. When using a pump, exercise caution to prevent cross-contaminating samples with the hose. Do not sample from the pump discharge for trace organic compounds. Always use a check valve if not using a dedicated hose. Discard hose if there is a question about whether it can be adequately decontaminated.

C. Check the holding times on the analyses to be conducted. The holding time for some parameters is 24 hours. Plan sampling and shipping of these samples accordingly.

D. Preserve samples immediately after collection, including keeping them cool. Do not let samples sit in a hot vehicle until the end of the day.

V. DOCUMENTATION

A. Record information on a Groundwater Monitoring Data Sheet (SOP 07-02-01).

B. Prepare a Trip Report (SOP 07-02-04) and include:

- ≅ Time, date, and method of sample shipment
- ≅ Preservation methods and sample handling
- ≅ Description of purge and sampling methods
- ≅ The Groundwater Monitoring Data Sheet.

VII. REFERENCES

None

04-01-01 EQUIPMENT BLANKS

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

II. PROJECT-SPECIFIC REQUIREMENTS:

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

III. METHODOLOGY

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

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

C. Rinse the blank water across the sampling equipment, catching it in a decontaminated stainless-steel bucket. Handle the water in the same manner as the samples. For example, if samples for metals analysis are to be filtered with a disposable filter, the blank aliquot for metals analysis should be processed through a new disposable filter. Blanks for soil sampling may be run across the split-spoon sampler, trowel, and bucket.

D. Fill a complete set of sample bottles.

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS

A. The selection of stock solution depends upon the requirements of the project. Analyses for trace contaminants will require a purer blank solution than analyses for major constituents. Stringent analytical requirements will necessitate the use of laboratory-supplied blank water.

B. Include ALL sampling equipment in the rinsing procedure.

V. DOCUMENTATION: Record the following information in the field logbook:

- ≅ Source of blank water
- ≅ Time and sequence within the sampling event when the blanks were prepared
- ≅ Description of the procedure for preparing the blanks
- ≅ Sample numbers assigned to blanks.

Incorporate this information into the Trip Report (SOP 07-02-04).

VI. REFERENCES

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

04-01-02 TRIP BLANKS

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

II. PROJECT-SPECIFIC REQUIREMENTS:

A. Frequency:

B. Other Criteria:

III. METHODOLOGY

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

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

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS: None.

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

VI. REFERENCES

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

04-02-01 LIQUID DUPLICATES

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

II. PROJECT-SPECIFIC REQUIREMENTS:

NUMBER/FREQUENCY OF DUPLICATE SAMPLING:

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

III. METHODOLOGY

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

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

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

D. Preserve the sample and duplicate identically.

IV. PRECAUTIONS AND COMMON PROBLEMS

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

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

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

VI. REFERENCES: None.

05-03-05 BAILER

I. EQUIPMENT SPECIFICATION: This procedure is applicable to the use of all bottom-fill bailers.

II. INSPECTION AND CALIBRATION

A. DAILY INSPECTION AND CHECKS: Make sure fittings at both ends of the bailer are secure. Assure that the check valve opens and closes freely.

B. CALIBRATION: There is no calibration applicable to this equipment.

C. ROUTINE MAINTENANCE: There is no maintenance applicable to this equipment. Bailers are typically replaced if damaged.

III. USE

A. Select a rope or cable for suspension of the bailer which is appropriate to project requirements. Typically, small gauge nylon rope is used, although stainless-steel cable may be used when samples will be analyzed to very low detection limits. The rope or cable should be new and clean. Do not use materials which have been used on another project, as this may result in cross contamination.

B. Consult the Project Manager to select a bailer composition which is compatible with the anticipated groundwater quality. For most applications, PVC bailers are adequate. Stainless-steel may be used where very low levels of organic compounds are of interest. Teflon bailers are available and may be requested on some projects.

C. Using a strong, non-slipping knot, such as a bowline, tie the rope or cable to the top of the bailer.

D. Lower the bailer into the well. Do not let the bailer free-fall down the well, as the device may shatter or the ball valve may become dislodged upon striking the water or the bottom of the well.

E. Raise the bailer by pulling the rope with a smooth, uniform motion. A jerky motion may open the check valve, resulting in water loss. Check the knot periodically.

Do not allow the bailer rope to drag on the ground. Place plastic sheeting on the ground to keep the rope clean if conditions are muddy, the ground surface is contaminated, or very low levels of contaminants are of interest.

IV. DECONTAMINATION: The equipment should be decontaminated in accordance with SOP 01-01-00.

Typically, the bailer is washed with a potable water and non-phosphate soap solution. The bailer is then rinsed with distilled water and wrapped in plastic or foil until used.

V. TROUBLESHOOTING

A. If the knot should come undone or the rope breaks, the bailer typically can be recovered using a weighted fishing hook tied to monofilament line.

B. When bailing turbid water, it may be necessary to rinse the ball-valve at the bottom of the bailer with distilled water if it clogs.

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

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

II. PROJECT-SPECIFIC REQUIREMENTS

A. REQUIRED READINGS:

B. APPLICABLE METHODS:

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

A. CHALKED-TAPE METHOD

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

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

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

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

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

B. SOUNDING

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

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

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

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

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

C. ELECTRIC-WATER LEVEL METER (Solinst)

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

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

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

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

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

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

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

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS:

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

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

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

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

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

V. DOCUMENTATION

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

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

VI. REFERENCES: None

07-01-01 MAINTAINING SAMPLE CHAIN OF CUSTODY

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

II. PROJECT-SPECIFIC REQUIREMENTS: None.

III. METHODOLOGY

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

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

B. CUSTODY RECORD

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS

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

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

V. DOCUMENTATION

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

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

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

VI. REFERENCES

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

07-02-01 GROUNDWATER MONITORING DATA SHEET

I. SCOPE AND APPLICABILITY: A Groundwater Monitoring Data Sheet is completed each time water samples are collected to document field data and sampling methodology.

II. PROJECT-SPECIFIC REQUIREMENTS: None.

III. METHODOLOGY: Complete the form (Exhibit 07-02-01) as samples are collected, as follows:

a. Self explanatory
b. CEC project number
c. Names or initials of all members of the sampling team
d. Complete well designation
e. Depth to water level, reported to $\pm$0.01 ft. (Check measurement datum at the top of the column.)
f. Date and time well purging is started
g. Volume of water removed, in gallons
h. Check if well was purged to dryness
i. Indicate method of purging, such as submersible pump or bailer
j. Date and time that the actual sample was withdrawn. If sample bottles were filled at multiple, separate times, these should all be indicated.
k. Self explanatory (Check units for temperature.)
l. Unusual odors or other observations
m. Other atypical information, such as special handling of purge water or field problems

IV. PRECAUTIONS AND COMMON PROBLEMS: All information required by the form must be provided.

V. DOCUMENTATION: Attach the form to the Trip Report (SOP 07-02-04).

VI. REFERENCES: None.