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GROUNDWATER STATISTICAL ANALYSIS REPORT FOR FORMER FLY ASH PONDS

HRP MERCER URBAN RENEWAL, LLC

Former Mercer Generating Station

1365 Lamberton Road

Trenton, New Jersey 08611

PREPARED BY

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1 INTRODUCTION

On behalf of HRP Mercer Urban Renewal, LLC (HRP), Weaver Consultants Group North Central, LLC (WCG) has prepared this Groundwater Statistical Analysis Report (Report) pursuant to the requirements of 40 Code of Federal Regulations (CFR) Part §257.93 for the former Mercer Generating Station located at 1365 Lamberton Road in Trenton, New Jersey (Mercer).

Effective December 21, 2018, the ownership of Mercer was transferred from Public Service Electric and Gas (PSEG) Fossil, LLC to HRP, located at 111 South Wacker Drive, Suite 3000, Chicago, Illinois 60606. As a result of this acquisition, HRP is the responsible party regarding the groundwater monitoring and corrective action program established for the following two inactive Coal Combustion Residual (CCR) units on the property (refer to **Figure 1 – Site Location Map with CCR Unit Locations**):

- North Fly Ash Pond; and
- South Fly Ash Pond.

The CCR units were constructed as predominantly incised ponds with a bermed wall along Lamberton Road that varies in height above the surrounding grade by five to six feet. These units ceased receiving CCR prior to October 19, 2015 and as described in a March 23, 2017 memorandum prepared by GEI Consultants, Inc. (GEI), CCR removal from the units was completed on October 19, 2016 while Mercer was owned by PSEG. A Notice of Intent (NOI) to initiate closure of the inactive CCR units in accordance with 40 CFR Section 257.100 was posted on the PSEG CCR Rule Compliance Data and Information website on November 6, 2015. A CCR Rule Compliance Report Summary dated April 17, 2018 and prepared by GEI was posted on PSEG's website[1]. As part of CCR unit closure activities, the Initial Detection Monitoring Program was initiated in 2018.

An Annual Groundwater and Corrective Action Report dated January 31, 2019 was submitted to the New Jersey Department of Environmental Protection Division of Water Supply and Geoscience pursuant to the requirements of 40 CFR 257.90(e) which documented the first phase of the Initial Detection Monitoring Program. The report described five independent groundwater sampling events and analyses completed in 2018, including procedures and techniques for

[1] https://corporate.pseg.com/aboutpseg/companyinformation/thepsegfamilyofcompanies/psegfossilllc

sample collection, sample preservation and shipment, analytical procedures, chain of custody control, and quality assurance and quality control. Since the submittal of the Annual Groundwater and Corrective Action Report dated January 31, 2019, three additional groundwater sampling events were performed at the facility. Thus, this Report includes the evaluation of a total of eight groundwater monitoring events. The reports generated for Mercer are available on HRP's website[2].

1.1 Purpose

This Report has been prepared to document the statistical methods employed to evaluate groundwater monitoring data from eight monitoring events at Mercer in accordance with 40 CFR §257.93. The statistical analysis has been conducted to establish background concentrations of the constituents listed in Appendices III and IV to 40 CFR 257. Appendix III constituents are Constituents for Detection Monitoring and Appendix IV constituents are Constituents for Assessment Monitoring. Mercer is currently implementing a Detection Monitoring Program. The facility is only required to enter an Assessment Monitoring Program if a Detection Monitoring Appendix III constituent displays a statistically significantly increasing concentration. Though Mercer is currently implementing a Detection Monitoring Program, groundwater samples from the eight monitoring events were analyzed for both Appendix III and Appendix IV constituents to be conservative.

This Report presents the methods employed to establish the background data set and statistical analyses used to evaluate potential groundwater quality impacts at Mercer. The statistical results served as indicators to evaluate whether additional groundwater evaluation may be warranted. The statistical analysis performed herein includes:

- Summary statistics of the groundwater quality data;
- Outlier testing of the groundwater quality data; and
- Selection of the appropriate statistical test for the 40 CFR 257 Appendix III and IV groundwater monitoring parameters.

1.2 Regulatory Status

According to 40 CFR §257.104(a)(2), an owner or operator of a CCR unit that elects to close a CCR unit by removing CCR as provided by §257.102(c) (as the owner has elected to do in this case) is

[2] https://www.hilcoredev.com/former-mercer-generating-station

not subject to the post-closure care criteria under 40 CFR §257.104. This Report is to be kept on file in the HRP operating record in accordance with the recordkeeping requirements of 40 CFR §257.105.

1.3 Background Information

1.3.1 Monitoring Well Network

The groundwater monitoring network at Mercer consists of six monitoring wells: MW-1 through MW-6 (see **Figure 2 – CCR Units & Groundwater Monitoring Well Location Map**) which were installed by GEI in 2018. Five of the wells (MW-1 through MW-5) were installed upgradient and downgradient of the CCR units to assess the quality of groundwater in the uppermost aquifer and to monitor potential contaminant pathways. Monitoring well MW-6 was installed in a crossgradient location away from the CCR units to obtain a representation of the groundwater that has not been affected by the CCR units.

A description of the monitoring well network installation, development, and surveying is included in the Annual Groundwater and Corrective Action Report dated January 31, 2019. **Table 1 – Monitoring Well Survey Data** includes elevations and location coordinates for the monitoring wells.

1.3.2 Groundwater Sampling and Results

In accordance with 40 CFR § 257.94, eight independent groundwater samples were collected from each background and downgradient well at Mercer. Groundwater samples used for statistical evaluation were collected on the following dates:

- Event 1: August 3-7, 2018;
- Event 2: September 4, 2018;
- Event 3: October 4, 2018;
- Event 4: October 29, 2018;
- Event 5: December 6, 2018;
- Event 6: January 30, 2019;
- Event 7: March 20-21, 2019; and
- Event 8: April 3, 2019.

Prior to groundwater sample collection, groundwater elevation data was obtained at each monitoring well, see **Table 2 – Groundwater Elevation Measurements** and **Figures 3a through 3h – Groundwater Elevation Contour Maps.** Following groundwater elevation data collection,

groundwater samples were collected using a stainless steel bladder pump with disposable Teflon bladders and a disposable length of ¼" diameter Teflon-lined polyethylene tubing. Non-dedicated equipment such as the bladder pump and water level/interface indicator were decontaminated using a phosphate-free detergent and a distilled water rinse between well locations.

The bladder pump was used to implement low flow methodology to minimize sediment disturbance (e.g., between 100 milliliters per minute [ml/min] to 500 ml/min). Prior to sample collection, the wells were purged until the purge water exhibited stable conditions based upon field measurements of pH, specific conductivity, dissolved oxygen, oxidation-reduction potential (ORP), and temperature. The groundwater sampling field forms for each event are included in **Appendix A – Groundwater Sampling Field Forms**.

Groundwater samples were collected in containers provided by the laboratory and preserved as necessary for their respective analyses. The sample containers were tightly capped, labeled, and placed in a cooler and surrounded with ice in order to maintain their temperature near four degrees Celsius. Each sample was logged onto a chain of custody form which is used to track the samples from the point of collection to receipt by the laboratory. The chain of custody is included with the laboratory analysis reports in **Appendix B – Laboratory Analytical Reports**.

The groundwater samples were submitted to Eurofins Lancaster Laboratories Environmental (Eurofins) for laboratory analysis of the constituents listed in Appendices III and IV of 40 CFR § 257. As presented in **Tables 3a through 3h - Groundwater Analytical Results**, for informationally purposes only, laboratory results were compared to the United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs). USEPA MCLs are considered the standard for drinking water quality analysis in Mercer County and the state of New Jersey and were therefore used for informational purposes only. The statistics discussed in detail in **Section 4** of this report represent the applicable groundwater quality determination.

Based on the analytical data, concentrations of cobalt and/or lithium were detected above USEPA MCLs during four of the sampling events in the monitoring wells surrounding the CCR units. With the exception of one cobalt detection in MW-1 in Event 5, and one lithium detection in MW-2 in Event 7, the remaining concentrations of cobalt and lithium were detected during Events 1 and 2. No Appendix III and Appendix IV constituents were detected above USEPA MCLs from the background well location MW-6.

2 OVERVIEW OF GROUNDWATER STATISTICS

In accordance with 40 CFR §257.23(g)(h), a preliminary data evaluation was conducted in order to select the appropriate statistical test. The selection of an appropriate statistical test is principally a function of the distribution of the background data for the constituent. Typically, one of three distributions are observed.

1. Normal distribution,
2. Log normal distribution, or
3. Random/No distribution.

Compounds which typically exhibit a normal or log normal distribution are naturally occurring inorganic compounds (non-anthropogenic) or indicator parameters such as temperature, total dissolved solids, and specific conductivity. Many other naturally occurring compounds exhibit no distributional relationship. The overwhelming majority of chemicals which CCR facilities are required to analyze for are man-made organics (anthropogenic) which presumably would not be present in the background water. If they are not present in the background, their distributional relationship typically cannot be determined, and statistics cannot be employed.

Similarly, when the background data set contains some or many "non-detect" values, the understanding of the data distribution is clouded by this “arbitrary” detection limit. Correcting a background data set by "creating" values for samples which are non-detect (e.g. one-half the detection limit) does not provide meaningful results unless the majority of the values are detected.

Requirements to use specific statistical tests without determining the distribution of the data are scientifically flawed, and often produce indications that contamination exists when in fact it does not (i.e. false positives). Other common problems in groundwater monitoring systems include sampling numerous constituents at relatively few wells; and background information sets with insufficient data points. These problems, individually and collectively, may potentially lead to inadequate understandings of the natural spatial and temporal variations of groundwater geochemistry. These conditions can create weakened statistical power, which means the monitoring system’s ability to detect real contamination is low.

Considering the above, an examination of background well data is discussed below in **Section 3.0.** For purposes of eliminating abnormal trends (due to sampling or analysis errors) in the historical database, each monitoring well has been tested for outliers. However, outliers are only

removed from the background data set if a specific reason for the high or low outlier is identified. Otherwise, the outliers will be considered to be atypical data, but representative of background conditions. Possible reasons for excluding outliers from the background database include laboratory or sampling errors.

3 EVALUATION OF BACKGROUND DATA SET

An evaluation of the background data set was performed in order to assess the appropriate statistical analysis that will be applied to groundwater monitoring data obtained at Mercer. Based on the variable nature of the groundwater flow direction inferred from the depth to water measurements obtained as part of the eight sampling events, WCG selected an intrawell approach where each well is used as "background", rather than upgradient well(s), and the concentration trends with time at each well are used to assess if a statistically significant increase in groundwater concentration has occurred. This approach is consistent with the control chart approach cited in 40 CFR 257.93(f)(4). In our experience, intrawell statistics are generally more reliable than interwell (upgradient versus downgradient) statistics because intrawell eliminates potential issues with spatial variability between upgradient and downgradient wells.

The evaluation of the data set for each well consisted of the following:

1. Normality testing in order to determine the distributional characteristics of the data set;
2. Outlier testing for purposes of eliminating abnormal trends (due to sampling or analysis errors) in the data set; and
3. Summary statistics, which included preparation of box plots and time versus concentration plots, for assessing trends/errors, etc. in the data set.

3.1 Normality Testing and Summary Statistics

In order to choose a statistical test for purposes of assessing groundwater quality, the distributional characteristics, and percent non-detects of the background data must be evaluated. Sanitas™ v.9.6, a groundwater statistical software program, was used to calculate summary statistics and to test the normality of the data set for each Appendix III and Appendix IV constituent. Background data from each of the monitoring wells has been tested for normality. Results of the normality testing are summarized in supporting documentation from Sanitas™ included as **Appendix C – Normality Testing**.

The following settings were input into Sanitas™ for normality testing:

- An alpha of 0.01 was selected for the normality test;
- The Ladder of Powers option was selected which uses the following transformations on the data in an attempt to normalize the data for use with parametric tests:
    - x (no transformation)

- $x^{1/2}$ (square root)
- x^2 (square)
- $x^{1/3}$ (cube root)
- x^3 (cube)
- $\ln x$ (natural log)
- x^4
- x^5
- x^6

Results from the normality tests are included in **Appendix C.** According to these results, the majority of the constituents have data sets with a largely normal distribution. In general, this means that parametric statistical tests may be performed on these constituents. However, select tests indicated that some constituents had non-normal distribution. The statistical evaluation method ultimately selected (i.e., Mann Kendall Test for Trend) has no distributional assumptions associated with it and therefore is appropriate for data that is both normally and non-normally distributed.

3.2 Outlier Testing

Outlier testing was performed using rigorous outlier test procedures to identify data which should not be included in the overall background data set. In general, for those constituents with a normal data distribution with a sample population less than 25 (n<25), Dixon's test is used. If n>25, Rosner's test is utilized. Sanitas™ automatically performs the Shapiro-Wilk normality test before identifying outliers. If the data fails the normality test at the 0.01 alpha level, Tukey's method is used in lieu of the parametric Dixon and/or Rosner's test.

Prior to eliminating an outlier identified in a particular monitoring well for a particular sampling date, the outliers identified by Sanitas™ were compared to the data analyzed at the remaining monitoring wells for the same sampling period as well as to the method detection limit to verify results of the outlier test.

A total of nine data points was identified as outliers by Sanitas™. The outliers identified by Sanitas™ were not removed from the background data set because a specific reason for the high or low outlier was not identified. Therefore, the outliers are considered to be atypical data, but representative of background conditions.

No other outliers were identified by either Tukey's method for the nonparametric data sets or Dixon's test for the parametric data sets. Supporting documentation for the outlier testing is included in **Appendix D – Outlier Testing**.

3.3 Graphical Representation of Background Data

Summary statistics and graphical representations of the data set in the form of box plots and time series plots were also produced for the Mercer groundwater data set. Summary statistics, box plots, and time series plots are provided in **Appendix E – Summary Statistics, Box Plots, and Time Series Plots**.

According to the USEPA's Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities dated March 2009 (USEPA, 2009), graphs are an important tool for exploring and understanding patterns in any data set. Plotting the data visually depicts the structure and helps unmask possible relationships between variables affecting the data set. Box plots are one method recommended for testing homogeneity of the variances. Box plots were first developed for exploratory data analysis as a quick way to visualize the "spread" or dispersion within a data set. The idea behind a box plot is to order the data from lowest to highest and to trim off 25 percent of the observations on either end, leaving just the middle 50 percent (known as the interquartile range or IQR). The middle 50 percent is represented by the length of the box. The middle observation (i.e. the median) can also be shown as a line cutting the box in two.

Summary statistics and box plots for groundwater data from permitted wells at Mercer have been prepared using the Sanitas™ software and are provided as **Appendix E**. The box plots indicate that a variance is present for several constituent/well combinations with detected concentrations of dissolved calcium, total dissolved solids, and sulfate. This variance is likely indicative of natural geochemical variability within the monitored aquifer.

Time versus concentration plots were prepared using the Sanitas™ software and are also provided in **Appendix E**. Analytical data from each of the monitoring wells has been plotted with the sample date on the *x*-axis and the concentration on the *y*-axis. Note that non-detect results were plotted with a hollow symbol at the respective laboratory Practical Quantitation Limit (PQL), also known as the Reporting Limit, while detected results were plotted with a solid symbol. Based on the visual inspection of these graphical displays, systematic seasonal effects were not observed in the data set.

4 MANN-KENDALL STATISTICAL ANALYSIS

In accordance with 40 CFR §257.23(g)(h), an evaluation of available statistical methods was undertaken once the appropriate statistical analyses were completed on the background data set as documented in previous section.

Although not specifically named in 40 CFR §257, the Mann-Kendall trend test was selected as the appropriate test to determine whether or not there is a statistically significant increase over background values for each Appendix III and Appendix IV groundwater monitoring constituent. The Mann-Kendall trend test meets the 40 CFR 257.93(f)(5) alternate statistical test method option and is specifically named in USEPA's Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities dated March 2009.

The Mann-Kendall trend test is appropriate to evaluate temporal trends for data without seasonal variability. Two main advantages of this test are that, it is a non-parametric test (i.e., data does not need to conform to any particular distribution), and it can handle a relatively large percentage of non-detects. The Mann-Kendall trend test is one of the recommended methods listed in the Unified Guidance for Statistical Analysis of Groundwater at RCRA Facilities (USEPA, 2009). The Mann-Kendall trend test was performed using Sanitas™ software.

The Mann-Kendall trend test involves computing a statistic *S*, which is the difference between the number of pairs of successive data points with increased concentration and the number with decreased concentration. A large positive value of *S* suggests a statistically significant increasing (SSI) trend, a large negative value suggests a statistically significant decreasing trend, and a small (absolute) value of *S* suggests no statistically significant trend. In accordance with 40 CFR §257.93(g)(2), the Mann-Kendall trend test was applied to evaluate trends of each constituent at individual wells, at a 1% significance level (i.e., 99% confidence level) for well-constituent combinations with detections above laboratory PQLs. Non-detects were replaced with the corresponding laboratory PQL, or median PQL if multiple PQLs were used throughout the period; thus, changes in PQL did not appear as showing a significant trend.

The results of the Mann-Kendall trend testing are presented in **Appendix F -Appendix III Constituent Mann-Kendall Trend Tests** and **Appendix G – Appendix IV Constituent Mann-Kendall Trend Tests**. Pursuant to 40 CFR §257.23(g)(h), based on the results of the Mann-Kendall trend testing, out of 132 trend tests performed, no SSIs were identified for Appendix III or Appendix IV constituents in the groundwater at Mercer. The majority of the statistical trends

were downward which is consistent with the expected outcome as CCR has been removed from both the North and South Fly Ash Ponds.

5 CONCLUSIONS

As discussed above, SSI trends were not identified within the Mercer groundwater data set. The North Fly Ash Pond and South Fly Ash Pond CCR units ceased receiving CCR prior to October 19, 2015, and CCR removal was completed on October 19, 2016 while Mercer was owned by PSEG. Given that CCR has been removed from the units, and groundwater quality data indicates that concentrations of 40 CFR § 257 Appendix III and Appendix IV constituents are generally stable or decreasing (i.e., no SSI concentrations are present), no additional groundwater monitoring data is warranted and groundwater monitoring may be discontinued at the Mercer CCR units.

The Mercer groundwater monitoring program and statistical analyses has been implemented in accordance with 40 CFR § 257.93. Pursuant to the requirements of 40 CFR § 257, this report shall be kept on file in the facility's operating record.

6 CERTIFICATION

In accordance with 40 CFR 257.93(f), I certify that, based on my review of the work completed to date, that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the Hudson CCR management area.

Carolyn Cybulski, P.E.	062-059114
By (print):	Registration Number:
	February 28, 2022
By (signature):	Expiration Date:
January 26, 2022	
Date:	

7 REFERENCES

Code of Federal Regulations (CFR), Title 40. Protection of Environment, Chapter I. Environmental Protection Agency, Subchapter I. Solid Wastes, Part 257. Criteria for Classification of Solid Waste Disposal Facilities and Practices.

Hilco Redevelopment Partners. Former Mercer Generating Station, Coal Combustion Residuals (CCR) Rule Compliance Data and Information, https://www.hilcoredev.com/former-mercer-generating-station

PSEG Fossil LLC
https://corporate.pseg.com/aboutpseg/companyinformation/thepsegfamilyofcompanies/psegfossilllc

USEPA 1992a. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Addendum to Interim Final Guidance.* Washington, D.C.: Office of Solid Waste, U.S. Environmental Protection Agency. Draft.

USEPA 1992b. Statistical Training Course for Groundwater Monitoring Data Analysis, EPA/530-R-93-003.

USEPA. 2009a. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance*. EPA 530-R-09-007.

USEPA. 2009b. National Primary Drinking Water Regulations. EPA 816-F-09-004

TABLES

Table 1
Monitoring Well Survey Data
Former Mercer Generating Station
Trenton, New Jersey

Well ID	Ground Surface Elevation (ft-msl)	TOC Elevation (ft-msl)	Protective Vault/Cover Elevation (ft-msl)	State Plane Coordinates		Latitude (North)			Longitude (West)		
				Northing	Easting	°	`	"	°	`	"
MW-1	14.64	16.76	17.24	491127.04	426960.53	40	10	53.538	74	43	59.653
MW-2	12.25	15.30	15.69	491584.22	426592.20	40	10	58.046	74	44	4.414
MW-3	11.17	14.21	14.49	491247.40	427923.35	40	10	54.752	74	43	47.251
MW-4	8.15	11.19	11.48	490555.44	428091.99	40	10	47.918	74	43	45.055
MW-5	15.57	15.41	15.70	490746.01	427670.72	40	10	49.790	74	43	50.489
MW-6	10.61	13.36	13.69	490343.12	428711.06	40	10	45.835	74	43	37.071

Notes:

This survey was completed on September 4, 2018 utilizing the New Jersey State Plane East in units of US Survey Feet, NAVD 88 vertical datum, and GEOID 12B.

TOC - Top of Casing

ft-msl - Feet above Mean Sea Level

Table 2
Groundwater Elevation Measurements
Former Mercer Generating Station
Trenton, New Jersey

Well ID	Total Depth (ft)	Surface Construction	Well Diameter (in)	Screen Interval (ft)	TOC Elevation (ft-msl)	Event 1		Event 2		Event 3		Event 4		Event 5		Event 6		Event 7		Event 8	
						August 3-7, 2018		September 4, 2018		October 4, 2018		October 29, 2018		December 6, 2018		January 30, 2019		March 20-21, 2019		April 3, 2019	
						Depth to Water (ft)	Groundwater Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft-msl))	Depth to Water (ft)	Groundwater Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft-msl)
MW-1	17	stick-up	2	7-17	16.76	13.95	2.81	14.40	2.36	13.41	3.35	13.62	3.14	12.99	3.77	14.50	2.26	14.25	2.51	14.00	2.76
MW-2	16	stick-up	2	1-16	15.3	12.45	2.85	12.77	2.53	11.60	3.70	12.11	3.19	11.28	4.02	11.71	3.59	12.25	3.05	12.34	2.96
MW-3	20	stick-up	2	8-20	14.21	10.91	3.30	11.83	2.38	9.67	4.54	10.33	3.88	7.85	6.36	8.05	6.16	8.30	5.91	8.60	5.61
MW-4	13	stick-up	2	3-13	11.19	7.64	3.55	8.36	2.83	6.49	4.70	7.36	3.83	5.45	5.74	6.14	5.05	6.80	4.39	7.00	4.19
MW-5	20	flushmount	2	10-20	15.41	13.76	1.65	13.26	2.15	12.20	3.21	12.37	3.04	11.92	3.49	12.11	3.30	13.15	2.26	13.15	2.26
MW-6	19	stick-up	2	4-19	13.36	10.71	2.65	11.15	2.21	9.78	3.58	10.22	3.14	8.95	4.41	9.42	3.94	10.20	3.16	10.52	2.84

Notes:
This survey was completed utilizing the New Jersey State Plane East in units of US Survey Feet, NAVD 88 vertical datum, and GEOID 12B.
TOC - Top of Casing
ft-msl - Feet above Mean Sea Level

Table 3a
Groundwater Analytical Summary Event 1
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 8/3/18	MW-2 8/3/18	MW-3 8/7/18	MW-4 8/7/18	MW-5 8/7/18	MW-6 8/3/18
Appendix III Analytes								
Boron	mg/L	---	1.00	0.963	0.238	<0.0600	0.377	0.0981
Calcium	mg/L	---	213.00	113.00	69.90	5.09	98.40	33.40
Chloride	mg/L	---	152.00	107.00	334.00	1.40	113.00	219.00
Fluoride	mg/L	4.00	<0.25	<0.25	0.35	<0.25	0.42	<0.25
pH	S.U.	---	8.00	7.60	6.80	7.00	7.80	7.70
Sulfate	mg/L	---	337.00	156.00	21.60	3.90	119.00	7.90
Total Dissolved Solids	mg/L	---	1240.00	552.00	724.00	51.00	614.00	430.00
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	0.00066	<0.00041	<0.00041	<0.00041	<0.00041
Arsenic	mg/L	0.01	<0.00068	0.0021	0.0022	<0.00068	0.00082	<0.00068
Barium	mg/L	2.00	0.185	0.49	0.25	0.0167	0.212	0.2290
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091
Cadmium	mg/L	0.005	<0.00015	0.00028	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053
Cobalt	mg/L	0.006	<0.0015	0.0073	0.026	0.0025	<0.0015	<0.0015
Fluoride	mg/L	4.00	<0.25	<0.25	0.35	<0.25	0.42	<0.25
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	<0.0110	0.06	0.0349	<0.0110	<0.0110	<0.0110
Mercury	mg/L	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L	0.100	0.0053	0.0558	0.0203	0.0022	0.0181	0.00072
Selenium	mg/L	0.05	<0.0210	<0.0210	<0.105	<0.105	<0.105	<0.0210
Thallium	mg/L	0.002	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140
Radium 228	pCi/L	5.00	<1.62	<1.09	2.55	<1.37	1.36	<1.43
Radium-226	pCi/L	5.00	<0.423	1.89	1.42	<0.289	0.43	<0.406

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

< - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

Table 3b
Groundwater Analytical Summary Event 2
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 9/4/18	MW-2 9/4/18	MW-3 9/4/18	MW-4 9/4/18	MW-5 9/4/18	MW-6 9/4/18
Appendix III Analytes								
Boron	mg/L	---	1.00	0.898	0.285	0.04	0.40	0.099
Calcium	mg/L	---	197.00	108.00	61.60	6.17	90.70	29.90
Chloride	mg/L	---	163.00	86.80	205.00	1.80	115.00	226.00
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
pH	S.U.	---	7.90	7.80	7.90	6.80	7.80	7.60
Sulfate	mg/L	---	328.00	171.00	16.20	3.50	10.00	2.40
Total Dissolved Solids	mg/L	---	1160.00	603.00	548.00	45.50	626.00	434.00
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041
Arsenic	mg/L	0.01	<0.00068	0.0008	0.0013	<0.00068	<0.00068	<0.00068
Barium	mg/L	2.00	0.174	0.20	0.1810	0.0186	0.201	0.193
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091
Cadmium	mg/L	0.005	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.053	<0.0053	<0.0053
Cobalt	mg/L	0.006	<0.0015	0.0087	<0.0015	0.0022	<0.0015	<0.0015
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	<0.0110	0.0831	0.0156	<0.0110	<0.0110	<0.0110
Mercury	mg/L	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00005
Molybdenum	mg/L	0.100	0.0035	0.088	0.0036	0.0012	0.0175	0.00076
Selenium	mg/L	0.05	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210
Thallium	mg/L	0.002	<0.0140	<0.0140	<0.0140	<00140	<0.0140	<0.0140
Radium 228	pCi/L	5.00	<0.532	<1.37	<0.754	<1.28	<1.29	<1.31
Radium-226	pCi/L	5.00	<0.193	<0.537	0.916	<0.615	<0.622	<0.558

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

< - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

Table 3c
Groundwater Analytical Summary Event 3
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 10/4/18	MW-2 10/4/18	MW-3 10/4/18	MW-4 10/4/18	MW-5 10/4/18	MW-6 10/4/18
Appendix III Analytes								
Boron	mg/L	---	1.10	0.0639	0.276	0.0336	0.427	0.22
Calcium	mg/L	---	208.00	38.30	47.40	2.92	101.00	34.30
Chloride	mg/L	---	146.00	1.50	113.00	1.10	102.00	136.00
Fluoride	mg/L	4.00	<0.25	0.69	<0.25	<0.25	0.72	<0.25
pH	S.U.	---	7.70	7.90	7.70	6.80	8.00	7.50
Sulfate	mg/L	---	297.00	4.60	14.70	<1.5	135.00	6.50
Total Dissolved Solids	mg/L	---	1070.00	140.00	398.00	29.00	602.00	309.00
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	0.0008	<0.00041	<0.00041	<0.00041	<0.00041
Arsenic	mg/L	0.01	<0.00068	0.0038	0.0014	<0.00068	<0.00068	<0.00068
Barium	mg/L	2.00	0.18	0.0368	0.186	0.009	0.212	0.166
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091
Cadmium	mg/L	0.005	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053
Cobalt	mg/L	0.006	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015
Fluoride	mg/L	4.00	<0.25	0.69	<0.25	<0.25	0.72	<0.25
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	<0.0110	<0.0110	0.0231	<0.0110	<0.0110	<0.0110
Mercury	mg/L	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L	0.100	0.0036	0.0033	0.0098	0.0017	0.0211	0.0035
Selenium	mg/L	0.05	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210
Thallium	mg/L	0.002	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140
Radium 228	pCi/L	5.00	<1.44	<0.132	<1.20	<1.55	<1.29	<0.550
Radium-226	pCi/L	5.00	1.13	0.337	0.747	0.365	0.661	0.482

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

< - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

Table 3d
Groundwater Analytical Summary Event 4
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 10/29/18	MW-2 10/29/18	MW-3 10/29/18	MW-4 10/29/18	MW-5 10/29/18	MW-6 10/29/18
Appendix III Analytes								
Boron	mg/L	---	1.17	0.0358	0.2670	0.0247	0.4100	0.1570
Calcium	mg/L	---	210.00	24.20	48.40	4.52	96.30	40.50
Chloride	mg/L	---	159.00	1.70	257.00	2.10	105.00	246.00
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
pH	S.U.	---	7.10	7.90	7.20	6.70	7.20	6.80
Sulfate	mg/L	---	280.00	6.40	18.20	3.40	104.00	6.40
Total Dissolved Solids	mg/L	---	1120.00	103.00	614.00	38.50	656.00	465.00
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	0.00046	<0.00041	<0.00041	<0.00041	<0.00041
Arsenic	mg/L	0.01	<0.00068	0.0031	0.0072	<0.00068	<0.00068	<0.00068
Barium	mg/L	2.00	0.186	0.0179	0.248	0.0119	0.197	0.254
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	0.00022	<0.000091	<0.000091
Cadmium	mg/L	0.005	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053
Cobalt	mg/L	0.006	<0.0015	<0.0015	0.0025	0.002	<0.0015	<0.0015
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	0.0305	<0.0110	0.034	<0.0110	<0.0110	<0.0110
Mercury	mg/L	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L	0.100	0.0037	0.0036	0.0179	0.0015	0.0184	0.0027
Selenium	mg/L	0.05	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210
Thallium	mg/L	0.002	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140
Radium 228	pCi/L	5.00	<2.11	<1.71	<1.19	<1.23	<1.50	<1.61
Radium-226	pCi/L	5.00	<0.196	<0.538	1.15	<0.374	<0.418	0.58

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

< - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

Table 3e
Groundwater Analytical Summary Event 5
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 12/6/18	MW-2 12/6/18	MW-3 12/6/18	MW-4 12/6/18	MW-5 12/6/18	MW-6 12/6/18
Appendix III Analytes								
Boron	mg/L	---	2.18	0.201	0.26	0.0142	0.4440	0.1570
Calcium	mg/L	---	312.00	39.00	54.80	2.94	105.00	38.50
Chloride	mg/L	---	87.00	3.10	68.50	1.40	94.50	26.10
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	0.58	<0.25
Sulfate	mg/L	---	571.00	26.40	25.10	2.10	103.00	6.30
Total Dissolved Solids	mg/L	---	1570.00	153.00	328.00	34.00	660.00	504.00
pH	S.U.	---	7.10	7.70	7.10	6.40	0.30	6.80
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041
Arsenic	mg/L	0.01	<0.00068	0.0039	0.0059	<0.00068	<0.00068	<0.00068
Barium	mg/L	2.00	0.14	0.0287	0.196	0.0057	0.202	0.211
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091
Cadmium	mg/L	0.005	0.0002	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053
Cobalt	mg/L	0.006	0.015	<0.0015	0.0038	<0.0015	<0.0015	0.0024
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	0.5800	<0.25
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	0.0158	<0.0110	0.0254	<0.0110	<0.0110	0.0150
Mercury	mg/L	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L	0.100	0.0577	0.0089	0.0122	0.0029	0.0185	0.0022
Selenium	mg/L	0.05	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210
Thallium	mg/L	0.002	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140
Radium 228	pCi/L	5.00	<1.24	<0.581	<1.68	<1.07	2.40	<0.657
Radium-226	pCi/L	5.00	<0.492	<0.220	<0.659	<0.226	0.699	0.824

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

"<" - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

Table 3f
Groundwater Analytical Summary Event 6
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 1/21/19	MW-2 1/21/19	MW-3 1/21/19	MW-4 1/21/19	MW-5 1/21/19	MW-6 1/21/19
Appendix III Analytes								
Boron	mg/L	---	2.51	0.0264	0.184	<0.012	0.434	0.248
Calcium	mg/L	---	311	23.1	43.4	2.65	94.8	36.9
Chloride	mg/L	---	55.7	2.3	10.1	<1.0	100	76.8
Fluoride	mg/L	4.00	0.39	<0.25	<0.25	<0.25	<0.25	<0.25
Sulfate	mg/L	---	729	<1.5	17.7	<1.5	94.4	8.6
Total Dissolved Solids	mg/L	---	1540	87.5	199	34.5	632	306
pH	S.U.	---	7.6	8	7.9	7.3	8.2	8.1
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	0.0011
Arsenic	mg/L	0.01	<0.00068	0.0029	<0.00068	<0.00068	<0.00068	0.0008
Barium	mg/L	2.00	0.0569	0.0155	0.142	0.0067	0.201	0.104
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091
Cadmium	mg/L	0.005	0.00029	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053
Cobalt	mg/L	0.006	0.004	<0.0015	<0.0015	<0.0015	<0.0015	0.0028
Fluoride	mg/L	4.00	0.39	<0.25	<0.25	<0.25	<0.25	<0.25
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	<0.0110	<0.0110	<0.0110	<0.0110	<0.0110	<0.0110
Mercury	mg/L	0.002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Molybdenum	mg/L	0.100	0.0652	0.0023	0.0103	0.002	0.0183	0.0123
Selenium	mg/L	0.05	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210
Thallium	mg/L	0.002	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140
Radium 228	pCi/L	5.00	0.459	<0.356	<0.362	<0.662	0.98	<0.141
Radium-226	pCi/L	5.00	0.11	<0.109	0.171	<0.283	0.456	<0.404

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

"<" - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

Table 3g
Groundwater Analytical Summary Event 7
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 3/20/19	MW-2 3/20/19	MW-3 3/21/19	MW-4 3/20/19	MW-5 3/20/19	MW-6 3/20/19
Appendix III Analytes								
Boron	mg/L	---	1.47	0.468	0.112	0.0167	0.388	0.172
Calcium	mg/L	---	286	72	30.9	3.89	105	33.7
Chloride	mg/L	---	127	78.2	40	3.3	96.4	60.9
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Sulfate	mg/L	---	510	78.8	9.2	2.8	89.5	7.6
Total Dissolved Solids	mg/L	---	1,290	456	189	32.5	655	243
pH	S.U.	---	7.3	7.1	7.2	6.3	7.4	7.1
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	0.00095
Arsenic	mg/L	0.01	<0.00068	0.0025	<0.00068	<0.00068	<0.00068	<0.00068
Barium	mg/L	2.00	0.202	0.184	0.112	0.0096	0.195	0.0759
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091
Cadmium	mg/L	0.005	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053
Cobalt	mg/L	0.006	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	0.0023
Fluoride	mg/L	4.00	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	0.0305	0.0736	<0.011	<0.011	<0.011	<0.011
Mercury	mg/L	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L	0.100	0.013	0.0198	0.009	0.00042	0.0124	0.0112
Selenium	mg/L	0.05	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
Thallium	mg/L	0.002	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Radium 228	pCi/L	5.00	0.38	<0.334	<0.0748	<0.0712	0.663	<0.408
Radium-226	pCi/L	5.00	0.193	0.294	<0.350	<0.334	0.298	0.0768

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

"<" - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

Table 3h
Groundwater Analytical Summary Event 8
Former Mercer Generating Station
Trenton, New Jersey

Parameter	Units	USEPA Drinking Water MCL [a]	Fly Ash Ponds					Background
			MW-1 4/3/19	MW-2 4/3/19	MW-3 4/3/19	MW-4 4/3/19	MW-5 4/3/19	MW-6 4/3/19
Appendix III Analytes								
Boron	mg/L	---	1.65	0.679	0.105	0.0206	0.422	0.208
Calcium	mg/L	---	314	98	31.9	4.29	116	35.6
Chloride	mg/L	---	91.9	110	62.5	3.7	85.3	45.3
Fluoride	mg/L	4.00	<0.25	0.66	0.71	0.66	0.63	0.67
Sulfate	mg/L	---	467	137	7	3.4	101	7.7
Total Dissolved Solids	mg/L	---	1,320	597	211	28	644	201
pH	S.U.	---	7.3	6.8	6.8	6.1	7.1	7
Appendix IV Analytes								
Antimony	mg/L	0.006	<0.00041	0.00055	<0.00041	<0.00041	<0.00041	0.0011
Arsenic	mg/L	0.01	<0.00068	0.003	<0.00068	<0.00068	<0.00068	<0.00068
Barium	mg/L	2.00	0.199	0.229	0.134	0.0115	0.226	0.0809
Beryllium	mg/L	0.004	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091	<0.000091
Cadmium	mg/L	0.005	<0.00015	0.00043	<0.00015	<0.00015	<0.00015	<0.00015
Chromium	mg/L	0.10	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053
Cobalt	mg/L	0.006	<0.0015	<0.0015	<0.0015	0.0015	<0.0015	0.002
Fluoride	mg/L	4.00	<0.25	0.66	0.71	0.66	0.63	0.67
Lead	mg/L	0.015	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Lithium	mg/L	0.04	<0.011	0.0927	<0.011	<0.011	<0.011	<0.011
Mercury	mg/L	0.002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Molybdenum	mg/L	0.100	0.0139	0.0439	0.0086	0.00059	0.0132	0.0132
Selenium	mg/L	0.05	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
Thallium	mg/L	0.002	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Radium 228	pCi/L	5.00	NA	NA	NA	NA	NA	NA
Radium-226	pCi/L	5.00	NA	NA	NA	NA	NA	NA

Concentration exceeds the USEPA Drinking Water MCL

Notes:

[a] Maximum Contaminant Levels obtained from USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

--- MCL not listed in USEPA National Primary Drinking Water Regulation Table updated May 2009 or 40 CFR 257.95(h)(2).

mg/L - milligrams per liter

"<" - Parameter not detected above method detection limit. Method detection limit shown.

pCi/l = picocuries per liter

S.U. - Standard Units

NA - Data Not Available

FIGURES



LEGEND

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE CCR UNIT LIMIT

APPROXIMATE GRAPHIC SCALE

400 0 200 400 800

1 inch = 400 ft.

N

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SITE LOCATION MAP WITH COAL COMBUSTION RESIDUAL (CCR) LOCATIONS

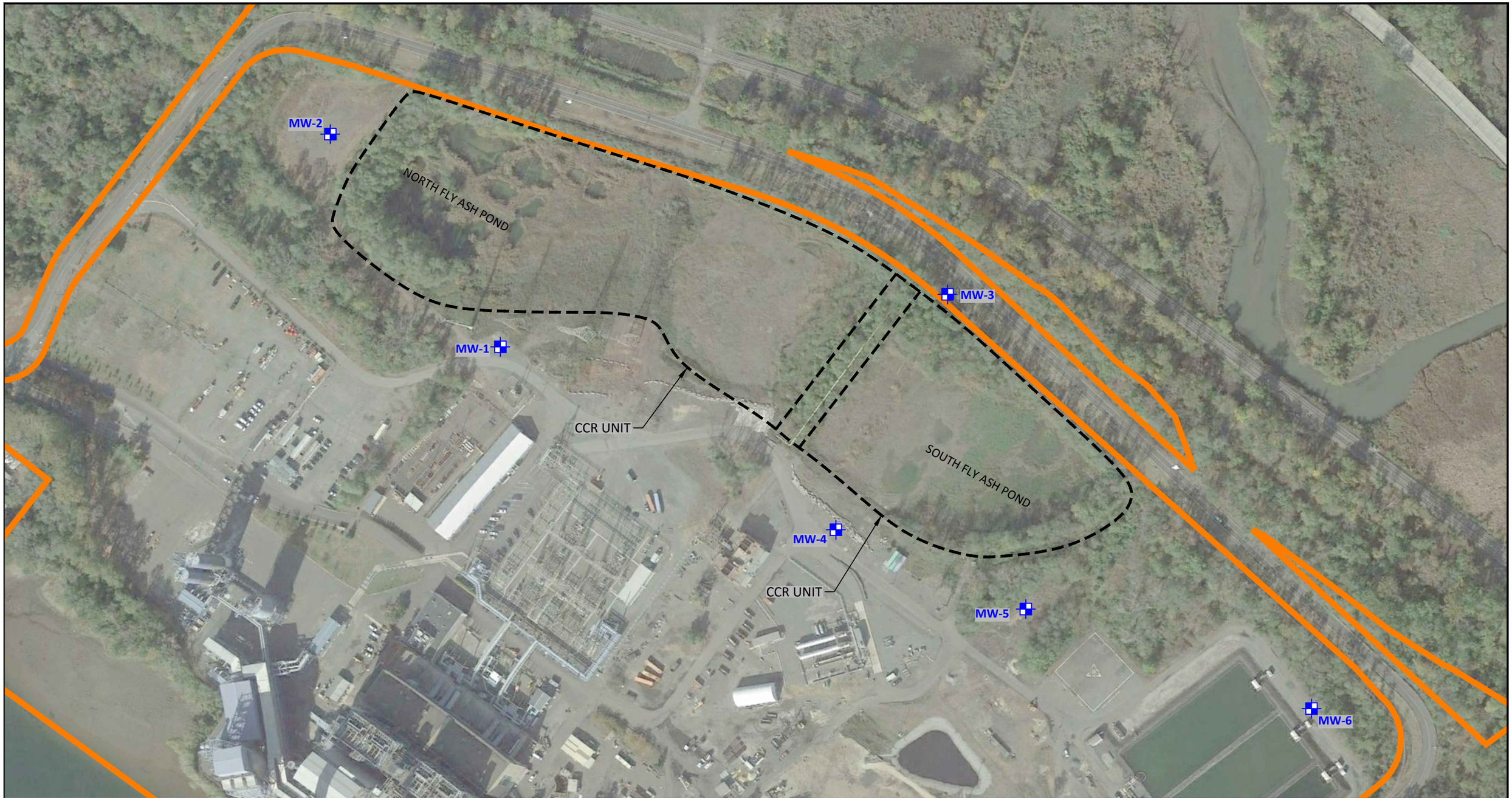
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FIGURE 1



LEGEND

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE CCR UNIT LIMIT

MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)

APPROXIMATE GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 ft.

N

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CCR UNITS & GROUNDWATER MONITORING WELL LOCATION MAP

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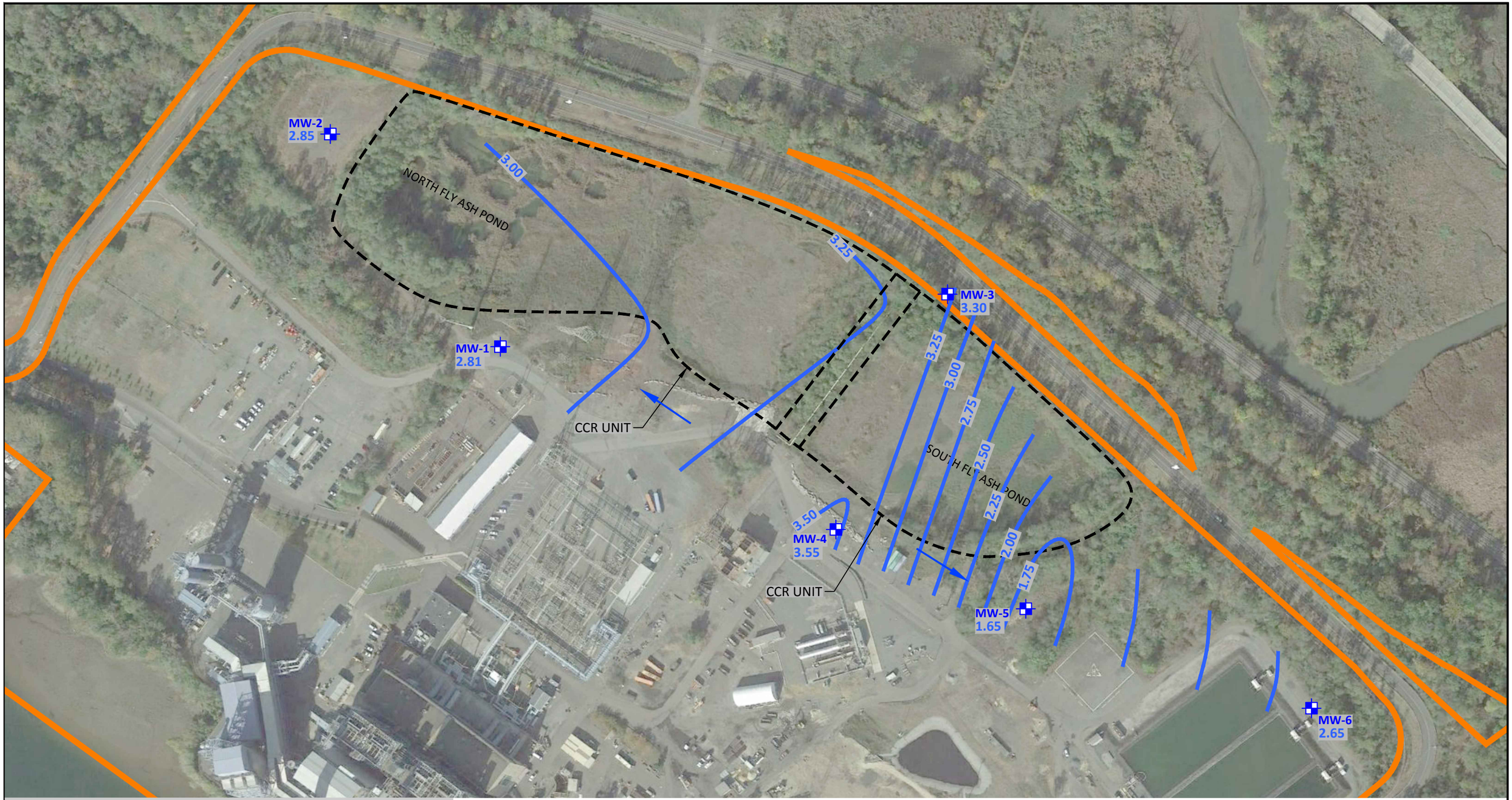
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FIGURE 2



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- GROUNDWATER CONTOUR
- 1.98 GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #1 MEASUREMENTS TAKEN AUGUST 3, 2018 TO AUGUST 7, 2018.

APPROXIMATE GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #1

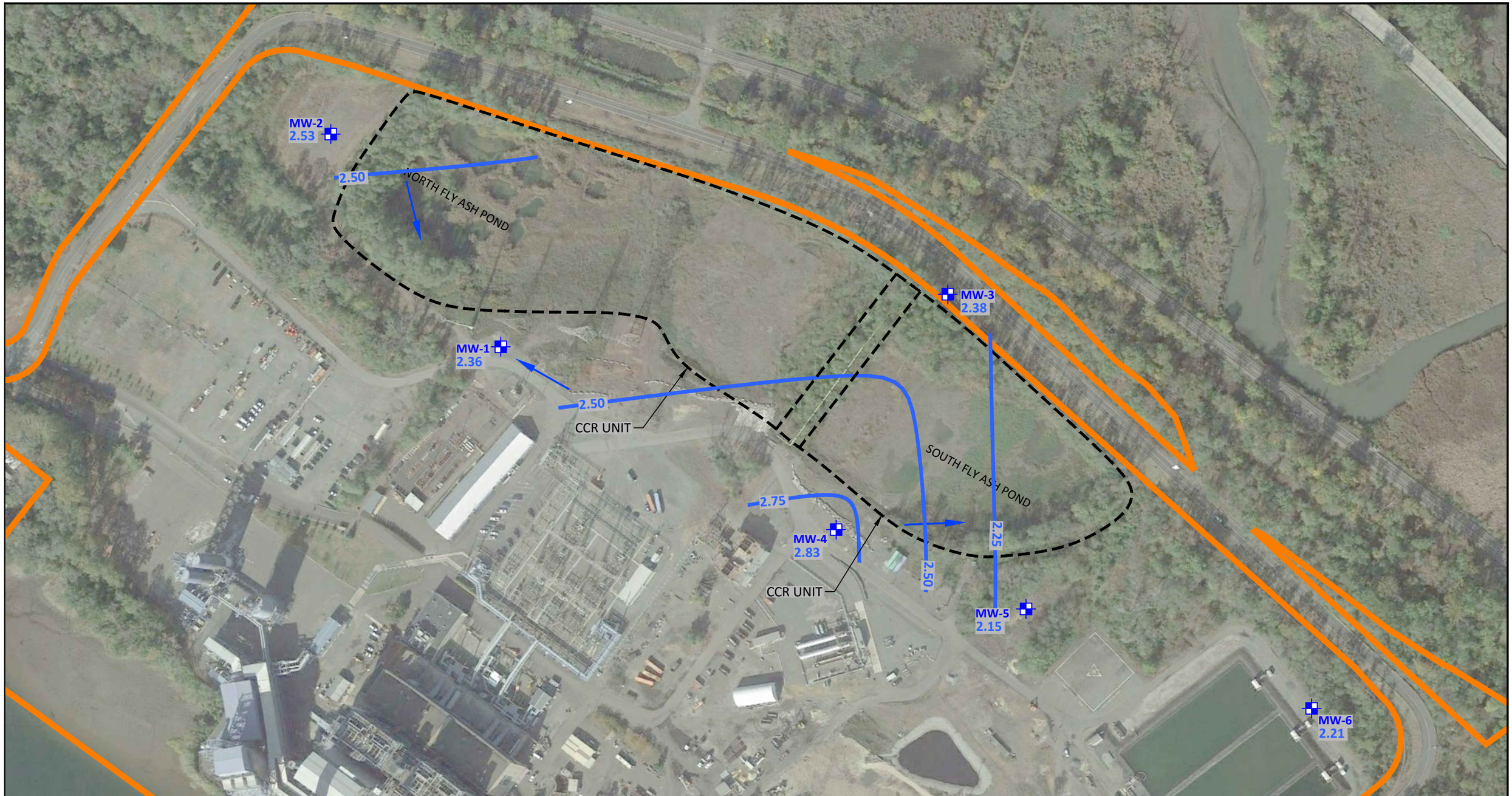
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FIGURE 3a



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- GROUNDWATER CONTOUR
- 1.98 GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #2 MEASUREMENTS TAKEN ON SEPTEMBER 4, 2018.

APPROXIMATE GRAPHIC SCALE
200 0 100 200 400
1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #2

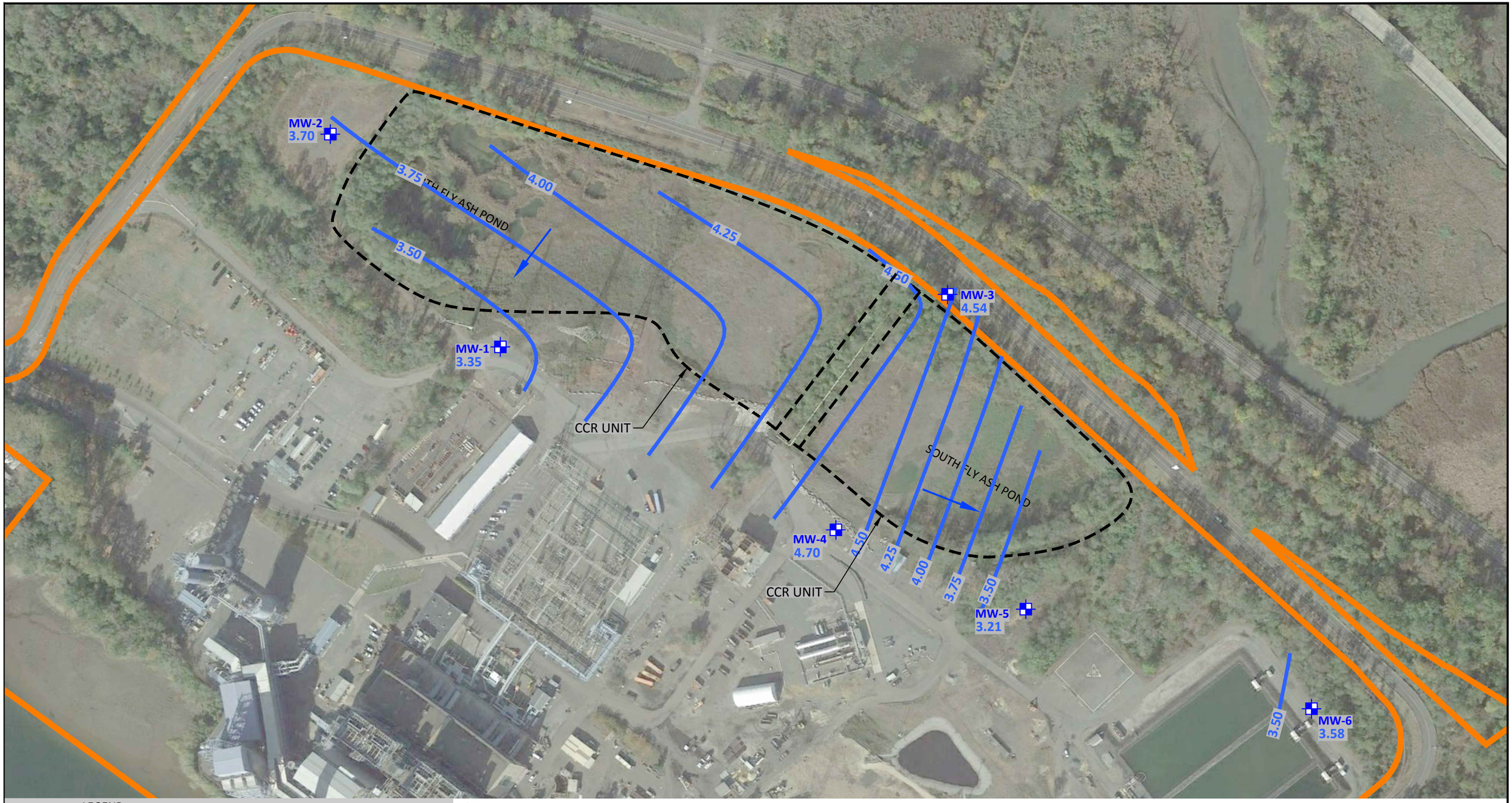
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FIGURE 3b



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- GROUNDWATER CONTOUR
- 1.98 GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #3 MEASUREMENTS TAKEN ON OCTOBER 4, 2018.

APPROXIMATE GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #3

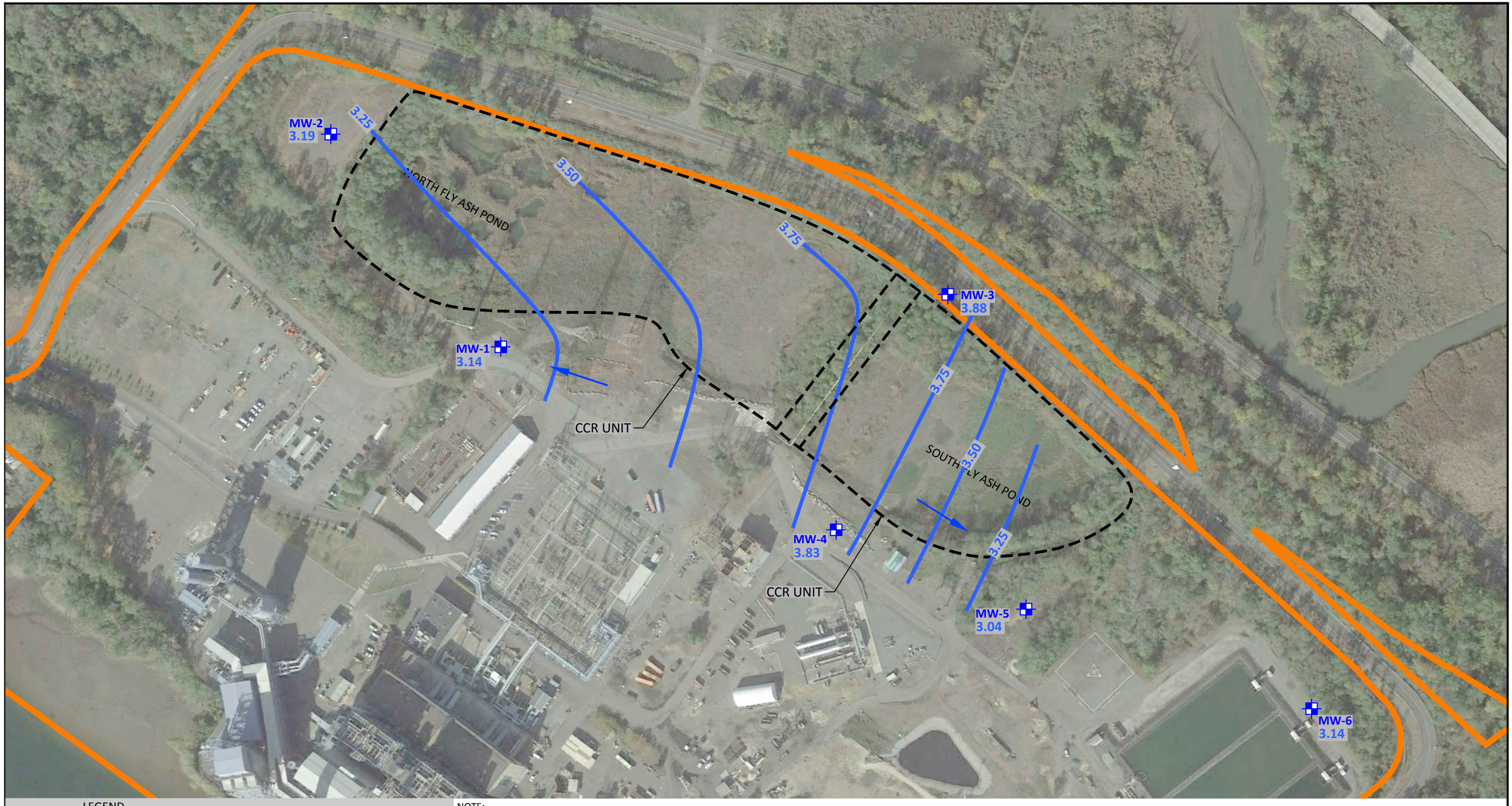
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FIGURE 3c



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- 1.98 GROUNDWATER CONTOUR
- GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #4 MEASUREMENTS TAKEN ON OCTOBER 29, 2018.

APPROXIMATE GRAPHIC SCALE
200 0 100 200 400
1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #4

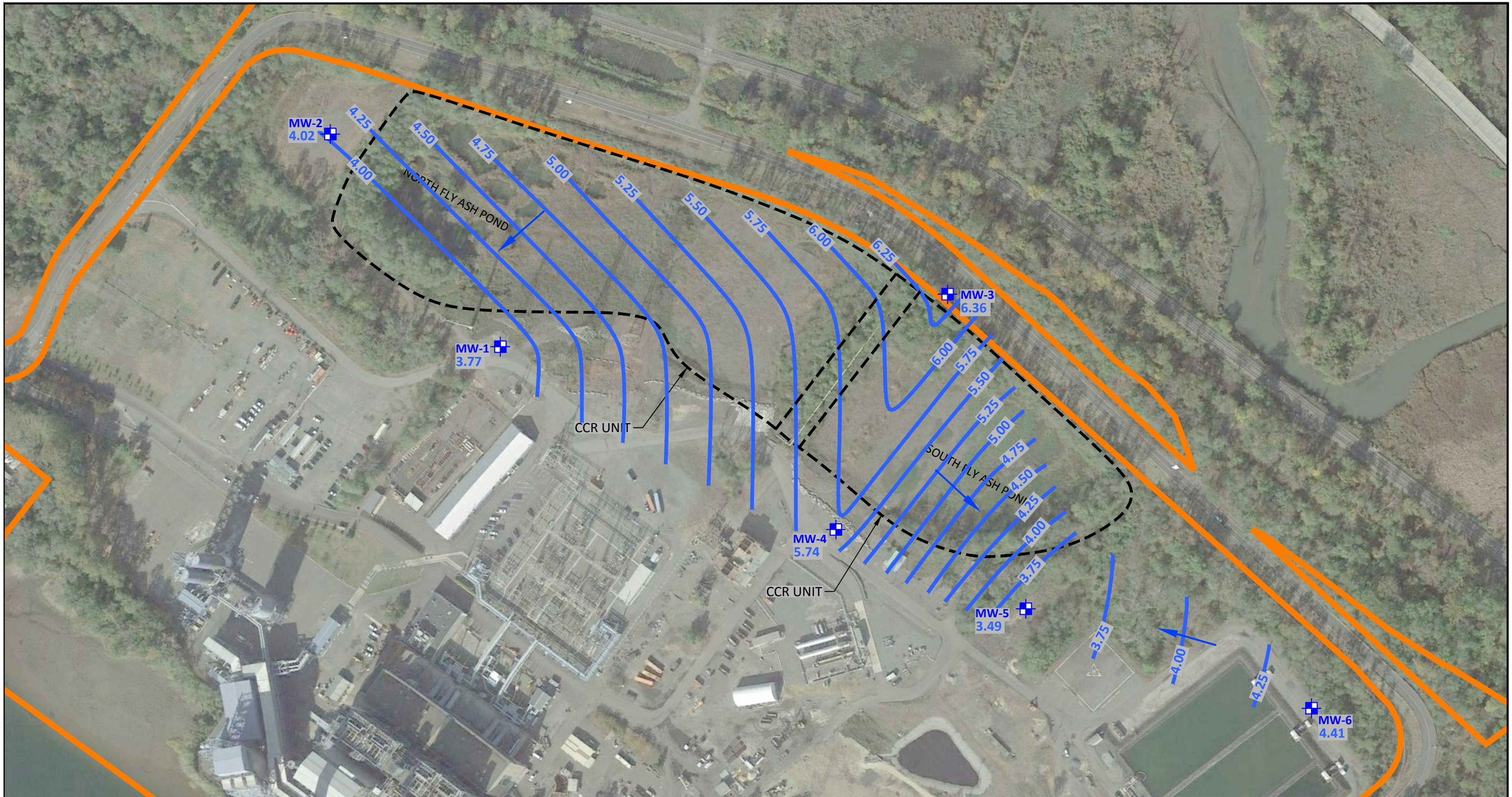
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FIGURE 3d



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- GROUNDWATER CONTOUR
- 1.98 GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #5 MEASUREMENTS TAKEN ON DECEMBER 6, 2018.

APPROXIMATE GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #5

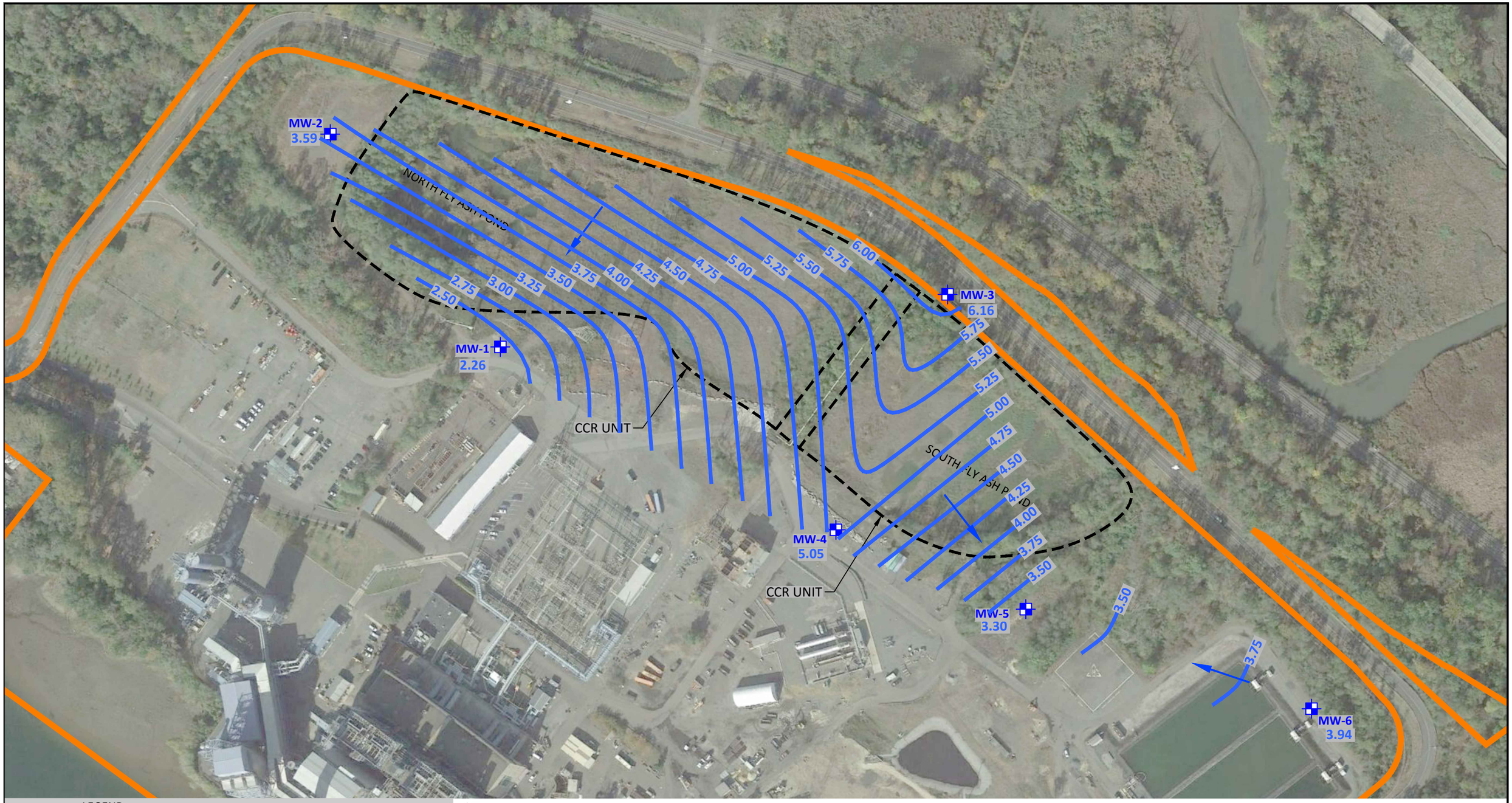
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FIGURE 3e



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- GROUNDWATER CONTOUR
- 1.98 GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #5 MEASUREMENTS TAKEN ON JANUARY 30, 2019.

APPROXIMATE GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #6

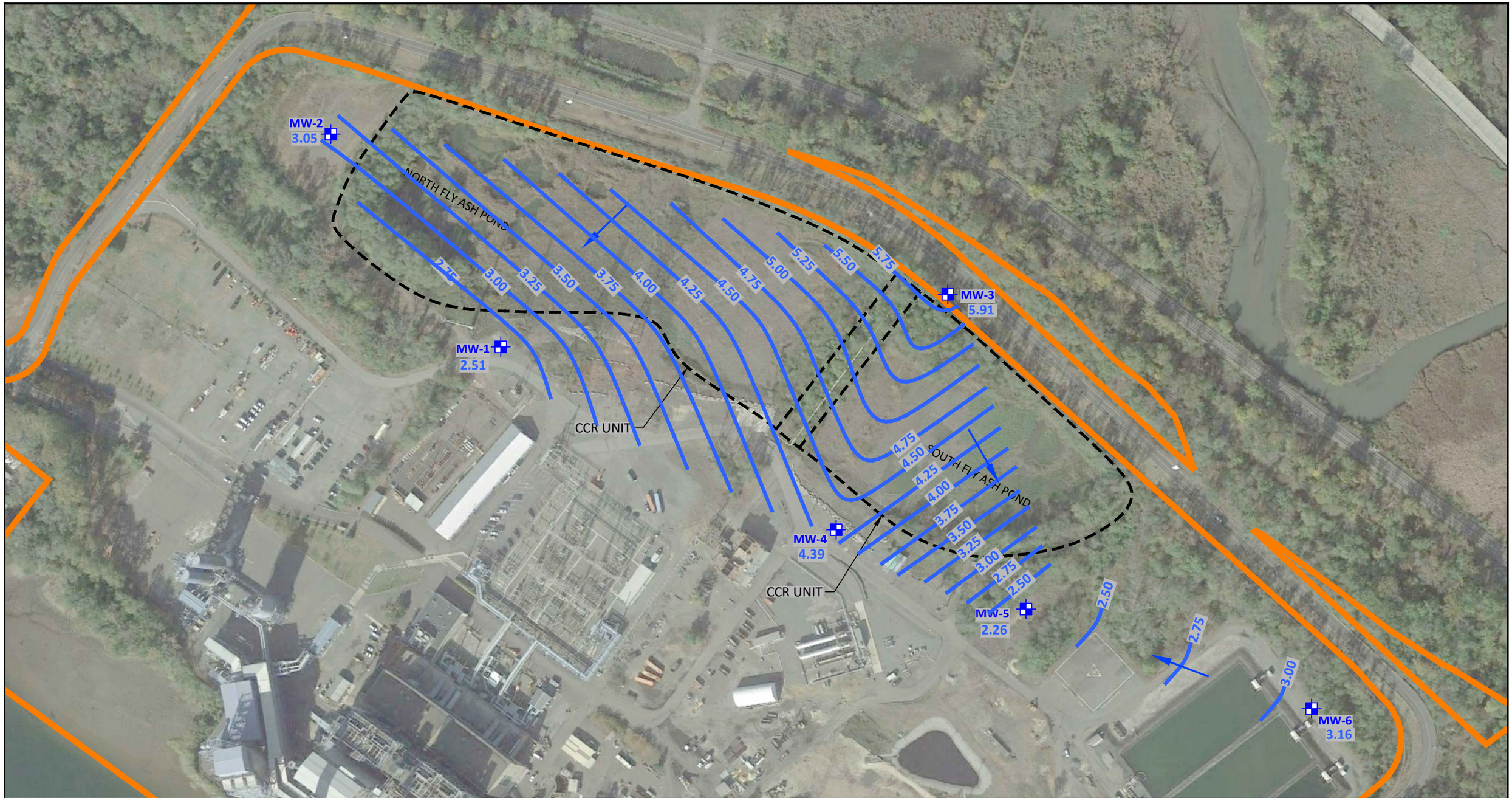
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FIGURE 3f



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- GROUNDWATER CONTOUR
- 1.98 GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #5 MEASUREMENTS TAKEN ON MARCH 20-21, 2019.

APPROXIMATE GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #7

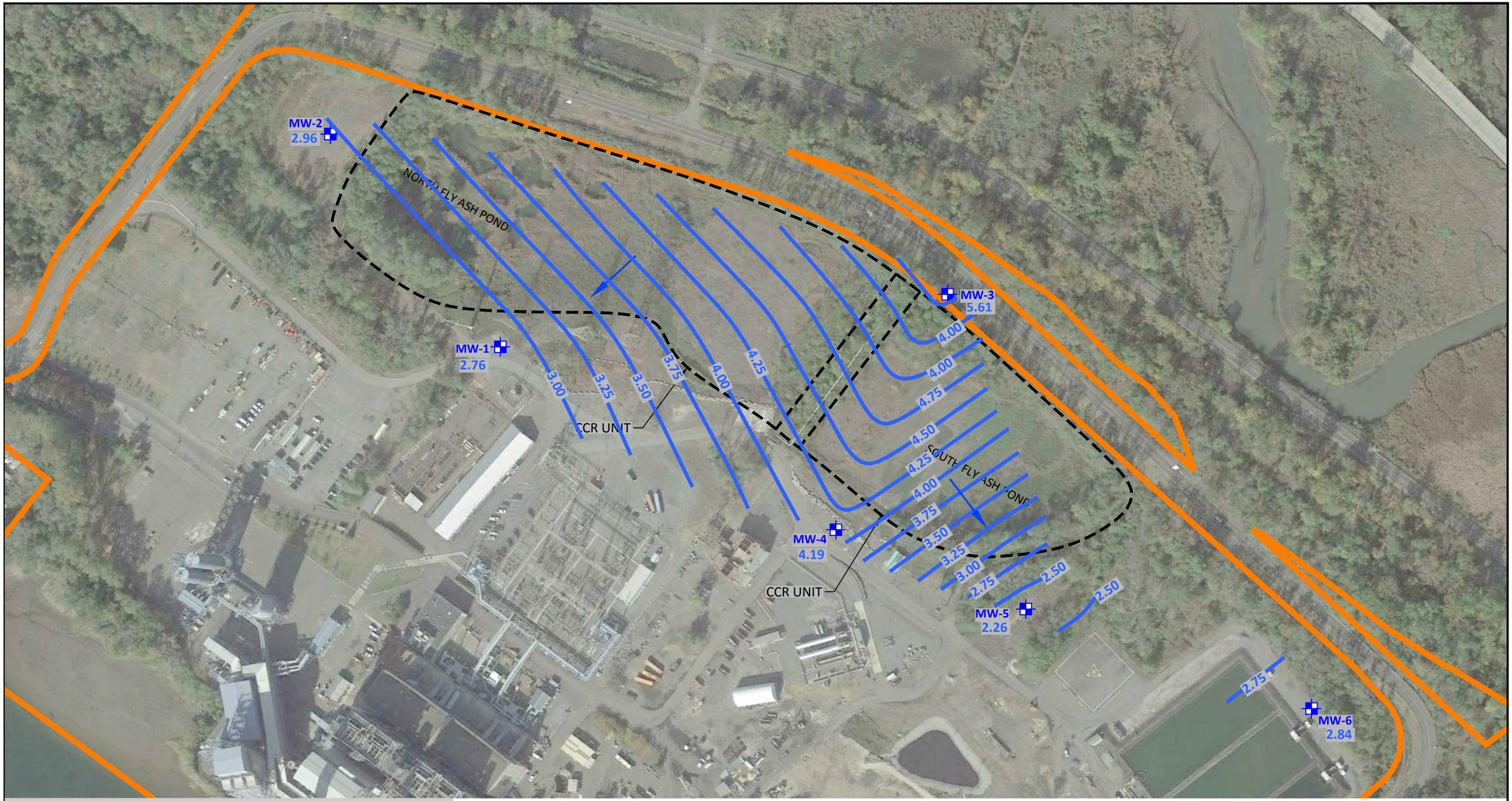
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FIGURE 3g



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE CCR UNIT LIMIT
- MW-1 APPROXIMATE MONITORING WELL LOCATION (BY GEI CONSULTANTS, INC.)
- GROUNDWATER CONTOUR
- 1.98 GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTE:
GROUNDWATER EVENT #5 MEASUREMENTS TAKEN ON APRIL 3, 2019.

APPROXIMATE GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 ft.

N

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GROUNDWATER ELEVATION CONTOUR MAP - EVENT #8

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FIGURE 3h

APPENDIX A

Groundwater Sampling Field Forms

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-1

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 84ºF, Mostly Cloudy **Sampling Date:** 8/3/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 13.95 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.99 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 9.99 - 19.99 (ft) h. **Depth of Pump:** 15.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1132 **End Purge Time:** 1230

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	1140	200	20.82	6.44	1.387	-64.1	0.99	981.3	--	--	14.00
2	1145	200	20.3	6.45	1.438	-73.8	0.40	580.7	--	--	14.02
3	1150	200	20.01	6.46	1.436	-77.4	0.52	306.3	--	--	14.03
4	1155	200	19.99	6.41	1.425	-78.4	0.40	189.5	--	--	14.03
5	1200	200	20.18	6.44	1.423	-78.8	0.40	152.6	--	--	14.03
6	1205	200	20.1	6.42	1.415	-78.8	0.61	84.3	--	--	14.03
7	1210	200	20.11	6.38	1.412	-79.0	0.20	46.2	--	--	14.03
8	1215	200	20.19	6.37	1.410	-79.1	0.23	33.7	--	--	14.03
9	1220	200	20.4	6.34	1.417	-79.9	0.26	5.6	--	--	14.03
10	1225	200	20.53	6.41	1.421	-79.9	0.29	0.3	--	--	14.03
11	1230	200	20.28	6.33	1.410	-79.2	0.22	4.8	--	--	14.03
									--	--	
									--	--	
									--	--	
									--	--	
									--	--	
									--	--	
									--	--	

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony J. Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-1, 8-3-2018, 1235

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1235 **End SampleTime:** 1250

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS: DO outside of range due to low range.

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-2

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 75ºF, Patrly Cloudy **Sampling Date:** 8/3/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 12.45 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 4.00 - 19.00 (ft) h. **Depth of Pump:** 11.5 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 0928 **End Purge Time:** 1100

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	0935	200	22.75	6.57	0.710	122.6	6.11	716.1	--	--	12.40
2	0940	200	23.32	6.61	0.720	121.6	6.25	530.3	--	--	12.41
3	0945	200	24.27	6.61	0.733	126.8	6.00	542.0	--	--	12.41
4	0950	200	25.45	6.56	0.751	135.9	4.91	787.1	--	--	12.41
5	0955	200	NO READING - CLEAN OUT YSI METER OF SILT.						--	--	12.41
6	1000	200	21.25	6.41	0.681	126.3	3.15	242.6	--	--	12.41
7	1005	200	21.54	6.41	0.688	133.8	2.85	161.4	--	--	12.41
8	1010	200	21.59	6.42	0.689	136.0	2.59	114.7	--	--	12.41
9	1015	200	21.42	6.38	0.688	137.6	2.19	76.2	--	--	12.41
10	1020	200	21.45	6.41	0.688	137.9	2.15	78.8	--	--	12.41
11	1025	200	21.35	6.38	0.687	137.5	1.97	63.3	--	--	12.41
12	1030	200	21.31	6.39	0.686	137.3	1.88	58.3	--	--	12.41
13	1035	200	21.38	6.39	0.686	136.5	1.72	47.0	--	--	12.41
14	1040	200	21.45	6.39	0.687	135.4	1.67	41.3	--	--	12.41
15	1045	200	21.61	6.39	0.688	134.0	1.58	38.4	--	--	12.41
16	1050	200	21.82	6.40	0.690	132.7	1.43	34.3	--	--	12.41
17	1055	200	21.88	6.39	0.691	132.3	1.47	29.6	--	--	12.41
18	1100	200	21.87	6.39	0.690	131.6	1.37	27.5	--	--	12.41

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony J. Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-2, 8-3-2018, 1100

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1100 **End SampleTime:** 1120

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None, black silt in purge water and grey color in sample water.

COMMENTS: 3rd turbidity reading outside of range (sampled due to time and minimal effect).

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-3

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 87ºF, Partly Cloudy **Sampling Date:** 8/7/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. Depth to LNAPL: -- (ft) **b. Depth to Water:** 10.98 (ft)

c. Depth to DNAPL: -- (ft) **d. Total Well Depth:** 23.00 (ft)

e. LNAPL Thickness: (a-b) -- (ft) **f. DNAPL Thickness:** (c-d) -- (ft)

g. Screen Interval: 11.00 - 23.00 (ft) **h. Depth of Pump:** 17.0 (ft)

2. WELL PURGE DATA

a. Purge Method: QED Bladder Pump / MP50 Controller

b. Field Testing Equipment: YSI 650 w/ turbidity meter

e. Begin Purge Time: 1209 **End Purge Time:** 1430

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	1215	200	27.79	7.11	0.006	-27.6	4.43	1242.0	--	--	11.00
2	1220	200	24.36	6.71	1.184	-78.9	0.51	998.1	--	--	11.00
3	1225	200	24.87	6.70	1.199	-86.9	0.70	1231.0	--	--	11.00
4	1230	200	24.82	6.69	1.196	-89.2	0.60	1230.0	--	--	11.00
5	1235	200	24.94	6.69	1.193	-91.3	0.63	1232.0	--	--	11.00
6	1240	200	24.60	6.68	1.168	-98.3	0.67	1229.0	--	--	11.00
7	1245	200	24.67	6.69	1.170	-100.4	0.64	1229.0	--	--	11.00
8	1330*	200	24.80	6.60	1.189	-94.4	3.01	1229.0	--	--	11.00
9	1335	200	24.34	6.60	1.166	-96.2	3.27	1226.0	--	--	11.00
10	1340	200	23.53	6.67	1.129	-104.0	5.10	614.0	--	--	11.00
11	1345	200	23.42	6.64	1.134	-103.4	5.82	545.9	--	--	11.00
12	1350	200	23.49	6.67	1.141	-105.7	6.8	537.6	--	--	11.00
13	1355	200	23.41	6.69	1.143	-109.5	6.91	468.1	--	--	11.00
14	1400	200	23.40	6.70	1.143	-112.3	7.08	403.7	--	--	11.00
15	1405	200	23.32	6.71	1.143	-113.7	7.08	363.0	--	--	11.00
16	1410	200	23.12	6.71	1.138	-115.0	7.08	328.0	--	--	11.00
17	1415	200	23.17	6.73	1.138	-116.5	7.05	320.9	--	--	11.00
18	1420	200	23.15	6.73	1.138	-117.7	6.90	304.9	--	--	11.00
19	1425	200	23.01	6.73	1.136	-118.1	6.82	293.4	--	--	11.00
20	1430	200	22.90	6.73	1.133	-118.5	6.75	284.4	--	--	11.00

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony J. Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-3, 8-7-2018, 1435

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1435 **End SampleTime:** 1450

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, red silt and color.

COMMENTS: Extreme siltiness during purge and sample. *Trouble shooting well, readings missed

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-4

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 77ºF, Cloudy **Sampling Date:** 8/7/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 7.85 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 15.99 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 5.99 - 15.99 (ft) h. **Depth of Pump:** 11.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 0841 **End Purge Time:** 0925

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	0845	200	24.61	5.10	0.045	224.0	1.63	413.6	--	--	7.85
2	0850	200	24.87	5.24	0.044	208.1	1.02	176.8	--	--	7.95
3	0855	200	24.99	5.53	0.046	175.4	0.85	78.1	--	--	8.05
4	0900	200	25.07	5.69	0.046	159.7	0.79	34.9	--	--	8.05
5	0905	200	25.19	5.77	0.046	150.5	1.01	15.2	--	--	8.05
6	0910	200	25.26	5.81	0.046	145.7	0.81	7.0	--	--	8.05
7	0915	200	25.30	5.82	0.046	144.5	0.74	4.0	--	--	8.05
8	0920	200	25.37	5.84	0.047	143.7	0.65	5.0	--	--	8.05
9	0925	200	25.40	5.84	0.047	141.9	0.58	3.0	--	--	8.05
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3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony J. Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-4, 8-7-2018, 0930

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 0930 **End SampleTime:** 0940

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS: DO readings outside range (low values causing variation).

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-5

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 81ºF, Partly Cloudy **Sampling Date:** 8/7/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. Depth to LNAPL: -- (ft) **b. Depth to Water:** 12.75 (ft)

c. Depth to DNAPL: -- (ft) **d. Total Well Depth:** 19.79 (ft)

e. LNAPL Thickness: (a-b) -- (ft) **f. DNAPL Thickness:** (c-d) -- (ft)

g. Screen Interval: 9.79 - 19.79 (ft) **h. Depth of Pump:** 14.8 (ft)

2. WELL PURGE DATA

a. Purge Method: QED Bladder Pump / MP50 Controller

b. Field Testing Equipment: YSI 650 w/ turbidity meter

e. Begin Purge Time: 0957 **End Purge Time:** 1125

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	1005	200	22.64	6.77	0.896	-105.5	1.11	251.7	--	--	12.68
2	1010	200	21.33	6.76	0.878	-113.0	0.52	324.3	--	--	12.68
3	1015	200	20.85	6.79	0.870	-114.2	0.42	239.4	--	--	12.68
4	1020	200	20.96	6.78	0.870	-115.2	0.39	174.2	--	--	12.68
5	1025	200	21.18	6.76	0.875	-114.8	0.38	137.9	--	--	12.68
6	1030	200	21.30	6.75	0.877	-114.7	0.38	106.7	--	--	12.68
7	1035	200	21.18	6.73	0.876	-114.3	0.38	94.4	--	--	12.68
8	1040	200	21.21	6.71	0.876	-114.0	0.39	65.0	--	--	12.68
9	1045	200	21.36	6.71	0.878	-113.8	0.39	60.2	--	--	12.68
10	1050	200	21.08	6.69	0.875	-113.7	0.40	43.6	--	--	12.68
11	1055	200	21.17	6.68	0.875	-113.4	0.41	30.3	--	--	12.68
12	1100	200	21.27	6.60	0.877	-114.3	0.42	26.9	--	--	12.68
13	1105	200	21.11	6.67	0.875	-114.1	0.46	18.5	--	--	12.68
14	1110	200	21.33	6.67	0.877	-114.9	0.45	18.6	--	--	12.68
15	1115	200	21.45	6.68	0.880	-116.1	0.46	13.4	--	--	12.68
16	1120	200	21.48	6.67	0.881	-116.7	0.47	11.9	--	--	12.68
17	1125	200	21.47	6.67	0.881	-117.1	0.48	11.2	--	--	12.68
									--	--	

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony J. Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-5, 8-7-2018, 1130

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1130 **End SampleTime:** 1145

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-6

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 86ºF, Partly Cloudy **Sampling Date:** 8/3/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 10.71 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 22.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 7.00 - 22.00 (ft) h. **Depth of Pump:** 15.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1304 **End Purge Time:** 1430

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	1310	200	20.11	6.51	0.680	-50.0	1.61	554.3	--	--	10.71
2	1315	200	20.16	6.46	0.675	-57.8	0.71	805.6	--	--	10.79
3	1320	200	19.92	6.46	0.670	-59.8	0.50	828.5	--	--	10.79
4	1325	200	18.91	6.47	0.655	-60.5	0.36	786.5	--	--	10.79
5	1330	200	18.36	6.48	0.645	-61.8	0.31	562.6	--	--	10.79
6	1335	200	18.39	6.51	0.645	-64.1	0.27	339.3	--	--	10.79
7	1340	200	18.14	6.53	0.641	-65.7	0.27	203.1	--	--	10.79
8	1345	200	17.96	6.55	0.639	-68.0	0.24	108.5	--	--	10.79
9	1350	200	17.89	6.57	0.641	-70.7	0.22	58.2	--	--	10.79
10	1355	200	17.77	6.57	0.640	-72.7	0.21	35.9	--	--	10.79
11	1400	200	17.47	6.58	0.637	-74.2	0.19	24.5	--	--	10.79
12	1405	200	17.85	6.58	0.634	-74.6	0.19	22.4	--	--	10.79
13	1410	200	17.41	6.57	0.633	-74.4	0.18	17.0	--	--	10.79
14	1415	200	17.17	6.57	0.627	-73.8	0.24	11.4	--	--	10.79
15	1420	200	17.00	6.57	0.624	-73.4	0.17	9.3	--	--	10.79
16	1425	200	17.12	6.57	0.624	-72.9	0.17	6.7	--	--	10.79
17	1430	200	17.24	6.57	0.624	-72.98	0.16	6.3	--	--	10.79
									--	--	

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony J. Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-6, 8-3-2018, 1435

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1435 **End SampleTime:** 1450

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, grey color.

COMMENTS: 3rd turbidity reading out of range. Sampled for time.

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-1

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: **Sampling Date:** 9/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 14.60 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.99 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 9.99 - 19.99 (ft) h. **Depth of Pump:** 15.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1505 **End Purge Time:** 1545

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	150	20.70	6.35	1.144	-148.8	1.26	25.2	--	--	14.60
2	10	150	20.10	6.32	1.009	-147.2	0.76	27.1	--	--	14.60
3	15	150	20.15	6.32	1.000	-145.5	0.19	52.0	--	--	14.60
4	20	150	19.49	6.31	1.576	-144.1	0.51	38.1	--	--	14.60
5	25	150	19.15	6.34	1.559	-144.4	0.40	29.5	--	--	14.60
6	30	150	19.05	6.33	1.549	-143.4	0.38	11.0	--	--	14.60
7	35	150	19.03	6.38	1.543	-144.3	0.36	12.1	--	--	14.60
8	40	150	19.00	6.36	1.543	-144.3	0.35	8.6	--	--	14.60

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Shane Wagner

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-1, 9-4-2018, 1545

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1545 **End SampleTime:** 1555

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-2

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: **Sampling Date:** 9/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 12.74 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 4.00 - 19.00 (ft) h. **Depth of Pump:** 11.5 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1245 **End Purge Time:** 1325

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	0	150	26.08	6.37	0.884	44.0	2.07	35.9	--	--	12.74
2	5	150	23.38	6.25	0.854	61.6	2.02	25.6	--	--	12.74
3	10	150	22.78	6.26	0.853	51.4	2.17	20.4	--	--	12.74
4	15	150	22.52	6.28	0.852	58.4	2.32	15.5	--	--	12.74
5	20	150	22.54	6.30	0.860	56.4	2.38	12.5	--	--	12.74
6	25	150	22.51	6.30	0.865	56.4	2.43	10.7	--	--	12.74
7	30	150	22.5	6.31	0.804	55.9	2.45	9.4	--	--	12.74
8	35	150	22.53	6.31	0.804	56.0	2.45	8.8	--	--	12.74

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Shane Wagner

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-2, 9-4-2018, 1330

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1330 **End SampleTime:** 1340

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None, black silt in purge water and grey color in sample water.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-3

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: **Sampling Date:** 9/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 11.78 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 23.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 11.00 - 23.00 (ft) h. **Depth of Pump:** 17.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1450 **End Purge Time:** 1535

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	0	100	20.76	6.87	0.997	-95.6	2.70	160.0	--	--	11.78
2	5	100	17.66	6.71	0.891	-100.2	0.95	102.7	--	--	11.84
3	10	100	17.58	6.70	0.873	-106.4	1.33	55.7	--	--	11.90
4	15	100	17.18	6.70	0.859	-109.6	1.42	25.2	--	--	11.97
5	20	100	17.00	6.72	0.853	-112.1	1.31	16.5	--	--	12.02
6	25	100	17.14	6.74	0.854	-114.3	1.38	9.6	--	--	12.10
7	30	100	17.19	6.77	0.888	-116.4	1.38	7.1	--	--	12.17
8	35	100	16.97	6.79	0.849	-117.7	0.84	5.4	--	--	12.22
9	40	100	16.73	6.80	0.843	-119.0	0.83	7.2	--	--	12.22
10	45	100	16.73	6.81	0.842	-119.4	0.83	8.1	--	--	12.22

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-3, 9-4-2018, 1545

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1545 **End SampleTime:** 1555

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: Little, light sheen.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-4

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: **Sampling Date:** 9/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 8.32 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 15.99 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 5.99 - 15.99 (ft) h. **Depth of Pump:** 11.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1030 **End Purge Time:** 1120

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	0	150	24.99	5.62	0.103	24.7	1.03	114.2	--	--	8.32
2	5	150	25.63	5.85	0.085	25.2	0.81	77.8	--	--	8.51
3	10	150	25.78	5.96	0.077	25.6	0.63	80.2	--	--	8.52
4	15	150	25.92	6.01	0.075	23.1	0.61	56.8	--	--	8.53
5	20	150	56.17	6.08	0.072	19.8	0.55	34.0	--	--	8.53
6	25	150	26.57	6.14	0.072	14.3	0.47	17.7	--	--	8.53
7	30	150	26.93	6.16	0.075	15.1	0.44	15.2	--	--	8.54
8	35	150	27.15	6.17	0.072	7.2	0.44	7.2	--	--	8.55
9	40	150	27.45	6.16	0.071	7.6	0.44	7.0	--	--	8.55
10	45	150	27.58	6.15	0.071	7.7	0.44	4.1	--	--	8.55
11	50	150	27.77	6.15	0.071	7.7	0.44	2.6	--	--	8.55

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-4, 9-4-2018, 1125

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1125 **End SampleTime:** 1135

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-5

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: **Sampling Date:** 9/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 12.93 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.79 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 9.79 - 19.79 (ft) h. **Depth of Pump:** 14.8 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1235 **End Purge Time:** 1345

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	19.86	6.64	0.944	-164.8	3.19	74.1	--	--	12.93
2	10	200	19.61	6.62	0.940	-164.9	2.80	72.1	--	--	12.93
3	15	200	19.48	6.60	0.932	-165.6	1.29	66.6	--	--	12.93
4	20	200	19.08	6.63	0.927	-168.6	1.24	48.6	--	--	12.93
5	25	200	18.78	6.68	0.923	-171.7	1.16	47.2	--	--	12.93
6	30	200	18.52	6.73	0.918	-174.0	1.05	38.0	--	--	12.93
7	35	200	18.40	6.71	0.913	-171.7	0.64	30.4	--	--	12.93
8	40	200	18.36	6.70	0.910	-169.4	0.43	125.8	--	--	12.93
9	45	200	18.28	6.72	0.911	-171.8	0.48	32.6	--	--	12.93
10	50	200	18.21	6.75	0.912	-172.3	0.52	28.4	--	--	12.93
11	55	200	17.94	6.75	0.912	-175.4	0.52	23.7	--	--	12.93
12	60	200	17.9	6.77	0.914	-179.9	0.53	18.4	--	--	12.93
13	65	200	17.85	6.76	0.913	-178.6	0.53	17.6	--	--	12.93
14	70	200	17.72	6.77	0.913	-177.2	0.53	16.0	--	--	12.93

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-5, 9-4-2018, 1350

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1350 **End SampleTime:** 1400

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-6

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: **Sampling Date:** 9/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 11.12 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 22.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 7.00 - 22.00 (ft) h. **Depth of Pump:** 15.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1045 **End Purge Time:** 1125

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	0	100	20.70	7.06	0.821	-95.2	1.51	27.9	--	--	11.12
2	5	100	17.16	6.04	0.718	-80.8	1.12	9.2	--	--	11.12
3	10	100	16.56	6.65	0.709	-81.1	0.93	5.3	--	--	11.12
4	15	100	16.38	6.67	0.707	-78.8	0.91	3.9	--	--	11.12
5	20	100	16.47	6.66	0.709	-79.3	0.90	2.9	--	--	11.12
6	25	100	16.55	6.68	0.711	-81.7	0.90	2.7	--	--	11.12
7	30	100	16.49	6.68	0.711	-83.3	0.92	1.8	--	--	11.12
8	35	100	16.45	6.69	0.710	-78.5	0.91	1.5	--	--	11.12
9	40	100	16.30	6.68	0.708	-76.4	0.95	1.4	--	--	11.12

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Shane Wagner

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-6, 9-4-2018, 1130

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1130 **End SampleTime:** 1140

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-1

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 76°F, Sunny **Sampling Date:** 10/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 12.92 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.99 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 9.99 - 19.99 (ft) h. **Depth of Pump:** 15.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1310 **End Purge Time:** 1425

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	150	21.97	6.61	1.016	-46.2	3.69	500.9	--	--	12.92
2	10	150	19.46	6.48	1.468	-58.4	1.18	297.6	--	--	12.92
3	15	150	19.15	6.49	1.472	-60.1	1.14	188.2	--	--	12.92
4	20	150	19.05	6.50	1.474	-61.1	1.35	111.4	--	--	12.92
5	25	150	19.02	6.51	1.472	-61.8	1.26	98.2	--	--	12.92
6	30	150	19.00	6.51	1.469	-62.0	1.20	68.8	--	--	12.92
7	35	150	19.06	6.51	1.466	-62.1	1.31	47.1	--	--	12.92
8	40	150	19.02	6.51	1.462	-61.4	1.34	29.7	--	--	12.92
9	45	150	19.07	6.51	1.464	-61.0	1.49	25.4	--	--	12.92
10	50	150	19.04	6.50	1.461	-60.7	1.50	18.5	--	--	12.92
11	55	150	19.18	6.50	1.465	-60.4	1.58	14.8	--	--	12.92
12	60	150	19.37	6.51	1.468	-59.8	1.6	14.5	--	--	12.92
13	65	150	19.26	6.50	1.469	-58.1	1.59	9.9	--	--	12.92
14	70	150	19.22	6.50	1.469	-58.4	1.59	8.6	--	--	12.92
15	75	150	19.18	6.51	1.470	-58.9	1.60	7.3	--	--	12.92

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-1, 10-4-2018, 1425

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1425 **End SampleTime:** 1430

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-2

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 70°F, Partly Cloudy **Sampling Date:** 10/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 11.60 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 4.00 - 19.00 (ft) h. **Depth of Pump:** 11.5 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1102 **End Purge Time:** 1140

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	23.20	6.93	0.191	187.5	6.67	199.6	--	--	11.60
2	10	200	23.18	7.22	0.205	165.8	5.72	87.3	--	--	11.54
3	15	200	23.20	7.23	0.205	162.7	5.62	38.0	--	--	11.54
4	20	200	23.21	7.29	0.206	161.8	5.51	11.1	--	--	11.54
5	25	200	23.22	7.24	0.206	161.5	5.50	6.3	--	--	11.54
6	30	200	23.28	7.24	0.207	161.8	5.46	3.8	--	--	11.54
7	35	200	23.35	7.24	0.207	161.2	5.46	2.8	--	--	11.54
8	40	200	23.42	7.24	0.208	161.0	5.42	2.2	--	--	11.54

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-2, 10-4-2018, 1145

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1145 **End SampleTime:** 1150

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-3

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 76°F, Sunny **Sampling Date:** 10/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 9.67 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 23.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 11.00 - 23.00 (ft) h. **Depth of Pump:** 17.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1226 **End Purge Time:** 1335

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	25.44	7.55	0.001	154.2	8.03	-1.2	--	--	9.67
2	10	200	23.56	6.74	0.001	59.7	2.30	1770.0	--	--	9.67
3	15	200	22.70	6.42	0.319	5.1	0.73	1762.0	--	--	9.67
4	20	200	20.94	6.39	0.331	47.5	0.68	1739.0	--	--	9.67
5	25	200	20.31	6.41	0.366	40.4	0.69	1730.0	--	--	9.67
6	30	200	21.44	7.20	0.003	54.9	0.71	1449.0	--	--	9.67
7	35	200	19.51	6.48	0.492	27.9	0.87	1365.0	--	--	9.67
8	40	200	19.34	6.50	0.518	10.9	0.77	1717.0	--	--	9.67
9	45	200	19.29	6.51	0.526	7.2	0.76	1686.0	--	--	9.67
10	50	200	19.26	6.51	0.529	3.1	0.76	1704.0	--	--	9.67
11	55	200	19.22	6.51	0.532	-0.7	0.78	1699.0	--	--	9.67
12	60	200	19.13	6.52	0.536	-4.6	0.8	1714.0	--	--	9.67
13	65	200	19.07	6.52	0.539	-6.6	0.8	1713.0	--	--	9.67
14	70	200	19.05	6.53	0.545	-8.9	0.8	1664.0	--	--	9.67

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-3, 10-4-2018, 1340

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1340 **End SampleTime:** 1345

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None

COMMENTS: Extremely turbid/brown color

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-4

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 62°F, Cloudy **Sampling Date:** 10/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 6.49 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 15.99 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 5.99 - 15.99 (ft) h. **Depth of Pump:** 11.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 924 **End Purge Time:** 1015

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	20.97	5.69	0.030	167.5	2.43	370.9	--	--	6.49
2	10	200	21.30	5.59	0.027	190.8	2.04	179.3	--	--	6.65
3	15	200	21.41	5.60	0.027	194.3	2.16	97.2	--	--	6.65
4	20	200	21.48	5.57	0.026	199.8	1.95	52.3	--	--	6.65
5	25	200	21.51	5.57	0.027	198.2	1.72	33.5	--	--	6.65
6	30	200	21.53	5.57	0.026	198.3	1.64	28.5	--	--	6.65
7	35	200	21.51	5.57	0.026	198.3	1.63	29.0	--	--	6.65
8	40	200	21.52	5.56	0.027	199.7	1.60	26.9	--	--	6.65
9	45	200	21.59	5.56	0.027	200.9	1.58	27.4	--	--	6.65
10	50	200	21.64	5.56	0.027	201.1	1.53	25.6	--	--	6.65

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-4, 10-4-2018, 1020

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1020 **End SampleTime:** 1025

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-5

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 71°F, Cloudy **Sampling Date:** 10/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 11.80 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.79 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 9.79 - 19.79 (ft) h. **Depth of Pump:** 14.8 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1115 **End Purge Time:** 1240

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	120	20.25	6.79	0.910	-68.1	2.04	809.4	--	--	11.85
2	10	120	17.72	6.79	0.852	-81.9	0.93	574.4	--	--	11.85
3	15	120	17.60	6.80	0.851	-85.8	0.84	340.2	--	--	11.85
4	20	120	17.53	6.81	0.850	-87.3	0.82	222.6	--	--	11.85
5	25	120	17.50	6.81	0.850	-88.9	0.77	174.5	--	--	11.85
6	30	120	17.47	6.81	0.850	-89.5	0.76	128.0	--	--	11.85
7	35	120	17.47	6.81	0.851	-89.4	0.73	96.2	--	--	11.85
8	40	120	17.40	6.82	0.850	-89.3	0.73	83.5	--	--	11.85
9	45	120	17.53	6.82	0.851	-89.4	0.74	67.5	--	--	11.85
10	50	120	17.59	6.82	0.854	-89.2	0.73	56.7	--	--	11.85
11	55	120	17.61	6.82	0.855	-89.8	0.72	41.6	--	--	11.85
12	60	120	17.62	6.81	0.855	-89.8	0.73	37.3	--	--	11.85
13	65	120	17.45	6.81	0.853	-89.7	0.72	28.3	--	--	11.85
14	70	120	17.46	6.82	0.851	-90.0	0.71	21.1	--	--	11.85
15	75	120	17.44	6.82	0.851	-91.0	0.71	18.5	--	--	11.85
16	80	120	17.46	6.82	0.851	-91.4	0.72	18.2	--	--	11.85
17	85	120	17.47	6.82	0.851	-91.6	0.72	18.0	--	--	11.85

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-5, 10-4-2018, 1240

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1240 **End SampleTime:** 1245

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-6

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton

Weather Conditions: 72°F, Cloudy **Sampling Date:** 10/4/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 9.77 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 22.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 7.00 - 22.00 (ft) h. **Depth of Pump:** 15.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 925 **End Purge Time:** 1015

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	17.44	7.48	0.274	-2.2	5.11	232.4	--	--	9.77
2	10	200	16.95	6.66	0.532	-57.3	1.71	136.2	--	--	9.77
3	15	200	16.83	6.64	0.531	-62.4	1.42	69.2	--	--	9.77
4	20	200	16.79	6.65	0.536	-66.1	1.18	34.3	--	--	9.77
5	25	200	16.79	6.66	0.538	-68.6	1.08	23.7	--	--	9.77
6	30	200	16.77	6.66	0.537	-70.3	0.96	14.4	--	--	9.77
7	35	200	16.76	6.66	0.537	-71.2	0.88	11.5	--	--	9.77
8	40	200	16.77	6.67	0.536	-71.7	0.82	9.6	--	--	9.77
9	45	200	16.78	6.66	0.536	-72.4	0.78	6.7	--	--	9.77
10	50	200	16.81	6.66	0.534	-72.4	0.77	4.5	--	--	9.77

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-6, 10-4-2018, 1020

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1020 **End SampleTime:** 1025

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-1

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton, NJ

Weather Conditions: 53°F, Mostly Cloudy **Sampling Date:** 10/29/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a.	Depth to LNAPL:	-- (ft)	b.	Depth to Water:	13.62 (ft)		
c.	Depth to DNAPL:	-- (ft)	d.	Total Well Depth:	19.99 (ft)		
e.	LNAPL Thickness: (a-b)	-- (ft)	f.	DNAPL Thickness: (c-d)	-- (ft)		
g.	Screen Interval:	9.99 - 19.99 (ft)	h.	Depth of Pump:	15.0 (ft)		

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1020 **End Purge Time:** 1425

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	150	17.44	6.60	1.468	-6.4	2.35	302.4	--	--	13.70
2	10	150	17.74	6.60	1.469	-43.4	0.53	184.5	--	--	13.70
3	15	150	17.78	6.61	1.473	-57.8	0.38	76.7	--	--	13.72
4	20	150	17.74	6.63	1.476	-68.2	0.30	56.6	--	--	13.73
5	25	150	17.74	6.64	1.480	-75.2	0.27	46.9	--	--	13.74
6	30	150	17.75	6.64	1.482	-79.4	0.25	43.0	--	--	13.75
7	35	150	17.77	6.63	1.488	-83.3	0.23	39.2	--	--	13.75
8	40	150	17.78	6.64	1.487	-86.1	0.23	36.8	--	--	13.75
9	45	150	17.77	6.64	1.496	-88.0	0.22	35.6	--	--	13.75
10	50	150	17.74	6.64	1.484	-90.3	0.21	33.1	--	--	13.75
11	55	150	17.80	6.64	1.484	-91.6	0.21	28.5	--	--	13.75
12	60	150	18.02	6.64	1.491	-91.2	0.21	6.1	--	--	13.75
13	65	150	18.08	6.64	1.487	-91.7	0.19	5.5	--	--	13.75
14	70	150	18.10	6.64	1.489	-91.9	0.19	4.8	--	--	13.75

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-1, 10-29-2018, 1130

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1130 **End SampleTime:** 1140

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-2

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton, NJ

Weather Conditions: 52°F, Overcast **Sampling Date:** 10/29/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 12.11 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 19.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 4.00 - 19.00 (ft) h. **Depth of Pump:** 11.5 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1015 **End Purge Time:** 1105

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	14.97	7.42	0.123	173.2	9.40	322.1	--	--	12.11
2	10	200	15.04	7.49	0.123	181.1	9.12	228.1	--	--	12.11
3	15	200	14.66	7.51	0.122	191.8	9.52	145.1	--	--	12.11
4	20	200	14.56	7.48	0.121	198.7	9.43	62.1	--	--	12.11
5	25	200	14.60	7.49	0.121	200.0	9.39	40.2	--	--	12.11
6	30	200	14.60	7.48	0.121	203.1	9.32	26.5	--	--	12.11
7	35	200	14.71	7.50	0.121	206.9	9.25	16.2	--	--	12.11
8	40	200	14.57	7.48	0.121	211.3	9.26	10.0	--	--	12.11
9	45	200	14.62	7.48	0.121	214.4	9.23	9.7	--	--	12.11
10	50	200	14.59	7.50	0.121	215.7	9.22	9.8	--	--	12.11

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-2, 10-29-2018, 1110

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1110 **End SampleTime:** 1120

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-3

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton, NJ

Weather Conditions: 56°F, Partly Sunny **Sampling Date:** 10/29/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) **b.** **Depth to Water:** 10.33 (ft)

c. **Depth to DNAPL:** -- (ft) **d.** **Total Well Depth:** 23.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) **f.** **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 11.00 - 23.00 (ft) **h.** **Depth of Pump:** 17.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1357 **End Purge Time:** 1455

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	15.89	6.73	0.809	47.5	3.30	1320.0	--	--	10.33
2	10	200	15.75	6.79	0.862	6.3	3.70	987.9	--	--	10.33
3	15	200	15.74	6.82	0.872	-10.7	4.49	426.0	--	--	10.33
4	20	200	15.58	6.84	0.875	-22.9	6.84	200.1	--	--	10.33
5	25	200	15.41	6.86	0.870	-30.8	6.86	116.1	--	--	10.33
6	30	200	15.24	6.87	0.866	-35.8	5.39	75.7	--	--	10.33
7	35	200	15.24	6.89	0.868	-39.9	5.25	53.6	--	--	10.33
8	40	200	15.25	6.89	0.869	-42.9	5.24	51.2	--	--	10.33
9	45	200	15.37	6.90	0.873	-46.7	5.10	36.6	--	--	10.33
10	50	200	15.53	6.89	0.880	-48.7	5.00	34.0	--	--	10.33
11	55	200	15.63	6.89	0.883	-52.4	4.77	32.0	--	--	10.33
12	60	200	15.63	6.89	0.884	-53.5	4.70	31.8	--	--	10.33

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-3, 10-29-2018, 1500

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1500 **End SampleTime:** 1510

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None

COMMENTS: Extremely turbid/brown color

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-4

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton, NJ

Weather Conditions: 54°F, Overcast **Sampling Date:** 10/29/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 7.36 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 15.99 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 5.99 - 15.99 (ft) h. **Depth of Pump:** 11.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1155 **End Purge Time:** 1255

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	200	17.40	5.68	0.033	191.8	4.04	380.1	--	--	7.36
2	10	200	17.51	5.65	0.033	197.2	4.30	300.3	--	--	7.36
3	15	200	17.44	5.69	0.033	197.4	4.63	227.2	--	--	7.36
4	20	200	17.33	5.73	0.033	197.0	5.03	118.1	--	--	7.36
5	25	200	17.42	5.72	0.034	195.8	5.60	82.5	--	--	7.36
6	30	200	17.29	5.74	0.034	194.0	5.74	56.7	--	--	7.36
7	35	200	17.44	5.79	0.034	192.1	5.81	41.9	--	--	7.36
8	40	200	17.47	5.79	0.034	191.7	6.05	29.5	--	--	7.36
9	45	200	17.52	5.81	0.034	191.1	5.93	26.0	--	--	7.36
10	50	200	17.47	5.76	0.034	195.6	5.90	18.2	--	--	7.36
11	55	200	17.57	5.79	0.034	195.7	5.92	17.1	--	--	7.36
12	60	200	17.62	5.82	0.034	193.2	5.91	18.7	--	--	7.36

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Anthony Shields

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-4, 10-29-2018, 1300

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1300 **End SampleTime:** 1310

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-5

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton, NJ

Weather Conditions: 54°F, Overcast **Sampling Date:** 10/29/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a.	Depth to LNAPL:	-- (ft)	b.	Depth to Water:	12.37 (ft)		
c.	Depth to DNAPL:	-- (ft)	d.	Total Well Depth:	19.79 (ft)		
e.	LNAPL Thickness: (a-b)	-- (ft)	f.	DNAPL Thickness: (c-d)	-- (ft)		
g.	Screen Interval:	9.79 - 19.79 (ft)	h.	Depth of Pump:	14.8 (ft)		

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1155 **End Purge Time:** 1240

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	150	16.42	6.93	0.905	-68.9	1.24	257.6	--	--	12.50
2	10	150	16.40	6.92	0.902	-93.3	0.43	228.0	--	--	12.51
3	15	150	16.43	6.92	0.897	-96.9	0.36	210.2	--	--	12.52
4	20	150	16.43	6.92	0.895	-98.1	0.30	165.4	--	--	12.52
5	25	150	16.44	6.92	0.895	-100.4	0.24	124.9	--	--	12.53
6	30	150	16.42	6.92	0.895	-102.4	0.21	91.1	--	--	12.55
7	35	150	16.42	6.92	0.899	-104.3	0.22	65.2	--	--	12.55
8	40	150	16.47	6.93	0.898	-105.6	0.20	54.2	--	--	12.57
9	45	150	16.47	6.93	0.898	-106.6	0.21	44.3	--	--	12.57
10	50	150	16.45	6.93	0.898	-107.6	0.21	39.0	--	--	12.58
11	55	150	16.46	6.93	0.898	-108.3	0.19	46.4	--	--	12.59
12	60	150	16.48	6.93	0.898	-109.1	0.18	34.1	--	--	12.59
13	65	150	16.46	6.93	0.899	-109.8	0.16	32.7	--	--	12.61
14	70	150	16.41	6.93	0.898	-109.3	0.17	31.8	--	--	12.62

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-5, 10-29-2018, 1310

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1310 **End SampleTime:** 1320

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN: None odor or sheen, clear.

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-6

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG - Mercer **Project Location:** Trenton, NJ

Weather Conditions: 56°F, Mostly Cloudy **Sampling Date:** 10/29/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** -- (ft) b. **Depth to Water:** 10.22 (ft)

c. **Depth to DNAPL:** -- (ft) d. **Total Well Depth:** 22.00 (ft)

e. **LNAPL Thickness:** (a-b) -- (ft) f. **DNAPL Thickness:** (c-d) -- (ft)

g. **Screen Interval:** 7.00 - 22.00 (ft) h. **Depth of Pump:** 15.0 (ft)

2. WELL PURGE DATA

a. **Purge Method:** QED Bladder Pump / MP50 Controller

b. **Field Testing Equipment:** YSI 650 w/ turbidity meter

e. **Begin Purge Time:** 1350 **End Purge Time:** 1455

Read No.	Lapse Time (min.)	Purge Rate mL/min	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
0	--	--	--	--	--	--	--	--	--	--	--
PURGING VALUES											
1	5	150	16.14	6.65	0.685	-23.1	0.64	225.9	--	--	10.40
2	10	150	15.93	6.60	0.714	-42.6	0.37	94.6	--	--	10.43
3	15	150	15.87	6.63	0.715	-46.2	0.33	60.7	--	--	10.43
4	20	150	15.83	6.65	0.712	-49.4	0.29	47.5	--	--	10.45
5	25	150	15.79	6.65	0.711	-51.0	0.26	41.3	--	--	10.45
6	30	150	15.82	6.64	0.709	-51.6	0.23	35.3	--	--	10.47
7	35	150	15.79	6.63	0.716	-52.1	0.19	35.1	--	--	10.47
8	40	150	15.76	6.63	0.724	-53.6	0.18	34.3	--	--	10.49
9	45	150	15.77	6.63	0.715	-53.9	0.17	33.2	--	--	10.50
10	50	150	15.78	6.63	0.717	-54.8	0.16	33.0	--	--	10.51
11	55	150	15.77	6.63	0.710	-56.0	0.16	31.2	--	--	10.52
12	60	150	15.75	6.63	0.710	-56.4	0.15	30.8	--	--	10.52

3. SAMPLE COLLECTION DATA **Sampling Personnel:** Casey Kincaid

Sampling Method(s) & Equip: Poly bladder and QED pump

Sample I.D. (Name, Date, Time): MW-6, 10-29-2018, 1500

Sample Analytical Parameters/Method: TDS, Ra 226 & Ra 228, Site-Spec Metals List, Chloride, Fluoride, Sulfate, and pH

Sample Start Time: 1500 **End SampleTime:** 1510

PID/FID READING(s) : Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-1

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG Mercer **Project Location:** Trenton NJ

Weather Conditions: 32F, partly cloudy **Sampling Date:** 12/6/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** --- (ft) b. **Depth to Water:** 12.99 (ft)

c. **Depth to DNAPL:** ---- (ft) d. **Total Well Depth:** 17 (ft)

e. **LNAPL Thickness:** (a-b) --- (ft) f. **DNAPL Thickness:** (c-d) --- (ft)

g. **Length of Water Column:** 4.01 (ft) (a-d)

h. **Well Volume:** 0.65 (gal)

2. WELL PURGE DATA

a. **Purge Method:** Low Flow

b. **Field Testing Equipment:** YSI 6920, QED Bladder pump

e. **Begin Purge Time:** 9:15 **End Purge Time:** 10:30

Read No.	Lapse Time (min.)	Purge Rate	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
---	---	---	---	---	---	---	---	---	---	---	---
PURGING VALUES											
1	5	150	13.26	6.73	2.291	76.8	4.26	21.8	---	---	13.20
2	10	150	13.75	6.80	2.325	61.5	4.39	12.6	---	---	13.25
3	15	150	13.97	6.80	2.343	58.0	4.75	11.3	---	---	13.25
4	20	150	13.96	6.86	2.349	55.7	4.1	9.2	---	---	13.25
5	25	150	13.95	6.87	2.350	55.1	4.13	8.7	---	---	13.28
6	30	150	14.09	6.73	2.361	54.8	3.79	9	---	---	13.30
7	35	150	14.10	6.81	2.368	55.5	3.48	8.2	---	---	13.30
8	40	150	14.00	6.8	2.368	56.1	3.34	8.1	---	---	13.30
9	45	150	14.08	6.76	2.367	56.8	3.37	8.1	---	---	13.30

3. SAMPLE COLLECTION DATA **Sampling Personnel:** RT

Sampling Method(s) & Equip: Low flow- QED bladder pump, poly bladder, MP50

Sample I.D. (Name, Date, Time): MW-1; 2018-12-06; 10:10

Sample Analytical Parameters/Method: TDS, Ra 226, Ra 228, Site Spec Metals List, Chloride, Fluoride, Sulfate, pH

Sample Start Time: 10:10 **End SampleTime:** 10:30

PID/FID READING(s): Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-2

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG Mercer **Project Location:** Trenton NJ

Weather Conditions: 33F, clear **Sampling Date:** 12/6/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** --- (ft) b. **Depth to Water:** 11.31 (ft)

c. **Depth to DNAPL:** ---- (ft) d. **Total Well Depth:** 16.00 (ft)

e. **LNAPL Thickness:** (a-b) --- (ft) f. **DNAPL Thickness:** (c-d) --- (ft)

g. **Length of Water Column:** 4.69 (ft) (a-d)

h. **Well Volume:** 0.77 (gal)

2. WELL PURGE DATA

a. **Purge Method:** Low Flow

b. **Field Testing Equipment:** YSI 6920, QED Bladder pump

e. **Begin Purge Time:** 9:19 **End Purge Time:**

Read No.	Lapse Time (min.)	Purge Rate	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
---	---	---	---	---	---	---	---	---	---	---	---
PURGING VALUES											
1	9:25	200	8.69	7.50	0.216	202.4	13.34	132.9	---	---	11.31
2	9:30	200	9.61	7.66	0.179	189.4	14.43	45.9	---	---	11.31
3	P:35	200	10.06	7.68	0.180	183.5	15.49	21.5	---	---	11.31
4	9:40	200	10.25	7.69	0.184	179.2	15.87	13.0	---	---	11.31
5	9:45	200	10.35	7.68	0.188	177.9	15.99	10.8	---	---	11.31
6	9:50	200	10.44	7.67	0.196	157.9	17.04	9.3	---	---	11.31
7	9:55	200	10.53	7.63	0.205	174.0	15.80	7.7	---	---	11.31
8	10:00	200	10.66	7.63	0.209	169.3	15.63	5.4	---	---	11.31
9	10:05	200	10.68	7.58	0.211	171.4	15.50	4.4	---	---	11.31

3. SAMPLE COLLECTION DATA **Sampling Personnel:** AS

Sampling Method(s) & Equip: Low flow- QED bladder pump, poly bladder, MP50

Sample I.D. (Name, Date, Time): ---

Sample Analytical Parameters/Method: TDS, Ra 226, Ra 228, Site Spec Metals List, Chloride, Fluoride, Sulfate, pH

Sample Start Time: 10:10 **End SampleTime:**

PID/FID READING(s): Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS: High DO, but stable

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-3

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG Mercer **Project Location:** Trenton NJ

Weather Conditions: **Sampling Date:** 12/6/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** --- (ft) b. **Depth to Water:** 7.85 (ft)

c. **Depth to DNAPL:** ---- (ft) d. **Total Well Depth:** 20 (ft)

e. **LNAPL Thickness:** (a-b) --- (ft) f. **DNAPL Thickness:** (c-d) --- (ft)

g. **Length of Water Column:** 12.15 (ft) (a-d)

h. **Well Volume:** 1.98 (gal)

2. WELL PURGE DATA

a. **Purge Method:** Low Flow

b. **Field Testing Equipment:** YSI 6920, QED Bladder pump

e. **Begin Purge Time:** 12:12 **End Purge Time:**

Read No.	Lapse Time (min.)	Purge Rate	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
---	---	---	---	---	---	---	---	---	---	---	---
PURGING VALUES											
1	1220	200	10.79	6.69	0.404	52.1	4.62	1227	---	---	7.85
2	1225	200	11.37	6.56	0.449	40.2	1.9	1233	---	---	7.85
3	1230	200	11.86	6.66	0.474	7.9	1.21	1238	---	---	7.85
4	1235	200	11.83	6.67	0.515	3.8	0.97	898	---	---	7.85
5	1240	200	11.7	6.71	0.546	-1.9	0.92	236.8	---	---	7.85
6	1245	200	11.69	6.69	0.564	-5.7	0.82	225.1	---	---	7.85
7	1250	200	11.72	6.71	0.572	-11.4	0.85	160.8	---	---	7.85
8	1255	200	11.73	6.71	0.593	-17.4	0.74	106.8	---	---	7.85
9	1300	200	11.72	6.72	0.612	-20.9	0.68	89.1	---	---	7.85
10	1305	200	11.73	6.73	0.630	-24.3	0.73	58.2	---	---	7.85
11	1310	200	11.71	6.73	0.649	-27.8	0.57	52.1	---	---	7.85
12	1315	200	11.68	6.75	0.663	-31.3	0.51	33.8	---	---	7.85
13	1320	200	11.62	6.76	0.669	-30.8	0.47	32.5	---	---	7.85
14	1325	200	11.63	6.74	0.671	-30.7	0.50	32.9	---	---	7.85

3. SAMPLE COLLECTION DATA **Sampling Personnel:** AS

Sampling Method(s) & Equip: Low flow- QED bladder pump, poly bladder, MP50

Sample I.D. (Name, Date, Time): MW-3; 2018-12-06; 13:30

Sample Analytical Parameters/Method: TDS, Ra 226, Ra 228, Site Spec Metals List, Chloride, Fluoride, Sulfate, pH

Sample Start Time: 13:30 **End SampleTime:**

PID/FID READING(s): Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-4

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG Mercer **Project Location:** Trenton NJ

Weather Conditions: **Sampling Date:** 12/6/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. **Depth to LNAPL:** --- (ft) b. **Depth to Water:** 5.49 (ft)

c. **Depth to DNAPL:** ---- (ft) d. **Total Well Depth:** 13.00 (ft)

e. **LNAPL Thickness:** (a-b) --- (ft) f. **DNAPL Thickness:** (c-d) --- (ft)

g. **Length of Water Column:** 7.51 (ft) (a-d)

h. **Well Volume:** 1.23 (gal)

2. WELL PURGE DATA

a. **Purge Method:** Low Flow

b. **Field Testing Equipment:** YSI 6920, QED Bladder pump

e. **Begin Purge Time:** **10:58** **End Purge Time:**

Read No.	Lapse Time (min.)	Purge Rate	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
---	---	---	---	---	---	---	---	---	---	---	---
PURGING VALUES											
1	1045	200	7.92	6.58	0.031	148.9	7.57	260.8	---	---	5.49
2	1050	200	7.69	6.05	0.028	156.5	7.14	163.6	---	---	5.49
3	1055	200	7.48	5.96	0.027	167.1	7.43	167.2	---	---	5.49
4	1100	200	7.41	5.90	0.027	171.9	8.00	82.6	---	---	5.49
5	1105	200	7.28	5.87	0.026	174.6	8.07	64.3	---	---	5.49
6	1110	200	7.28	5.86	0.026	174.7	8.32	50.9	---	---	5.49
7	1115	200	7.26	5.85	0.026	175.2	8.17	45.6	---	---	5.49
8	1120	200	7.28	5.82	0.025	174.7	7.72	40.8	---	---	5.49
9	1125	200	7.22	5.87	0.025	172.4	7.67	40.4	---	---	5.49
10	1130	200	7.30	5.84	0.025	171.3	8.02	39.0	---	---	5.49

3. SAMPLE COLLECTION DATA **Sampling Personnel:** AS

Sampling Method(s) & Equip: Low flow- QED bladder pump, poly bladder, MP50

Sample I.D. (Name, Date, Time): MW-4; 2018-12-06; 11:35

Sample Analytical Parameters/Method: TDS, Ra 226, Ra 228, Site Spec Metals List, Chloride, Fluoride, Sulfate, pH

Sample Start Time: 11:35 **End SampleTime:**

PID/FID READING(s): Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-5

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG Mercer **Project Location:** Trenton NJ

Weather Conditions: 35F, partly cloudy **Sampling Date:** 12/6/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. Depth to LNAPL: --- (ft) **b.** Depth to Water: 11.92 (ft)

c. Depth to DNAPL: ---- (ft) **d.** Total Well Depth: 20.00 (ft)

e. LNAPL Thickness: (a-b) --- (ft) **f.** DNAPL Thickness: (c-d) --- (ft)

g. Length of Water Column: 8.08 (ft) (a-d)

h. Well Volume: 1.32 (gal)

2. WELL PURGE DATA

a. Purge Method: Low Flow

b. Field Testing Equipment: YSI 6920, QED Bladder pump

e. Begin Purge Time: 10:40 End Purge Time: 12:55

Read No.	Lapse Time (min.)	Purge Rate	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
---	---	---	---	---	---	---	---	---	---	---	---
PURGING VALUES											
1	5	200	13.71	7.02	1.274	17.4	2.41	555.1	---	---	12.21
2	10	200	13.92	8.06	1.279	15.1	2.19	510.1	---	---	12.20
3	15	200	13.92	6.96	1.297	4.7	2.95	256	---	---	12.20
4	20	200	14.41	6.99	1.299	3.0	1.87	189.9	---	---	12.20
5	25	200	41.32	7.01	1.298	2.9	1.89	181	---	---	12.20
6	30	200	14.58	6.99	1.307	-2.2	2.63	114.7	---	---	12.20
7	35	200	14.59	6.99	1.307	-4.7	1.51	90.1	---	---	12.20
8	40	200	14.51	7.00	1.310	-6.9	1.37	75.8	---	---	12.20
9	45	200	14.53	7.00	1.310	-8.6	1.20	63	---	---	12.20
10	50	200	14.64	7.01	1.314	-10.7	1.20	54.2	---	---	12.20
11	55	200	14.53	7.00	1.311	-12.6	1.14	43.9	---	---	12.20
12	60	200	14.44	7.00	1.308	-13.9	1.09	42.2	---	---	12.20
13	65	200	14.38	7.00	1.306	-15.2	1.10	33.1	---	---	12.20
14	70	200	14.38	7.00	1.307	-16.5	1.22	30.3	---	---	12.20
15	75	200	14.83	6.99	1.324	-17.7	0.85	27	---	---	12.20
16	80	200	15.19	6.99	1.338	-20.0	1.11	24.5	---	---	12.20
17	85	200	15.07	7.00	1.332	-21.3	1.08	20.5	---	---	12.20
18	90	200	14.96	6.99	1.328	-22.3	0.91	17.4	---	---	12.20
19	95	200	14.75	6.97	1.319	-23.0	0.86	16.4	---	---	12.20
20	100	200	14.75	6.97	1.317	-24.2	1.32	15.4	---	---	12.20
21	105	200	14.71	6.97	1.316	-24.9	0.90	13.5	---	---	12.20
22	110	200	14.58	6.96	1.311	-25.8	0.87	12.5	---	---	12.20
23	115	200	14.57	6.96	1.310	-26.4	0.95	12.6	---	---	12.20

3. SAMPLE COLLECTION DATA

Sampling Personnel: RT

Sampling Method(s) & Equip: Low flow- QED bladder pump, poly bladder, MP50

Sample I.D. (Name, Date, Time): MW-5; 2015-12-06; 12:40

Sample Analytical Parameters/Method: TDS, Ra 226, Ra 228, Site Spec Metals List, Chloride, Fluoride, Sulfate, pH

Sample Start Time: 12:40 **End SampleTime:** 12:55

PID/FID READING(s): Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

GEI Consultants

LOW-FLOW GROUNDWATER SAMPLE COLLECTION RECORD

WELL NO.: MW-6

PERMIT NO.:

Project No.: 1504710 **Client:** PSEG

Project Name: PSEG Mercer **Project Location:** Trenton NJ

Weather Conditions: 38F, mostly cloudy **Sampling Date:** 12/6/2018

1. WATER LEVEL DATA (measured from top of inner well casing)

a. Depth to LNAPL: --- (ft) **b. Depth to Water:** 8.95 (ft)

c. Depth to DNAPL: ---- (ft) **d. Total Well Depth:** 19 (ft)

e. LNAPL Thickness: (a-b) --- (ft) **f. DNAPL Thickness:** (c-d) --- (ft)

g. Length of Water Column: 10.05 (ft) (a-d)

h. Well Volume: 1.64 (gal)

2. WELL PURGE DATA

a. Purge Method: Low Flow

b. Field Testing Equipment: YSI 6920, QED Bladder pump

e. Begin Purge Time: 13:15 **End Purge Time:** 14:35

Read No.	Lapse Time (min.)	Purge Rate	Temp (deg. C) (±3%)	pH (s.u.) (±0.1)	Spec. Cond. (ms/cm) (±3%)	Eh/ORP (mV) (±10mV)	Diss O2 (mg/L) (±10%)	TURB (NTU) (±10%)	Salinity %	TDS G/L	Water Level (<0.3 ft)
CORRECTION FACTORS											
---	---	---	---	---	---	---	---	---	---	---	---
PURGING VALUES											
1	5	200	11.60	6.74	0.610	43.9	1.25	225.5	---	---	9.00
2	10	200	11.87	6.68	0.664	45.6	1.18	144.3	---	---	9.03
3	15	200	12.07	6.65	0.749	46.2	0.92	89.6	---	---	8.97
4	20	200	12.13	6.66	0.808	45.1	0.96	52.1	---	---	8.95
5	25	200	12.10	6.65	0.839	44.2	0.92	40.1	---	---	8.95
6	30	200	12.25	6.66	0.856	42.8	0.84	30.9	---	---	8.99
7	35	200	12.22	6.66	0.882	41.3	0.85	22.9	---	---	8.95
8	40	200	12.18	6.66	0.903	40.5	0.78	18.1	---	---	8.95
9	45	200	12.24	6.65	0.913	40.0	0.77	16.2	---	---	8.95
10	50	200	12.26	6.66	0.929	39.2	0.78	14.6	---	---	8.95
11	55	200	12.28	6.68	0.941	38.0	0.84	14.7	---	---	8.95
12	60	200	12.32	6.66	0.958	37.3	0.79	14.1	---	---	8.95

3. SAMPLE COLLECTION DATA **Sampling Personnel:** RT

Sampling Method(s) & Equip: Low flow- QED bladder pump, poly bladder, MP50

Sample I.D. (Name, Date, Time): ---

Sample Analytical Parameters/Method: TDS, Ra 226, Ra 228, Site Spec Metals List, Chloride, Fluoride, Sulfate, pH

Sample Start Time: 14:20 **End SampleTime:** 14:35

PID/FID READING(s): Not Measured **PID/FID Model & Ionization Potential** Not Measured

ODOR/SHEEN:

COMMENTS:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer	Monitoring Well:	MW-2	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	1/30/18	Equipment Make/Model:	YSI 6820	Depth to Water:	11.71 feet (from top of casing)
Field Personnel:	Tristan Morgan			Total Depth of Well:	19.1 feet (from top of casing)
Weather:	Sunny, 16F	Equipment Serial #:	02A0931AA	Pump Intake:	14 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	930	4.21	X	7.39	X	177.30	X	0.160	X	28.7	X	11.10	X	Yellow	Clear	11.74	200
1	935	4.24	0.71%	7.41	0.02	175.20	2.1	0.149	6.88%	22.4	21.95%	11.68	5.23%	Yellow	Clear	11.74	200
2	940	4.25	0.95%	7.43	0.04	171.60	5.7	0.148	8.11%	16.7	71.86%	12.31	10.90%	Yellow	Clear	11.74	200
3	945	5.43	28.07%	7.45	0.04	150.30	24.9	0.121	23.14%	8.2	173.17%	12.80	9.59%	Yellow	Clear	11.74	200
4	950	5.64	32.71%	7.60	0.17	142.10	29.5	0.120	23.33%	7.6	119.74%	12.71	3.98%	Yellow	Clear	11.74	200
5	955	5.75	5.89%	7.61	0.16	138.50	11.8	0.120	0.83%	6.9	18.84%	12.67	1.03%	Yellow	Clear	11.74	200
6	1000	5.82	3.19%	7.60	0.01	136.20	5.9	0.120	0.00%	5.2	46.15%	12.49	1.76%	Yellow	Clear	11.74	200
7	1005	5.91	2.78%	7.60	0.01	134.80	3.7	0.120	0.00%	4.7	46.81%	12.47	1.60%	Yellow	Clear	11.74	200
8																	
9																	
10																	
11																	
12																	
13																	
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*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	930	Purge End Time:	1005
Total Purge Volume (L):	8	Total Purge Time:	40 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	200

Sample Start Time:	1005	Sample End Time:	1045
Sampling Method:	Bladder Pump	Total Sampling Time:	40 Minutes

Observations: Turbidity under 10 for three readings was considered stable.

Sampling Technician: Tristan Morgan Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer	Monitoring Well:	MW-5	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	1/30/19	Equipment Make/Model:	YSI 6820	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Tristan Morgan			Depth to Water:	12.11 feet (from top of casing)
Weather:	Sunny, 20F	Equipment Serial #:	02A0931AA	Pump Intake:	15 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	1120	11.59	X	6.74	X	121.30	X	0.885	X	77.4	X	6.53	X	Yellow	S.Turb.	11.75	225
1	1125	11.55	0.35%	6.71	0.03	117.80	3.5	0.885	0.00%	79.7	2.97%	4.94	24.35%	Yellow	S.Turb.	11.89	225
2	1130	11.54	0.43%	6.69	0.05	112.20	9.1	0.885	0.00%	102.2	32.04%	4.23	54.37%	Yellow	S.Turb.	11.97	225
3	1135	11.68	1.21%	6.67	0.04	89.50	28.3	0.888	0.34%	136.8	71.64%	3.98	24.12%	Yellow	S.Turb.	12.11	225
4	1140	11.56	1.21%	6.70	0.03	55.60	56.6	0.886	0.34%	121.2	33.86%	4.22	6.28%	Yellow	S.Turb.	12.08	225
5	1145	11.54	1.21%	6.72	0.05	53.90	35.6	0.887	0.23%	120.1	13.91%	4.22	6.03%	Yellow	S.Turb.	12.05	225
6	1150	11.27	2.57%	6.72	0.02	50.20	5.4	0.888	0.23%	111.7	8.50%	3.97	6.30%	Yellow	S.Turb.	12.01	225
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*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	1120	Purge End Time:	1150
Total Purge Volume (L):	6.75	Total Purge Time:	30 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	225

Sample Start Time:	1150	Sample End Time:	1210
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Tristan Morgan Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD- Mercer County	Monitoring Well:	MW-1	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	01/30/2019	Equipment Make/Model:	Horiba U-52	Depth to Water:	14.50 feet (from top of casing)
Field Personnel:	Greg Mayer			Total Depth of Well:	16 feet (from top of casing)
Weather:	Cloudy, 20F	Equipment Serial #:	00J0695AA	Pump Intake:	9 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	11:50	7.72	X	6.90	X	176.50	X	1.809	X	99.2	X	7.93	X	Clear	Clear	14.50	150
1	11:55	8.12	5.18%	6.76	0.14	163.90	12.6	1.804	0.28%	87.2	12.10%	6.26	21.06%	Clear	Clear	14.52	150
2	12:00	8.54	10.62%	6.64	0.26	153.60	22.9	1.802	0.39%	76.2	30.18%	6.26	26.68%	Clear	Clear	14.54	150
3	12:05	8.52	5.17%	6.62	0.14	151.20	12.7	1.801	0.17%	66.5	31.13%	6.26	0.00%	Clear	Clear	14.57	150
4	12:10	8.50	0.47%	6.60	0.04	150.20	3.4	1.800	0.11%	62.1	22.71%	6.26	0.00%	Clear	Clear	14.62	150
5	12:15	8.49	0.35%	6.57	0.05	145.90	5.3	1.799	0.11%	50.1	32.73%	6.26	0.00%	Clear	Clear	14.65	150
6	12:20	8.49	0.12%	6.56	0.04	144.50	5.7	1.799	0.06%	46.8	32.69%	6.26	0.00%	Clear	Clear	14.69	150
7	12:25	8.49	0.00%	6.55	0.02	143.00	2.9	1.798	0.06%	46.5	7.74%	6.27	0.16%	Clear	Clear	14.75	150
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*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	11:50	Purge End Time:	12:25
Total Purge Volume (L):	5.25	Total Purge Time:	35 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	150

Sample Start Time:	12:25	Sample End Time:	12:50
Sampling Method:	Bladder Pump	Total Sampling Time:	25 Minutes

Observations:

Sampling Technician: Greg Mayer Signature: Greg Mayer

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD- Mercer County	Monitoring Well:	MW-3	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	01/30/2019	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Greg Mayer			Depth to Water:	8.05 feet (from top of casing)
Weather:	Cloudy, 20F	Equipment Serial #:	00J0695AA	Pump Intake:	14 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	13:35	8.14	X	7.36	X	114.60	X	0.378	X	114.0	X	7.22	X	Clear	Clear	8.05	200
1	13:40	8.25	1.35%	7.30	0.06	109.50	5.1	0.354	6.35%	51.5	54.82%	6.20	14.13%	Clear	Clear	8.10	200
2	13:45	8.38	2.95%	7.25	0.11	105.40	9.2	0.334	13.17%	42.5	168.24%	5.02	43.82%	Clear	Clear	8.15	200
3	13:50	8.55	3.64%	7.21	0.09	100.20	9.3	0.321	10.28%	31.8	61.95%	4.78	29.71%	Clear	Clear	8.21	200
4	13:55	8.95	6.80%	7.00	0.25	95.50	9.9	0.315	6.03%	16.7	154.49%	4.15	20.96%	Clear	Clear	8.28	200
5	14:00	9.06	5.96%	6.78	0.43	94.20	6	0.305	5.25%	12.4	156.45%	3.78	26.46%	Clear	Clear	8.33	200
6	14:05	9.15	2.23%	6.68	0.32	93.10	2.4	0.294	7.14%	10.5	59.05%	3.01	37.87%	Clear	Clear	8.39	200
7	14:10	9.35	3.20%	6.48	0.3	90.41	3.79	0.291	4.81%	7.9	56.96%	2.22	70.27%	Clear	Clear	8.42	200
8	14:15	9.49	3.72%	6.44	0.24	88.40	4.7	0.287	2.44%	7.4	41.89%	2.13	41.31%	Clear	Clear	8.48	200
9	14:20	9.63	2.99%	6.39	0.09	86.90	3.51	0.284	2.46%	7.2	9.72%	2.08	6.73%	Clear	Clear	8.54	200
10																	
11																	
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*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	13:35	Purge End Time:	14:20
Total Purge Volume (L):	9	Total Purge Time:	45 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	200

Sample Start Time:	14:20	Sample End Time:	14:45
Sampling Method:	Bladder Pump	Total Sampling Time:	Minutes

Observations:

Sampling Technician: Greg Mayer Signature: Greg Mayer

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer	Monitoring Well:	MW-6	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	1/30/19	Equipment Make/Model:	YSI 6820	Total Depth of Well:	21.80 feet (from top of casing)
Field Personnel:	Tristan Morgan			Depth to Water:	9.42 feet (from top of casing)
Weather:	Sunny, 23F	Equipment Serial #:	02A0931AA	Pump Intake:	13 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	1400	8.25	X	6.25	X	57.30	X	0.340	X	48.1	X	5.12	X	Yellow	Clear	9.43	225
1	1405	8.42	2.06%	6.37	0.12	46.70	10.6	0.366	7.65%	46.4	3.53%	3.21	37.30%	Yellow	Clear	9.44	225
2	1410	8.71	5.58%	6.42	0.17	41.40	15.9	0.370	8.82%	47.3	3.66%	3.24	59.50%	Yellow	Clear	9.45	225
3	1415	8.85	5.11%	6.48	0.11	35.80	10.9	0.386	5.46%	43.8	7.99%	3.55	10.59%	Yellow	Clear	9.45	225
4	1420	8.83	1.61%	6.50	0.08	32.80	8.6	0.391	5.68%	39.5	19.75%	3.66	12.96%	Yellow	Clear	9.45	225
5	1425	8.88	0.57%	6.52	0.04	31.30	4.5	0.403	4.40%	31.2	40.38%	3.49	4.87%	Yellow	Clear	9.45	225
6	1430	8.86	0.57%	6.54	0.04	29.80	3	0.418	6.91%	23.9	65.27%	3.76	7.74%	Yellow	Clear	9.45	225
7	1435	8.98	1.35%	6.54	0.02	28.20	3.1	0.425	5.46%	24.4	30.54%	3.67	7.74%	Yellow	Clear	9.45	225
8	1440	8.89	1.35%	6.57	0.03	26.00	3.8	0.420	1.67%	23.4	4.27%	3.85	4.90%	Yellow	Clear	9.45	225
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14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	1400	Purge End Time:	1440
Total Purge Volume (L):	9	Total Purge Time:	40 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	225

Sample Start Time:	1440	Sample End Time:	1515
Sampling Method:	Bladder Pump	Total Sampling Time:	35 Minutes

Observations: Snow Squal hit during sampling, had to wait for wind to die down to continue.

Sampling Technician: Tristan Morgan Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer	Monitoring Well:	MW-4	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	1/30/19	Equipment Make/Model:	YSI 6820	Total Depth of Well:	16.00 feet (from top of casing)
Field Personnel:	Tristan Morgan			Depth to Water:	6.14 feet (from top of casing)
Weather:	Sunny, 22F	Equipment Serial #:	02A0931AA	Pump Intake:	9 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	1230	5.88	X	7.74	X	19.20	X	0.039	X	90.1	X	5.99	X	Yellow	S.Turb.	6.17	225
1	1235	5.81	1.19%	7.46	0.28	22.10	2.9	0.034	12.82%	85.6	5.02%	5.57	7.01%	Yellow	emi Turbi	6.19	225
2	1240	5.78	1.73%	7.03	0.71	34.20	15	0.028	39.29%	74.6	20.80%	5.49	9.11%	Yellow	emi Turbi	6.20	225
3	1245	5.49	5.83%	6.51	0.95	46.90	24.8	0.025	36.00%	57.4	49.13%	4.69	18.76%	Yellow	emi Turbi	6.19	225
4	1250	5.28	9.47%	6.11	0.92	47.30	13.1	0.024	16.67%	45.9	62.53%	4.31	27.38%	Yellow	Clear	6.17	225
5	1255	5.19	5.78%	5.89	0.62	45.10	2.2	0.023	8.70%	34.1	68.33%	3.97	18.14%	Yellow	Clear	6.17	225
6	1300	5.15	2.52%	5.84	0.27	41.60	5.7	0.023	4.35%	32.8	39.94%	3.86	11.66%	Yellow	Clear	6.17	225
7	1305	5.08	2.17%	5.81	0.08	41.80	3.5	0.023	0.00%	32.0	6.56%	3.66	8.47%	Yellow	Clear	6.17	225
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*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	1230	Purge End Time:	1305
Total Purge Volume (L):	7.875	Total Purge Time:	35 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	225

Sample Start Time:	1305	Sample End Time:	1325
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Tristan Morgan Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD - Mercer	Monitoring Well:	MW-2	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	3/20/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	19.10 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	12.25 feet (from top of casing)
Weather:	Sunny, 30F	Equipment Serial #:	YD008XGK	Pump Intake:	14 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	9:45	9.99	X	6.94	X	84.00	X	0.139	X	45.5	X	0.00	X	Clear	Clear	12.35	250
1	9:50	9.89	1.00%	6.46	0.48	121.00	37	0.226	62.59%	9.9	78.24%	0.00	0.00%	Clear	Clear	12.30	250
2	9:55	9.96	1.01%	6.46	0.48	129.00	45	0.229	64.75%	7.9	475.95%	0.00	0.00%	Clear	Clear	12.30	250
3	10:00	10.09	2.02%	6.45	0.01	140.00	19	0.230	1.77%	4.7	110.64%	0.00	0.00%	Clear	Clear	12.30	250
4	10:05	10.23	2.71%	6.43	0.03	142.00	13	0.234	2.18%	0.7	1028.57%	0.00	0.00%	Clear	Clear	12.30	250
5	10:10	10.26	1.68%	6.42	0.03	147.00	7	0.236	2.61%	0.0	0.00%	0.00	0.00%	Clear	Clear	12.30	250
6	10:15	10.41	1.76%	6.40	0.03	149.00	7	0.237	1.28%	0.0	0.00%	0.00	0.00%	Clear	Clear	12.30	250
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*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	9:45	Purge End Time:	10:15
Total Purge Volume (L):	7.5	Total Purge Time:	30 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	250

Sample Start Time:	10:15	Sample End Time:	10:35
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

Groundwater Purge Data Sheet

Sheet _____ of _____

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD - Mercer	Monitoring Well:	MW-1	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	3/20/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	14.25 feet (from top of casing)
Weather:	Sunny, 30F	Equipment Serial #:	YD008XGK	Pump Intake:	17 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	11:15	13.47	X	6.65	X	-16.00	X	0.546	X	1000+	X	2.75	X	Brown	Turbid	14.15	150
1	11:20	12.20	9.43%	6.67	0.02	-50.00	34	0.576	5.49%	555.0	#VALUE!	0.00	100.00%	Brown	Semi Turbid	14.25	150
2	11:25	11.97	12.53%	6.68	0.03	-67.00	51	0.581	6.41%	220.0	152.27%	0.00	0.00%	Brown	Semi Turbid	14.25	200
3	11:30	11.89	2.61%	6.68	0.01	-75.00	25	0.583	1.22%	97.9	466.91%	0.00	0.00%	Brown	Semi Turbid	14.25	200
4	11:35	11.93	0.67%	6.68	0	-79.00	12	0.582	0.34%	42.6	416.43%	0.00	0.00%	Brown	Semi Turbid	14.25	200
5	11:40	11.99	0.84%	6.69	0.01	-80.00	5	0.580	0.52%	26.3	272.24%	0.00	0.00%	Clear	Semi Turbid	14.25	200
6	11:45	11.96	0.50%	6.70	0.02	-81.00	2	0.578	0.69%	15.4	176.62%	0.00	0.00%	Clear	Clear	14.25	200
7	11:50	11.98	0.25%	6.69	0.01	-81.00	1	0.576	0.69%	9.4	179.79%	0.00	0.00%	Clear	Clear	14.25	200
8	11:55	11.87	0.93%	6.65	0.05	-79.00	2	0.576	0.35%	4.2	266.67%	0.00	0.00%	Clear	Clear	14.25	200
9	12:00	11.90	0.93%	6.68	0.04	-79.00	2	0.576	0.00%	0.0	0.00%	0.00	0.00%	Clear	Clear	14.25	200
10																	
11																	
12																	
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	11:15	Purge End Time:	12:00
Total Purge Volume (L):	9	Total Purge Time:	45 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	200

Sample Start Time:	12:00	Sample End Time:	12:20
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature: _____

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD - Mercer	Monitoring Well:	MW-5	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	3/20/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	13.15 feet (from top of casing)
Weather:	Sunny, 55F	Equipment Serial #:	YD008XGK	Pump Intake:	15 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	13:00	12.88	X	6.92	X	-85.00	X	0.346	X	92.5	X	0.00	X	Clear	Clear	13.10	150
1	13:05	12.86	0.16%	6.89	0.03	-101.00	16	0.347	0.29%	67.5	27.03%	0.00	0.00%	Clear	Clear	13.10	175
2	13:10	12.96	0.78%	6.99	0.1	-103.00	18	0.344	0.87%	57.0	62.28%	0.00	0.00%	Clear	Clear	13.10	200
3	13:15	12.99	1.01%	6.99	0.1	-100.00	3	0.345	0.87%	41.6	62.26%	0.00	0.00%	Clear	Clear	13.10	225
4	13:20	12.98	0.23%	6.99	0	-99.00	4	0.338	2.07%	12.4	359.68%	0.00	0.00%	Clear	Clear	13.10	225
5	13:25	13.06	0.62%	7.01	0.02	-99.00	1	0.346	2.37%	10.2	307.84%	0.00	0.00%	Clear	Clear	13.10	225
6	13:30	13.10	0.92%	7.00	0.02	-98.00	1	0.341	2.37%	9.8	26.53%	0.00	0.00%	Clear	Clear	13.10	225
7	13:35	13.10	0.31%	6.99	0.02	-96.00	3	0.351	2.93%	9.3	9.68%	0.00	0.00%	Clear	Clear	13.10	225
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	13:00	Purge End Time:	13:35
Total Purge Volume (L):	7.875	Total Purge Time:	35 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	225

Sample Start Time:	13:35	Sample End Time:	13:55
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD - Mercer	Monitoring Well:	MW-4	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	3/20/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	16.00 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	6.8 feet (from top of casing)
Weather:	Partly Cloudy, 50F	Equipment Serial #:	YD008XGK	Pump Intake:	9 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	14:25	10.80	X	6.81	X	18.00	X	0.015	X	23.5	X	3.10	X	Clear	Clear	6.80	225
1	14:30	9.79	9.35%	5.71	1.1	134.00	116	0.013	13.33%	9.3	60.43%	0.00	100.00%	Clear	Clear	6.80	250
2	14:35	9.49	13.80%	5.53	1.28	169.00	151	0.013	15.38%	0.0	0.00%	0.00	0.00%	Clear	Clear	6.80	250
3	14:40	9.41	4.04%	5.49	0.22	182.00	48	0.013	0.00%	0.0	0.00%	0.00	0.00%	Clear	Clear	6.80	250
4	14:45	9.37	1.28%	5.48	0.05	197.00	28	0.012	8.33%	0.0	0.00%	0.00	0.00%	Clear	Clear	6.80	250
5	14:50	9.34	0.75%	5.47	0.02	196.00	15	0.012	8.33%	0.0	0.00%	0.00	0.00%	Clear	Clear	6.80	250
6	14:55	9.29	0.86%	5.47	0.01	199.00	3	0.012	0.00%	0.0	0.00%	0.00	0.00%	Clear	Clear	6.80	250
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	14:25	Purge End Time:	14:55
Total Purge Volume (L):	7.5	Total Purge Time:	30 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	250

Sample Start Time:	14:55	Sample End Time:	15:15
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD - Mercer	Monitoring Well:	MW-6	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	3/20/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	21.80 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	10.2 feet (from top of casing)
Weather:	Sunny, 48F	Equipment Serial #:	YD008XGK	Pump Intake:	13 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	15:50	11.28	X	6.44	X	167.00	X	0.103	X	26.9	X	0.00	X	Clear	Clear	10.25	225
1	15:55	10.26	9.04%	6.51	0.07	122.00	45	0.106	2.91%	21.7	19.33%	0.00	0.00%	Clear	Clear	10.25	225
2	16:00	9.91	13.82%	6.56	0.12	109.00	58	0.108	4.85%	2.7	896.30%	0.00	0.00%	Clear	Clear	10.25	225
3	16:05	9.76	5.12%	6.59	0.08	96.00	26	0.113	6.60%	0.0	0.00%	0.00	0.00%	Clear	Clear	10.25	225
4	16:10	9.72	1.95%	6.59	0.03	87.00	22	0.120	11.11%	0.0	0.00%	0.00	0.00%	Clear	Clear	10.25	225
5	16:15	9.59	1.77%	6.60	0.01	86.00	10	0.123	8.85%	0.0	0.00%	0.00	0.00%	Clear	Clear	10.25	225
6	16:20	9.49	2.42%	6.59	0.01	78.00	9	0.123	2.50%	0.0	0.00%	0.00	0.00%	Clear	Clear	10.25	225
7																	
8																	
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12																	
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	15:50	Purge End Time:	16:20
Total Purge Volume (L):	6.75	Total Purge Time:	30 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	225

Sample Start Time:	16:20	Sample End Time:	16:40
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	WCD - Mercer	Monitoring Well:	MW-3	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	3/21/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	8.3 feet (from top of casing)
Weather:	Rain, 42F	Equipment Serial #:	YD008XGK	Pump Intake:	14 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	9:55	9.08	X	6.17	X	106.00	X	0.067	X	18.9	X	6.36	X	Clear	Clear	8.30	175
1	10:00	8.91	1.87%	6.24	0.07	114.00	8	0.066	1.49%	10.7	43.39%	2.63	58.65%	Clear	Clear	8.30	225
2	10:05	8.87	2.37%	6.26	0.09	125.00	19	0.066	1.52%	5.3	256.60%	1.78	257.30%	Clear	Clear	8.30	225
3	10:10	8.82	1.02%	6.28	0.04	131.00	17	0.066	0.00%	3.8	181.58%	1.32	99.24%	Clear	Clear	8.30	225
4	10:15	8.82	0.57%	6.29	0.03	136.00	11	0.067	1.52%	0.8	562.50%	1.11	60.36%	Clear	Clear	8.30	225
5	10:20	8.76	0.68%	6.29	0.01	140.00	9	0.067	1.52%	0.0	0.00%	1.09	21.10%	Clear	Clear	8.30	225
6	10:25	8.73	1.03%	6.30	0.01	145.00	9	0.067	0.00%	0.0	0.00%	1.05	5.71%	Clear	Clear	8.30	225
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14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	9:55	Purge End Time:	10:25
Total Purge Volume (L):	6.75	Total Purge Time:	30 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	225

Sample Start Time:	10:25	Sample End Time:	10:45
Sampling Method:	Bladder Pump	Total Sampling Time:	20 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer Generating Station	Monitoring Well:	MW-2	PID Reading:	- ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	4/3/19	Equipment Make/Model:	Horiba U-52	Depth to Water:	12.34 feet (from top of casing)
Field Personnel:	Tristan Morgan			Total Depth of Well:	19.1 feet (from top of casing)
Weather:	Sunny, 46F	Equipment Serial #:	R91VKTH5	Pump Intake:	14 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	8:55	10.57	X	8.51	X	89.00	X	0.861	X	150.0	X	0.00	X	Clear	S.Turb.	12.39	150
1	9:00	10.36	1.99%	8.21	0.3	100.00	11	0.843	2.09%	129.0	14.00%	0.00	0.00%	Clear	Semi Turbid	12.39	150
2	9:05	10.45	2.03%	7.22	1.29	139.00	50	0.818	5.26%	63.0	138.10%	0.00	0.00%	Clear	Semi Turbid	12.39	150
3	9:10	10.47	1.06%	7.03	1.18	180.00	80	0.816	3.31%	25.8	400.00%	0.00	0.00%	Clear	Clear	12.39	150
4	9:15	10.61	1.53%	6.98	0.24	199.00	60	0.814	0.49%	6.0	950.00%	0.00	0.00%	Clear	Clear	12.39	150
5	9:20	10.71	2.29%	6.98	0.05	201.00	21	0.811	0.62%	5.6	360.71%	0.00	0.00%	Clear	Clear	12.39	150
6	9:25	10.90	2.73%	6.95	0.03	208.00	9	0.808	0.74%	5.8	7.14%	0.00	0.00%	Clear	Clear	12.39	150
7																	
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13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	8:55	Purge End Time:	9:25
Total Purge Volume (L):	4.5	Total Purge Time:	30 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	150

Sample Start Time:	9:25	Sample End Time:	10:25
Sampling Method:	Bladder Pump	Total Sampling Time:	60 Minutes

Observations:

Sampling Technician: Tristan Morgan Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer Generating Station	Monitoring Well:	MW-1	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	4/3/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	14 feet (from top of casing)
Weather:	Sunny, 46F	Equipment Serial #:	GWUWF40R	Pump Intake:	17 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	9:20	11.79	X	7.04	X	33.00	X	2.020	X	1000.0	X	0.00	X	Brown	Turbid	14.15	125
1	9:25	11.61	1.53%	6.88	0.16	93.00	60	1.760	12.87%	1000.0	0.00%	0.00	#DIV/0!	Brown	Turbid	14.20	175
2	9:30	11.63	1.55%	6.98	0.16	27.00	66	1.710	18.13%	1000.0	0.00%	0.00	0.00%	Brown	Turbid	14.25	200
3	9:35	11.81	1.72%	7.03	0.15	19.00	74	1.700	3.53%	1000.0	0.00%	6.13	0.00%	Brown	Turbid	14.25	200
4	9:40	11.69	1.55%	7.11	0.13	0.00	27	1.700	0.59%	1000.0	0.00%	7.30	0.00%	Brown	Turbid	14.25	200
5	9:45	11.78	1.03%	7.11	0.08	-3.00	22	1.690	0.59%	1000.0	0.00%	6.92	0.00%	Brown	Turbid	14.25	200
6	9:50	11.89	1.71%	7.04	0.07	-4.00	4	1.660	2.41%	1000.0	0.00%	5.84	25.00%	Brown	Turbid	14.25	200
7	9:55	11.91	1.10%	7.04	0.07	-11.00	8	1.670	1.81%	258.0	287.60%	6.33	18.49%	Brown	Turbid	14.25	200
8	10:00	11.93	0.34%	7.11	0.07	-18.00	14	1.690	1.81%	677.0	287.60%	7.16	22.60%	Brown	Turbid	14.25	200
9	10:05	11.99	0.67%	7.14	0.1	-21.00	10	1.700	1.80%	1000.0	287.60%	7.31	15.48%	Brown	Turbid	14.25	200
10	10:10	12.00	0.59%	7.17	0.06	-23.00	5	1.700	0.59%	879.0	47.71%	7.69	7.40%	Brown	Turbid	14.25	200
11	10:15	11.99	0.08%	7.17	0.03	-24.00	3	1.700	0.00%	810.0	23.46%	7.63	5.20%	Brown	Turbid	14.25	200
12	10:20	12.04	0.42%	7.16	0.01	-25.00	2	1.700	0.00%	825.0	8.52%	7.57	1.59%	Brown	Turbid	14.25	200
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	9:20	Purge End Time:	10:20
Total Purge Volume (L):	12	Total Purge Time:	60 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	200

Sample Start Time:	10:20	Sample End Time:	11:45
Sampling Method:	Bladder Pump	Total Sampling Time:	85 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer Generating Station	Monitoring Well:	MW-5	PID Reading:	- ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	4/3/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Tristan Morgan			Depth to Water:	13.15 feet (from top of casing)
Weather:	Sunny, 52F	Equipment Serial #:	R91VKTH5	Pump Intake:	15 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	10:40	14.30	X	7.40	X	-20.00	X	0.965	X	10.7	X	2.40	X	Clear	Clear	13.15	200
1	10:45	14.19	0.77%	7.42	0.02	-24.00	4	0.968	0.31%	9.8	8.41%	1.31	45.42%	Clear	Clear	13.15	200
2	10:50	13.73	4.15%	7.38	0.04	-34.00	14	0.967	0.31%	21.7	121.43%	0.89	169.66%	Clear	Clear	13.15	200
3	10:55	13.48	5.27%	7.42	0.04	-37.00	13	0.967	0.10%	13.0	121.43%	0.61	114.75%	Clear	Clear	13.15	200
4	11:00	13.46	2.01%	7.46	0.08	-37.00	3	0.971	0.41%	10.4	108.65%	0.50	78.00%	Clear	Clear	13.15	200
5	11:05	13.54	0.59%	7.48	0.06	-40.00	3	0.984	1.76%	6.0	116.67%	0.36	69.44%	Clear	Clear	13.15	200
6	11:10	13.40	1.04%	7.48	0.02	-40.00	3	0.988	1.75%	5.9	76.27%	0.34	47.06%	Clear	Clear	13.15	200
7	11:15	13.55	1.12%	7.48	0	-40.00	0	0.991	0.71%	5.6	7.14%	0.33	9.09%	Clear	Clear	13.15	200
8																	
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13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	10:40	Purge End Time:	11:15
Total Purge Volume (L):	7	Total Purge Time:	35 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	200

Sample Start Time:	11:15	Sample End Time:	12:00
Sampling Method:	Bladder Pump	Total Sampling Time:	45 Minutes

Observations:

Sampling Technician: Tristan Morgan Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer Generating Station	Monitoring Well:	MW-4	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	4/3/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	16.00 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	7 feet (from top of casing)
Weather:	Sunny, 54F	Equipment Serial #:	GWUWF40R	Pump Intake:	9 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	12:10	13.64	X	6.55	X	207.00	X	0.038	X	13.7	X	2.39	X	Clear	Clear	7.05	225
1	12:15	12.56	7.92%	6.23	0.32	258.00	51	0.034	10.53%	9.7	29.20%	1.67	30.13%	Clear	Clear	7.05	250
2	12:20	11.64	17.18%	5.64	0.91	279.00	72	0.033	15.15%	2.1	552.38%	0.00	0.00%	Clear	Clear	7.05	250
3	12:25	11.51	9.12%	5.60	0.63	284.00	26	0.034	3.03%	0.8	1112.50%	0.00	0.00%	Clear	Clear	7.05	250
4	12:30	11.41	2.02%	5.60	0.04	284.00	5	0.034	3.03%	0.7	200.00%	0.00	0.00%	Clear	Clear	7.05	250
5	12:35	11.42	0.88%	5.59	0.01	286.00	2	0.033	3.03%	0.4	100.00%	0.00	0.00%	Clear	Clear	7.05	250
6	12:40	11.43	0.18%	5.59	0.01	285.00	2	0.033	3.03%	0.2	250.00%	0.00	0.00%	Clear	Clear	7.05	250
7	12:45	11.40	0.26%	5.60	0.01	284.00	2	0.033	0.00%	0.0	0.00%	0.00	0.00%	Clear	Clear	7.05	250
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	12:10	Purge End Time:	12:45
Total Purge Volume (L):	8.75	Total Purge Time:	35 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	250

Sample Start Time:	12:45	Sample End Time:	13:20
Sampling Method:	Bladder Pump	Total Sampling Time:	35 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer Generating Station	Monitoring Well:	MW-6	PID Reading:	- ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	4/3/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	21.80 feet (from top of casing)
Field Personnel:	Tristan Morgan			Depth to Water:	10.52 feet (from top of casing)
Weather:	Sunny, 57F	Equipment Serial #:	R91VKTH5	Pump Intake:	13 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	12:30	15.42	X	8.21	X	112.00	X	0.283	X	43.3	X	0.74	X	Clear	Clear	10.55	200
1	12:35	13.35	13.42%	7.56	0.65	126.00	14	0.279	1.41%	33.7	22.17%	0.00	100.00%	Clear	Clear	10.55	200
2	12:40	12.81	20.37%	7.28	0.93	126.00	14	0.281	1.43%	23.1	87.45%	0.00	0.00%	Clear	Clear	10.55	200
3	12:45	12.43	7.40%	7.09	0.47	121.00	5	0.284	1.79%	22.4	50.45%	1.24	0.00%	Clear	Clear	10.55	200
4	12:50	12.30	4.15%	7.05	0.23	117.00	9	0.282	1.07%	20.2	14.36%	1.02	17.74%	Clear	Clear	10.55	200
5	12:55	12.28	1.22%	7.01	0.08	116.00	5	0.281	1.07%	19.7	13.71%	0.61	40.20%	Clear	Clear	10.55	200
6	13:00	12.20	0.82%	7.06	0.05	114.00	3	0.279	1.08%	19.1	5.76%	0.57	6.56%	Clear	Clear	10.55	200
7	13:05	12.14	1.15%	7.04	0.05	112.00	4	0.280	0.72%	18.2	8.24%	0.56	1.75%	Clear	Clear	10.55	200
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	12:30	Purge End Time:	13:05
Total Purge Volume (L):	7	Total Purge Time:	35 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	200

Sample Start Time:	13:05	Sample End Time:	13:55
Sampling Method:	Bladder Pump	Total Sampling Time:	50 Minutes

Observations:

Sampling Technician: Tristan Morgan Signature:

Groundwater Purge Data Sheet

Sheet 1 of 1

Hampton-Clarke

Hampton-Clarke, Inc.
175 Route 46 W, Fairfield, NJ
07004

Project Name:	Former PSEG Mercer Generating Station	Monitoring Well:	MW-3	PID Reading:	0.00 ppm
Project Number:	1901252			Well Diameter:	2 inches
Date:	4/3/19	Equipment Make/Model:	Horiba U-52	Total Depth of Well:	20.00 feet (from top of casing)
Field Personnel:	Fabio Iannacco			Depth to Water:	8.6 feet (from top of casing)
Weather:	Sunny, 61F	Equipment Serial #:	GWUWF40R	Pump Intake:	14 feet (from top of casing)

	Time	Temperature (°C)		pH		ORP (mV)		Specific Conductivity (ms/cm)		Turbidity (NTU)		Dissolved Oxygen (mg/L)		Color / Clarity		Depth to Water	Purge Rate (mL/m)
		Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ				
0	1415	14.64	X	6.51	X	228.00	X	0.292	X	21.8	X	2.71	X	Clear	Clear	8.70	175
1	14:20	11.78	19.54%	6.49	0.02	234.00	6	0.301	3.08%	7.3	66.51%	1.79	33.95%	Clear	Clear	8.70	225
2	14:25	11.82	24.28%	6.50	0.02	238.00	10	0.291	3.44%	6.5	235.38%	1.59	70.44%	Clear	Clear	8.70	225
3	14:30	11.14	6.10%	6.48	0.02	240.00	6	0.302	3.78%	6.2	17.74%	1.46	22.60%	Clear	Clear	8.70	225
4	14:35	11.07	6.78%	6.49	0.02	243.00	5	0.306	5.15%	4.1	58.54%	1.26	26.19%	Clear	Clear	8.70	225
5	14:40	11.12	0.63%	6.48	0.01	244.00	4	0.306	1.32%	3.2	93.75%	0.97	50.52%	Clear	Clear	8.70	225
6	14:45	11.09	0.45%	6.48	0.01	246.00	3	0.308	0.65%	1.1	272.73%	0.81	55.56%	Clear	Clear	8.70	225
7	14:50	11.04	0.72%	6.48	0	247.00	3	0.308	0.65%	0.0	0.00%	0.75	29.33%	Clear	Clear	8.70	225
8	14:55	11.30	2.36%	6.48	0	248.00	2	0.309	0.32%	0.0	0.00%	0.76	8.00%	Clear	Clear	8.70	225
9																	
10																	
11																	
12																	
13																	
14																	
15																	

*Indicator Parameters Stabilized When 3 Consecutive Readings are Within:

Temp:+/- 3%, pH: +/- 0.1, Spec. Cond. +/- 3%, Turb: +/- 10% (for values >1), DO: +/- 10%, ORP: +/- 10

Temp: +/- 3% pH: +/- 0.1 ORP: +/- 10 Spec. Cond. +/- 3% Turb: +/- 10% DO: +/- 10%

Percent (%) Change = [(old value - new value)/ old value] * 100 = Δ

Purge Start Time:	14:15	Purge End Time:	14:55
Total Purge Volume (L):	9	Total Purge Time:	40 Minutes
Purge Method:	Bladder Pump	Purge Rate (mL/min):	225

Sample Start Time:	14:55	Sample End Time:	15:40
Sampling Method:	Bladder Pump	Total Sampling Time:	45 Minutes

Observations:

Sampling Technician: Fabio Iannacco Signature:

APPENDIX B

Laboratory Analytical Reports

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Type III Data Package

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Project: PSEG Hudson & Mercer Stations
Groundwater and Water Samples
Collected on 08/07/18

SDG# GEJ47

GROUP	SAMPLE NUMBERS
1974423	9744060-9744063

PA Cert. # 36-00037
NY Cert. # 10670
NJ Cert. # PA011
NC Cert. # 521
TX Cert. # T104704194-13-10
AZ Cert. # AZ0780

Through our technical processes and second person review of data, we have established that our data/deliverables are in compliance with the methods and project requirements unless otherwise noted or previously resolved with the client.

Authorized by: Dana M Kauffman

Dana M. Kauffman
Manager

Date: 09/11/2018

Any questions or concerns you might have regarding this data package should be directed to your client representative, Kerri Sachtleben at (717)-556-7376.

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Sample Reference List for SDG Number GEJ47 with a Data Package Type of III

07701 - GEI Consultants, Inc.

Project: PSEG Hudson & Mercer Stations

Lab Sample Number	Client Sample ID	Collection Date	Date Received
9744060	MW-3	08/07/2018 14:35	08/08/2018 17:20
9744061	MW-4	08/07/2018 09:30	08/08/2018 17:20
9744062	MW-5	08/07/2018 11:30	08/08/2018 17:20
9744063	FB-20180807	08/07/2018 12:30	08/08/2018 17:20

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Sample pH Log

SDG: GEJ47

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9744060	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:05:19PM	12665
9744060	015A	5	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 9:32:56PM	1201
9744060	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:11:23PM	24788
9744060	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:13:27PM	24788
9744060	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:25:36PM	12665
9744060	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/10/2018 10:50:29PM	1201
9744060	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:05:19PM	12665
9744060	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:05:19PM	12665
9744061	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:06:35PM	12665
9744061	015A	5	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 9:32:35PM	1201
9744061	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:13:41PM	24788
9744061	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:12:17PM	24788
9744061	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:14:29PM	12665
9744061	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/10/2018 9:37:23PM	25804
9744061	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:06:35PM	12665
9744061	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:06:35PM	12665
9744062	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:28:28PM	12665
9744062	015A	5	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 9:32:17PM	1201
9744062	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:14:04PM	24788
9744062	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:13:01PM	24788
9744062	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:16:20PM	12665
9744062	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/10/2018 10:18:38PM	1201
9744062	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:28:28PM	12665
9744062	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:16:20PM	12665
9744063	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:09:31PM	12665
9744063	015A	5	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 9:32:48PM	1201
9744063	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:12:28PM	24788
9744063	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 11:12:40PM	24788
9744063	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:19:51PM	12665
9744063	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/10/2018 10:37:36PM	1201
9744063	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:09:31PM	12665
9744063	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	8/8/2018 10:09:31PM	12665

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee

*pH Check Code Key
PK = Original container checked - pH is within the correct range. (No preservative was added)
PA = Original container checked - pH adjusted to correct range. (Preservative was added)
PV = Volatile container checked
PC = pH checked (unpreserved container)
SPK = Subsampled from an original container. Original container checked - pH is within correct range
SPA = Subsampled from an original container. Subsample container checked - pH adjusted to correct range.
SPC = Subsampled from an original container. pH checked (unpreserved container).
SUP = Subsampled from original container. Unable to be preserved due to the matrix of the sample.
UP = Unable to preserve due to matrix of the sample.
NA = Not applicable

**Chlorine Present Code Key
NA = Chlorine Not Checked
Y = Chlorine Present
N = Chlorine Not Present

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00259 Mercury

The solution resulting from the mercury digestion is analyzed by Cold Vapor AA.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

14044 ICP-WW, 3005A (tot rec) - U5

The sample is digested with nitric acid and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3005A, July 1992

14047 ICPMS - Water, 3020A - U5

The sample is digested with nitric and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3020A, July 1992

05713 WW SW846 Hg Digest

The sample is heated at 95 c with nitric acid, sulfuric acid, potassium persulfate, and potassium permanganate. Excess potassium permanganate is reduced with sodium chloride/hydroxylamine hydrochloride. Mercuric ions are reduced to mercury metal using stannous chloride.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

07046 Barium
08014 Boron
01750 Calcium
07051 Chromium
07052 Cobalt
01756 Lithium
07036 Selenium
07022 Thallium

The solution resulting from the metals digestion is analyzed by Trace ICP.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6010D, Rev. 4, July 2014.

06024 Antimony
06025 Arsenic
06027 Beryllium
06028 Cadmium
06035 Lead
06038 Molybdenum

The solution resulting from the metals digestion is analyzed by ICP/MS.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6020B, Rev.2, July 2014.

00224 Chloride
01504 Fluoride
00228 Sulfate

A small volume of sample is introduced into an ion chromatograph. The anions are then separated and measured by a system consisting of a guard column, separator column, suppressor, and conductivity detector.

Reference: Method 300.0, Revision 2.1 (1993), Methods for Chemical Analysis of Water and Wastes USEPA 600.

12152 pH

The activity of hydrogen ions in the sample is measured using a glass electrode and a reference electrode.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 4500-H+ B-2011

00212 Total Dissolved Solids

A well-mixed sample is filtered through a glass fiber filter. The filtrate is collected in a tared beaker, evaporated in a steam bath and dried in an oven at 180C +/- 2C to a constant weight. The increase in weight is the total dissolved solids.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2540 C-2011

12151 Temperature of pH

The temperature of the sample measured during the pH analysis.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2550 B-2010

Analysis Reports / Field Chain of Custody

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Report Date: September 11, 2018 10:09

Project: PSEG Hudson & Mercer Stations

Account #: 07701
Group Number: 1974423
SDG: GEJ47
PO Number: 1504710
State of Sample Origin: NJ

Electronic Copy To	GEI Consultants, Inc.	Attn: Jason Kohl
Electronic Copy To	GEI Consultants, Inc.	Attn: Data Group

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-3 Grab Groundwater	08/07/2018 14:35	9744060
MW-4 Grab Groundwater	08/07/2018 09:30	9744061
MW-5 Grab Groundwater	08/07/2018 11:30	9744062
FB-20180807 Grab Water	08/07/2018 12:30	9744063

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: GEI Consultants, Inc.
Project: PSEG Hudson & Mercer Stations
Sampling Date(s): 08/07/18
Laboratory Sample ID(s): 9744060-9744063
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	No
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality."
***The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.**

Dorothy M Love

Dorothy M. Love
Director

09/11/2018



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Project Name: PSEG Hudson & Mercer Stations
ELLE Group #: 1974423

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Sample #s: 9744060-9744063

The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 9744060, 9744061, 9744062, 9744063

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

Sample #s: 9744060, 9744061, 9744062, 9744063

The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium
An interfering analyte exceeded the linear range of the instrument, and all affected analytes were analyzed at a higher dilution. The reporting limits were raised accordingly.

SW-846 6020B Rev.2, July 2014, Metals Dissolved

Sample #s: 9744060, 9744061, 9744062, 9744063

The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: arsenic, lead.

SM 2540 C-2011, Wet Chemistry

Batch #: 18225921202A (Sample number(s): 9744060, 9744062-9744063 BKG: 9744062)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: Total Dissolved Solids

Sample Description: **MW-3 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 14:35
SDG#: GEJ47-01

GEI Consultants, Inc.
ELLE Sample #: GW 9744060
ELLE Group #: 1974423
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.250	0.0010	0.0100	1
08014	Boron	7440-42-8	0.238 J	0.0600	0.500	5
01750	Calcium	7440-70-2	69.9	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07052	Cobalt	7440-48-4	0.0026 J	0.0015	0.0100	1
01756	Lithium	7439-93-2	0.0349 J	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.105	0.500	5
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium An interfering analyte exceeded the linear range of the instrument, and all affected analytes were analyzed at a higher dilution. The reporting limits were raised accordingly.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K3K4	0.00041	0.0040	1
06025	Arsenic	7440-38-2	0.0022 J	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.0010	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: arsenic, lead.					
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0203	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	334	20.0	40.0	100
01504	Fluoride	16984-48-8	0.35 J	0.25	0.50	5
00228	Sulfate	14808-79-8	21.8	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	724	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	11.5	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 14:35
SDG#: GEJ47-01

GEI Consultants, Inc.
ELLE Sample #: GW 9744060
ELLE Group #: 1974423
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:31	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:32	Xavier Arroyo	5
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:31	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:31	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:31	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:31	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:32	Xavier Arroyo	5
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:31	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/30/2018 23:09	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182261404701A	09/05/2018 18:34	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:14	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:14	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:14	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182261404701C	08/30/2018 23:09	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	182250571302	08/14/2018 08:46	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 14:35
SDG#: GEJ47-01

GEI Consultants, Inc.
ELLE Sample #: GW 9744060
ELLE Group #: 1974423
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182261404403	08/14/2018 22:31	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182261404701	08/14/2018 21:00	Annamaria Kuhns	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182250571302	08/13/2018 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	18227837109B	08/18/2018 19:14	Clinton M Wilson	100
01504	Fluoride	EPA 300.0	1	18227837109B	08/15/2018 20:48	Samuel J Weaver	5
00228	Sulfate	EPA 300.0	1	18227837109B	08/15/2018 20:48	Samuel J Weaver	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18225921202A	08/13/2018 15:08	Alexa Sanchez	1
12151	Temperature of pH	SM 2550 B-2010	1	18225121521A	08/13/2018 17:20	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18225121521A	08/13/2018 17:20	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 09:30
SDG#: GEJ47-02

GEI Consultants, Inc.
ELLE Sample #: GW 9744061
ELLE Group #: 1974423
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0167	0.0010	0.0100	1
08014	Boron	7440-42-8	N.D.	0.0600	0.500	5
01750	Calcium	7440-70-2	5.09	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07052	Cobalt	7440-48-4	0.0025 J	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.105	0.500	5
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium An interfering analyte exceeded the linear range of the instrument, and all affected analytes were analyzed at a higher dilution. The reporting limits were raised accordingly.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K3	0.00041	0.0040	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.0010	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: arsenic, lead.					
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0022 J	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	1.4 J	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	3.9 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	51.0 J	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.6	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 09:30
SDG#: GEJ47-02

GEI Consultants, Inc.
ELLE Sample #: GW 9744061
ELLE Group #: 1974423
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.0	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:34	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:34	Xavier Arroyo	5
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:34	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:34	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:34	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:34	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:34	Xavier Arroyo	5
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:34	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/30/2018 23:16	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182261404701A	09/05/2018 18:41	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:21	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:21	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:21	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182261404701C	08/30/2018 23:16	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	182250571302	08/14/2018 08:52	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 09:30
SDG#: GEJ47-02

GEI Consultants, Inc.
ELLE Sample #: GW 9744061
ELLE Group #: 1974423
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182261404403	08/14/2018 22:31	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182261404701	08/14/2018 21:00	Annamaria Kuhns	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182250571302	08/13/2018 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	18227837109B	08/15/2018 21:41	Samuel J Weaver	5
01504	Fluoride	EPA 300.0	1	18227837109B	08/15/2018 21:41	Samuel J Weaver	5
00228	Sulfate	EPA 300.0	1	18227837109B	08/15/2018 21:41	Samuel J Weaver	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18221921202A	08/09/2018 16:26	Alexa Sanchez	1
12151	Temperature of pH	SM 2550 B-2010	1	18221009206A	08/10/2018 11:22	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18221009206A	08/10/2018 11:22	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 11:30
SDG#: GEJ47-03

GEI Consultants, Inc.
ELLE Sample #: GW 9744062
ELLE Group #: 1974423
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.212	0.0010	0.0100	1
08014	Boron	7440-42-8	0.377 J	0.0600	0.500	5
01750	Calcium	7440-70-2	98.4	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.105	0.500	5
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium An interfering analyte exceeded the linear range of the instrument, and all affected analytes were analyzed at a higher dilution. The reporting limits were raised accordingly.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K3	0.00041	0.0040	1
06025	Arsenic	7440-38-2	0.00082 J	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.0010	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: arsenic, lead.					
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0181	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	113	10.0	20.0	50
01504	Fluoride	16984-48-8	0.42 J	0.25	0.50	5
00228	Sulfate	14808-79-8	119	3.0	10.0	10
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	614	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.7	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 11:30
SDG#: GEJ47-03

GEI Consultants, Inc.
ELLE Sample #: GW 9744062
ELLE Group #: 1974423
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:41	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:37	Xavier Arroyo	5
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:41	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:41	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:41	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:41	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:37	Xavier Arroyo	5
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:41	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/30/2018 23:18	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182261404701A	09/05/2018 18:44	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:24	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:24	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:24	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182261404701C	08/30/2018 23:18	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	182250571302	08/14/2018 08:55	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 11:30
SDG#: GEJ47-03

GEI Consultants, Inc.
ELLE Sample #: GW 9744062
ELLE Group #: 1974423
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182261404403	08/14/2018 22:31	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182261404701	08/14/2018 21:00	Annamaria Kuhns	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182250571302	08/13/2018 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	18227837109B	08/18/2018 20:06	Clinton M Wilson	50
01504	Fluoride	EPA 300.0	1	18227837109B	08/15/2018 22:34	Samuel J Weaver	5
00228	Sulfate	EPA 300.0	1	18227837109B	08/18/2018 19:49	Clinton M Wilson	10
00212	Total Dissolved Solids	SM 2540 C-2011	1	18225921202A	08/13/2018 15:10	Alexa Sanchez	1
12151	Temperature of pH	SM 2550 B-2010	1	18221009207A	08/10/2018 12:40	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18221009207A	08/10/2018 12:40	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20180807 Grab Water**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 12:30
SDG#: GEJ47-04FB

GEI Consultants, Inc.
ELLE Sample #: GW 9744063
ELLE Group #: 1974423
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D.	0.0010	0.0100	1
08014	Boron	7440-42-8	N.D.	0.0600	0.500	5
01750	Calcium	7440-70-2	0.0567 J	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.105	0.500	5
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium An interfering analyte exceeded the linear range of the instrument, and all affected analytes were analyzed at a higher dilution. The reporting limits were raised accordingly.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K3	0.00041	0.0040	1
06025	Arsenic	7440-38-2	0.00070 J	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.0010	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: arsenic, lead.					
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.4	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20180807 Grab Water**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 12:30
SDG#: GEJ47-04FB

GEI Consultants, Inc.
ELLE Sample #: GW 9744063
ELLE Group #: 1974423
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.0	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:44	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:40	Xavier Arroyo	5
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:44	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:44	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:44	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:44	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/23/2018 00:40	Xavier Arroyo	5
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182261404403	08/15/2018 05:44	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/30/2018 23:21	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182261404701A	09/05/2018 18:46	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:26	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:26	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182261404701A	08/29/2018 16:26	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182261404701C	08/30/2018 23:21	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	182250571302	08/14/2018 08:57	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20180807 Grab Water**
PSEG Mercer / 1504710

Project Name: **PSEG Hudson & Mercer Stations**

Submittal Date/Time: 08/08/2018 17:20
Collection Date/Time: 08/07/2018 12:30
SDG#: GEJ47-04FB

GEI Consultants, Inc.
ELLE Sample #: GW 9744063
ELLE Group #: 1974423
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182261404403	08/14/2018 22:31	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182261404701	08/14/2018 21:00	Annamaria Kuhns	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182250571302	08/13/2018 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	18227837109B	08/15/2018 23:45	Samuel J Weaver	1
01504	Fluoride	EPA 300.0	1	18227837109B	08/15/2018 23:45	Samuel J Weaver	1
00228	Sulfate	EPA 300.0	1	18227837109B	08/15/2018 23:45	Samuel J Weaver	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	18225921202A	08/13/2018 15:08	Alexa Sanchez	1
12151	Temperature of pH	SM 2550 B-2010	1	18221009206A	08/10/2018 11:33	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18221009206A	08/10/2018 11:33	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1974423
Reported: 09/11/2018 10:09

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 182250571302	Sample number(s): 9744060-9744063		
Mercury	N.D.	0.000050	0.00020
Batch number: 182261404403	Sample number(s): 9744060-9744063		
Barium	N.D.	0.0010	0.0100
Boron	N.D.	0.0120	0.100
Calcium	N.D.	0.0330	1.00
Chromium	N.D.	0.0053	0.0300
Cobalt	N.D.	0.0015	0.0100
Lithium	N.D.	0.0110	0.100
Selenium	N.D.	0.0210	0.100
Thallium	N.D.	0.0140	0.0600
Batch number: 182261404701A	Sample number(s): 9744060-9744063		
Antimony	N.D.	0.00041	0.0040
Arsenic	N.D.	0.00068	0.0040
Beryllium	N.D.	0.000091	0.0010
Cadmium	N.D.	0.00015	0.0020
Lead	N.D.	0.0011	0.0060
Batch number: 182261404701C	Sample number(s): 9744060-9744063		
Molybdenum	N.D.	0.00031	0.0040
Batch number: 18227837109B	Sample number(s): 9744060-9744063		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 18221921202A	Sample number(s): 9744061		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 18225921202A	Sample number(s): 9744060,9744062-9744063		
Total Dissolved Solids	N.D.	20.0	60.0

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1974423
Reported: 09/11/2018 10:09

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 182250571302	Sample number(s): 9744060-9744063								
Mercury	0.00100	0.000929			93		80-120		
Batch number: 182261404403	Sample number(s): 9744060-9744063								
Barium	2.00	2.03			102		80-120		
Boron	2.00	1.91			96		80-120		
Calcium	4.00	4.11			103		80-120		
Chromium	0.200	0.202			101		80-120		
Cobalt	0.500	0.519			104		80-120		
Lithium	1.00	1.04			104		80-120		
Selenium	0.150	0.153			102		80-120		
Thallium	0.150	0.151			100		80-120		
Batch number: 182261404701A	Sample number(s): 9744060-9744063								
Antimony	0.00600	0.00603			101		80-120		
Arsenic	0.0100	0.0106			106		80-120		
Beryllium	0.00400	0.00427			107		80-120		
Cadmium	0.00500	0.00485			97		80-120		
Lead	0.0150	0.0154			103		80-120		
Batch number: 182261404701C	Sample number(s): 9744060-9744063								
Molybdenum	0.0500	0.0529			106		80-120		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18227837109B	Sample number(s): 9744060-9744063								
Chloride	3.00	2.77			92		90-110		
Fluoride	0.750	0.701			94		90-110		
Sulfate	7.50	7.01			93		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18221921202A	Sample number(s): 9744061								
Total Dissolved Solids	200	202			101		62-127		
Batch number: 18225921202A	Sample number(s): 9744060,9744062-9744063								
Total Dissolved Solids	200	188			94		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 18221009206A	Sample number(s): 9744061,9744063								
pH	7.00	7.07			101		95-105		
Batch number: 18221009207A	Sample number(s): 9744062								
pH	7.00	7.05			101		95-105		
Batch number: 18225121521A	Sample number(s): 9744060								
pH	7.00	6.99			100		95-105		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1974423
Reported: 09/11/2018 10:09

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 18225921202A	Sample number(s): 9744060,9744062-9744063 BKG: 9744062			
Total Dissolved Solids	614	662	8* (1)	5

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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For Eurofins Lancaster Laboratories Environmental use only

Acct. # 7701 Group # 1974423 Sample # 974060-63

COC # 578958

Client Information

Client: GEI Consultants, Inc.	Acct. #:
Project Name/#: PSEG Mercer / 1504710	PWSID #:
Project Manager: Jason Kohl	P.O. #:
Sampler: Anthony J. Shields	Quote #:
State where samples were collected: NJ	For Compliance: Yes ☑ No ☐

Matrix: Soil ☐ Sediment ☐ Tissue ☐ | Water: Potable ☐ Ground ☑ NPDES ☐ Surface ☐ | Other: ____

Analysis Requested — Preservation and Filtration Codes

For Lab Use Only

FSC:

SCR#: 229140

Preservation Codes

H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 P=H_3PO_4
F=Field Filtered O=Other

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Sediment	Tissue	Potable	Ground	Surface	NPDES	Other	Total # of Containers	TDS	Site-List Metals	Radium (Subcontract)	Chloride, Fluoride, Sulfate	pH	Remarks
MW-3	8-7-18	1435	✓					✓					7	✓	✓	✓	✓	✓	
MW-4	8-7-18	0930	✓					✓					7	✓	✓	✓	✓	✓	
MW-5	8-7-18	~~1245~~	✓					✓					7	✓	✓	✓	✓	✓	
FB-20180807	8-7-18	~~1230~~ 1130 @LS 27577 8/9/18	✓	12:30 (3) KS 27577 8/9/18								FB	7	✓	✓	✓	✓	✓	
		See email																	

Turnaround Time (TAT) Requested (please circle)

Standard Rush

(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days: ____

E-mail address: JKohl@GEIConsultants.com

Data Package Options (circle if required)

Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only)

Type III (Reduced non-CLP) ~~NJ DKQP~~ TX TRRP-13

NYSDEC Category A or B MA MCP CT RCP

Relinquished by	Date	Time	Received by	Date	Time
Bottle Storage	8-2-18	1200		8-2-18	1200
	8/8/18	1335		8/8/18	1335
	8/8/18	1720			

EDD Required? Yes No

If yes, format: ____

Site-Specific QC (MS/MSD/Dup)? Yes No

(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier: UPS ____ FedEx ____ Other ____

Temperature upon receipt 0.7 °C

Kerri Sachtleben

From: Kerri Sachtleben
Sent: Thursday, August 09, 2018 12:37 PM
To: 'Shields, Anthony'
Subject: RE: MW-5 sample collected yesterday

Anthony,

Sorry, I looked at the wrong entry. 11:25 is on the COC for MW-5 but we'll enter it as 11:30.

Thanks,
Kerri

From: Shields, Anthony [mailto:ashields@geiconsultants.com]
Sent: Thursday, August 09, 2018 12:02 PM
To: Kerri Sachtleben
Subject: RE: MW-5 sample collected yesterday

EXTERNAL EMAIL*

11:30 should be correct for MW-5 at PSEG Mercer.

Anthony J. Shields, E.I.T.
Project Engineer
Direct: 856.291.5673

From: KerriSachtleben@eurofinsUS.com <KerriSachtleben@eurofinsUS.com>
Sent: Thursday, August 9, 2018 11:54 AM
To: Shields, Anthony <ashields@geiconsultants.com>
Subject: MW-5 sample collected yesterday

Hi Anthony,

The COC for MW-5 has a collection time of 12:30. The sample label says 11:30. Please let me know which is correct.

Thanks!

Kerri Sachtleben
Senior Client Service Specialist

Eurofins Lancaster Laboratories Environmental LLC
2425 New Holland Pike
Lancaster, PA 17601
USA

Phone: (717) 556-7376

KerriSachtleben@EurofinsUS.com
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Sample Administration Receipt Documentation Log

Doc Log ID: 223618

Group Number(s): 1974423

Client: GEI Consultants

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	08/08/2018 17:20
Number of Packages:	2	Number of Projects:	1
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	No	Sample Date/Times match COC:	Yes
Samples Chilled:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	0
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Wanita Curry (14057) at 18:21 on 08/08/2018

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	0.7	DT	Wet	Y	Bagged	N
2	DT146	0.7	DT	Wet	Y	Bagged	N

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Lancaster, PA 17601-2425
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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Metals in Liquid Data

Case Narrative/Conformance Summary

Metals in Liquid

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

ICP Metals

Fraction: Metals in Liquid

Sample #	Client ID	Matrix Liquid	Matrix Solid	Comments
9744060	MW-3	X		
9744061	MW-4	X		
9744062	MW-5	X		
9744063	FB-20180807	X		Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

SAMPLE ANALYSIS:

Refer to analysis run log for samples requiring dilutions.

The instrument detection limits (IDLs) are used for determining the U flags on the initial and continuing calibration blanks. The highest IDL is selected when multiple

Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

ICP Metals

Fraction: Metals in Liquid

instruments are used for an analysis. The method detection limits (MDLs) are used for determining all other U flags.

(Sample number(s): 9744060-9744063: Analysis: 07036)
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium
An interfering analyte exceeded the linear range of the instrument, and all affected analytes were analyzed at a higher dilution. The reporting limits were raised accordingly.

(Sample number(s): 9744060-9744063: Analysis: 06027)
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: arsenic, lead.

(Sample number(s): 9744060-9744063: Analysis: 07051)
The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

No other problems were encountered with the analysis of the samples.

Abbreviation Key

BKG – Background	AF - Cold Vapor Atomic Fluorescence
DUP – Duplicate	U - Below MDL
MS - Matrix Spike	B - Below LOQ
MSD - Matrix Spike Dup	N - Matrix Spike out of specifications
B – Blank	* - Duplicate out of specifications
Q - Laboratory Control Sample	E - Matrix Effects exist as proven by Serial Dilution or Spiked Dilution
Y - Laboratory Control Sample Duplicate	A - Post Digestion Spike
P - ICP Atomic Emission Spectrometer	L - Serial Dilution
MS - ICP Mass Spectrometry	R - Internal Standard Relative Intensity OOS
CV - Cold Vapor	NR - Not Required

Sample Data

Metals in Liquid

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ47
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9744060 % Solids: 0.0
Concentration Units: UG/L Date Received: 08/08/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	2.2	B		MS
7440-39-3	Barium	250			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	238	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	69900			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	2.6	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	34.9	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	20.3			MS
7782-49-2	Selenium	105	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ47
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9744061 % Solids: 0.0
Concentration Units: UG/L Date Received: 08/08/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	16.7			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	60.0	U		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	5090			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	2.5	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	2.2	B		MS
7782-49-2	Selenium	105	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ47
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9744062 % Solids: 0.0
Concentration Units: UG/L Date Received: 08/08/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.82	B		MS
7440-39-3	Barium	212			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	377	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	98400			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	18.1			MS
7782-49-2	Selenium	105	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ47
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9744063 % Solids: 0.0
Concentration Units: UG/L Date Received: 08/08/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.70	B		MS
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	60.0	U		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	56.7	B		P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	0.31	U		MS
7782-49-2	Selenium	105	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

Quality Control and Calibration Summary Forms

Metals in Liquid

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ47
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Barium	182261404403	9744060
Boron		9744061
Calcium		9744062
Chromium		9744063
Cobalt		*44390BKG
Lithium		P22604CB
Selenium		P22604CQ
Thallium		

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ47
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Antimony	182261404701	9744060
Arsenic		9744061
Beryllium		9744062
Cadmium		9744063
Lead		*46739BKG
Molybdenum		P22604AB
		P22604AQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ47
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Mercury	182250571302	9744060
		9744061
		9744062
		9744063
		*44386BKG
		P22571BB
		P22571BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: P
Run Name: 1822702T71
Calibration Date(s): 08/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium		600.0	602.63	100.4	500.0	503.79	100.8	500.0	493.83	98.8
Boron										
Calcium		30000.0	29774.28	99.2	25000.0	25202.68	100.8	25000.0	24864.67	99.5
Chromium		600.0	577.25	96.2	500.0	487.42	97.5	500.0	490.14	98.0
Cobalt		600.0	589.69	98.3	500.0	501.45	100.3	500.0	503.75	100.8
Lithium		600.0	611.06	101.8	500.0	518.32	103.7	500.0	523.71	104.7
Selenium										
Thallium		600.0	603.90	100.7	500.0	505.56	101.1	500.0	503.37	100.7

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: P
Run Name: 1822702T71
Calibration Date(s): 08/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	486.05	97.2	500.0	490.45	98.1
Boron										
Calcium					25000.0	24311.55	97.2	25000.0	24111.41	96.4
Chromium					500.0	496.72	99.3	500.0	501.80	100.4
Cobalt					500.0	504.31	100.9	500.0	502.73	100.5
Lithium					500.0	542.60	108.5	500.0	542.17	108.4
Selenium										
Thallium					500.0	505.06	101.0	500.0	510.98	102.2

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: P
Run Name: 1823408T75
Calibration Date(s): 08/22/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron		600.0	592.23	98.7	500.0	495.04	99.0	500.0	495.82	99.2
Calcium										
Chromium										
Cobalt										
Lithium										
Selenium		600.0	598.35	99.7	500.0	480.50	96.1	500.0	492.69	98.5
Thallium		600.0	612.49	102.1	500.0	507.21	101.4	500.0	507.32	101.5

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: P
Run Name: 1823408T75
Calibration Date(s): 08/22/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron					500.0	488.74	97.7			
Calcium										
Chromium										
Cobalt										
Lithium										
Selenium					500.0	489.48	97.9			
Thallium					500.0	495.85	99.2			

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1823410T72
Calibration Date(s): 8/22/2018 - 08/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron		600.0	595.64	99.3	500.0	482.49	96.5	500.0	488.39	97.7
Calcium										
Chromium										
Cobalt										
Lithium										
Selenium		600.0	608.65	101.4	500.0	501.28	100.3	500.0	491.43	98.3
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: P
Run Name: 1823410T72
Calibration Date(s): 8/22/2018 - 08/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron					500.0	475.79	95.2			
Calcium										
Chromium										
Cobalt										
Lithium										
Selenium					500.0	480.50	96.1			
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: MS
Run Name: 1824106E03
Calibration Date(s): 08/29/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic										
Beryllium	9	50.0	50.40	100.8	25.0	24.74	99.0	25.0	36.53	146.1*
Cadmium	111	50.0	51.71	103.4	25.0	26.64	106.6	25.0	26.43	105.7
Lead	208	50.0	50.96	101.9	25.0	27.23	108.9	25.0	26.43	105.7
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: MS
Run Name: 1824106E03
Calibration Date(s): 08/29/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic										
Beryllium	9				25.0	38.16	152.6*			
Cadmium	111				25.0	25.99	104.0			
Lead	208				25.0	26.03	104.1			
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: MS
Run Name: 1824210E03
Calibration Date(s): 08/30/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121	50.0	55.61	111.2*	25.0	27.85	111.4*	25.0	25.80	103.2
Arsenic	75	500.0	524.50	104.9	250.0	266.40	106.6	250.0	273.50	109.4
Beryllium										
Cadmium										
Lead										
Molybdenum	98	50.0	51.84	103.7	25.0	26.98	107.9	25.0	25.58	102.3

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: MS
Run Name: 1824210E03
Calibration Date(s): 08/30/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121				25.0	27.05	108.2			
Arsenic										
Beryllium										
Cadmium										
Lead										
Molybdenum	98				25.0	26.05	104.2			

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: MS
Run Name: 1824808E03
Calibration Date(s): 09/05/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121	50.0	54.25	108.5	25.0	25.03	100.1	25.0	24.80	99.2
Arsenic	75	500.0	533.70	106.7	250.0	256.60	102.6	250.0	270.40	108.2
Beryllium	9	50.0	50.42	100.8	25.0	25.65	102.6	25.0	26.97	107.9
Cadmium										
Lead										
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: MS
Run Name: 1824808E03
Calibration Date(s): 09/05/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic	75				250.0	258.70	103.5			
Beryllium										
Cadmium										
Lead										
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: CV
Run Name: 1822601M07
Calibration Date(s): 08/14/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury		2.5	2.49	99.6	1.0	0.99	99.0	1.0	1.00	100.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ47

Method: CV
Run Name: 1822601M07
Calibration Date(s): 08/14/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.97	97.0	1.0	1.02	102.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Run Name: 1822601M07
Calibration Date(s): 08/14/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	1.01	101.0			

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1822702T71
Calibration Date(s): 08/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium		10.0	11.07	110.7		
Boron						
Calcium		1000.0	1044.98	104.5		
Chromium		30.0	29.67	98.9		
Cobalt		10.0	11.04	110.4		
Lithium		100.0	102.61	102.6		
Selenium						
Thallium		60.0	58.45	97.4		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1823408T75
Calibration Date(s): 08/22/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium						
Boron		100.0	102.78	102.8		
Calcium						
Chromium						
Cobalt						
Lithium						
Selenium		100.0	115.66	115.7		
Thallium		60.0	63.56	105.9		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1823410T72
Calibration Date(s): 8/22/2018 - 08/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium						
Boron		100.0	97.90	97.9		
Calcium						
Chromium						
Cobalt						
Lithium						
Selenium		100.0	103.40	103.4		
Thallium						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2B
LOW LEVEL CHECK STANDARD
SDG No.: GEJ47

Method: MS
Run Name: 1824106E03
Calibration Date(s): 08/29/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony						
Arsenic						
Beryllium	9	1.0	1.07	107.0		
Cadmium	111	2.0	2.27	113.5		
Lead	208	6.0	6.29	104.8		
Molybdenum						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1824210E03
Calibration Date(s): 08/30/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony	121	4.0	5.02	125.5		
Arsenic	75	4.0	4.84	121.0		
Beryllium						
Cadmium						
Lead						
Molybdenum	98	4.0	4.44	111.0		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1824808E03
Calibration Date(s): 09/05/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony	121	4.0	3.73	93.3		
Arsenic	75	4.0	3.71	92.8		
Beryllium	9	1.0	0.99	99.0		
Cadmium						
Lead						
Molybdenum						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2B
LOW LEVEL CHECK STANDARD
SDG No.: GEJ47

Method: CV
Run Name: 1822601M07
Calibration Date(s): 08/14/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Mercury		0.2	0.20	100.0		

Control limits: 50% - 150%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1822702T71
Calibration Date(s): 08/15/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium		0.64	U	0.64	U	0.64	U	0.64	U		1.000	U	182261404403
Boron													
Calcium		33.4	U	33.4	U	33.4	U	33.4	U		33.000	U	182261404403
Chromium		1.2	U	1.2	U	-1.2	B	1.2	U		5.300	U	182261404403
Cobalt		0.90	B	0.76	U	0.76	U	0.76	U		1.500	U	182261404403
Lithium		4.0	U	4.0	U	4.0	U	4.0	U		11.000	U	182261404403
Selenium													
Thallium		-8.3	B	7.3	U	7.3	U	7.3	U		14.000	U	182261404403

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ47

Method: P
Run Name: 1822702T71
Calibration Date(s): 08/15/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium				0.64	U								
Boron													
Calcium				33.4	U								
Chromium				1.2	U								
Cobalt				0.76	U								
Lithium				4.0	U								
Selenium													
Thallium				7.3	U								

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

Method: P
Run Name: 1823408T75
Calibration Date(s): 08/22/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium													
Boron		8.4	U	8.4	U	8.4	U	8.4	U		12.000	U	182261404403
Calcium													
Chromium													
Cobalt													
Lithium													
Selenium		8.4	B	9.7	B	12.6	B	8.7	B		21.000	U	182261404403
Thallium		7.3	U	7.3	U	7.3	U	7.3	U				

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

Method: P
Run Name: 1823410T72
Calibration Date(s): 08/22/2018 - 08/23/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium													
Boron		8.4	U	8.4	U	8.4	U	8.4	U				
Calcium													
Chromium													
Cobalt													
Lithium													
Selenium		5.8	U	5.8	U	5.8	U	5.8	U				
Thallium													

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ47

Method: MS
Run Name: 1824106E03
Calibration Date(s): 08/29/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony													
Arsenic													
Beryllium	9	0.052	B	0.030	B	0.036	B	0.048	B				
Cadmium	111	0.14	U	0.14	U	0.14	U	0.20	B	111	0.150	U	182261404701A
Lead	208	0.20	U	0.20	U	0.20	U	0.20	U	208	1.100	U	182261404701A
Molybdenum													

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ47

Method: MS
Run Name: 1824210E03
Calibration Date(s): 08/30/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121	0.35	B	0.78	B	0.34	U	0.38	B				
Arsenic	75	0.96	B	0.40	U	1.1	B			75	0.680	U	182261404701A
Beryllium													
Cadmium													
Lead													
Molybdenum	98	0.25	U	0.25	U	0.25	U	0.25	U	98	0.310	U	182261404701A

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ47

Method: MS
Run Name: 1824808E03
Calibration Date(s): 09/05/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121	0.34	U	0.42	B	0.34	U			121	0.410	U	182261404701A
Arsenic	75	0.72	B	0.40	U	1.2	B	0.40	U				
Beryllium	9	0.018	U	0.018	U	-0.036	B			9	0.091	U	182261404701A
Cadmium													
Lead													
Molybdenum													

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

Method: CV
Run Name: 1822601M07
Calibration Date(s): 08/14/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury		0.050	U	0.050	U	0.050	U	0.050	U		0.050	U	182250571302

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ47

Method: CV
Run Name: 1822601M07
Calibration Date(s): 08/14/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U						

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ47

Instrument ID: 16315
Run Name: 1822702T71
Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found %R	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found %R	Final Found Sol. AB	Final Found %R
Aluminum	500000		502004	100.4						
Barium	0		1							
Boron										
Calcium	500000		510449	102.1						
Chromium	0		-6							
Cobalt	0		-1							
Iron	200000		198971	99.5						
Lithium	0		51							
Magnesium	500000		507799	101.6						
Selenium										
Thallium	0		-4							

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ47

Instrument ID: 23290
Run Name: 1823408T75
Concentration Units: ug/L

Analyte	True		Initial Found				Final Found			
	Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R	Sol. A	%R	Sol. AB	%R
Aluminum	500000		487299	97.5						
Barium										
Boron	0		-20							
Calcium	500000		482228	96.4						
Chromium										
Cobalt										
Iron	200000		193638	96.8						
Lithium										
Magnesium	500000		486324	97.3						
Selenium	0		5							
Thallium	0		2							

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ47

Instrument ID: 16417
Run Name: 1823410T72
Concentration Units: ug/L

Analyte	True		Initial Found				Final Found			
	Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R	Sol. A	%R	Sol. AB	%R
Aluminum	500000		482752	96.6						
Barium										
Boron	0		-20							
Calcium	500000		481446	96.3						
Chromium										
Cobalt										
Iron	200000		188128	94.1						
Lithium										
Magnesium	500000		505214	101.0						
Selenium	0		14							
Thallium										

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ47

Instrument ID: 11332
Run Name: 1824106E03
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		104000	104.0		
Antimony							
Arsenic							
Beryllium	9	0		0			
Cadmium	111	0		0			
Calcium	44	300000		293000	97.7		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		270500	108.2		
Lead	208	0		1			
Magnesium	24	100000		98820	98.8		
Molybdenum	98	2000		2565	128.3		
Phosphorus	31	10000		NA			
Potassium	39	100000		105900	105.9		
Sodium	23	250000		232000	92.8		
Sulfur	34	10000		NA			
Titanium	47	2000		2002	100.1		

Control Limits: All Metals 80%-120%

Instrument ID: 11332
Run Name: 1824210E03
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		112100	112.1		
Antimony	121	0		2			
Arsenic	75	0		1			
Beryllium							
Cadmium							
Calcium	44	300000		298600	99.5		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		273500	109.4		
Lead							
Magnesium	24	100000		109000	109.0		
Molybdenum	98	2000		2398	119.9		
Phosphorus	31	10000		NA			
Potassium	39	100000		114400	114.4		
Sodium	23	250000		248900	99.6		
Sulfur	34	10000		NA			
Titanium	47	2000		2068	103.4		

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ47

Instrument ID: 11332
Run Name: 1824808E03
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		106200	106.2		
Antimony	121	0		1			
Arsenic	75	0		1			
Beryllium	9	0		0			
Cadmium							
Calcium	44	300000		298500	99.5		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		269600	107.8		
Lead							
Magnesium	24	100000		101900	101.9		
Molybdenum	98	2000		2132	106.6		
Phosphorus	31	10000		NA			
Potassium	39	100000		121500	121.5		
Sodium	23	250000		232500	93.0		
Sulfur	34	10000		NA			
Titanium	47	2000		2082	104.1		

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 7
LABORATORY CONTROL SAMPLE
SDG No.: GEJ47
Matrix: WATER

Analyte	Mass	Batch Number	Units	True	Found	C	Control Limits (%)	%R	M	In Spec
Antimony	121	182261404701	UG/L	6.000	6.030		80 - 120	101	MS	Yes
Arsenic	75	182261404701	UG/L	10.000	10.550		80 - 120	106	MS	Yes
Barium		182261404403	UG/L	2000.000	2030.200		80 - 120	102	P	Yes
Beryllium	9	182261404701	UG/L	4.000	4.269		80 - 120	107	MS	Yes
Boron		182261404403	UG/L	2000.000	1913.720		80 - 120	96	P	Yes
Cadmium	111	182261404701	UG/L	5.000	4.849		80 - 120	97	MS	Yes
Calcium		182261404403	UG/L	4000.000	4111.710		80 - 120	103	P	Yes
Chromium		182261404403	UG/L	200.000	202.260		80 - 120	101	P	Yes
Cobalt		182261404403	UG/L	500.000	519.210		80 - 120	104	P	Yes
Lead	208	182261404701	UG/L	15.000	15.400		80 - 120	103	MS	Yes
Lithium		182261404403	UG/L	1000.000	1043.690		80 - 120	104	P	Yes
Mercury		182250571302	UG/L	1.000	0.929		80 - 120	93	CV	Yes
Molybdenum	98	182261404701	UG/L	50.000	52.880		80 - 120	106	MS	Yes
Selenium		182261404403	UG/L	150.000	152.750		80 - 120	102	P	Yes
Thallium		182261404403	UG/L	150.000	150.500		80 - 120	100	P	Yes

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ47
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: *44390BKG Serial Dilution Lab Sample ID: *44390L
Batch Number(s): 182261404403
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Barium		52.9800		52.5000		1		P
Boron		158.0000	B	600.0000	U	100		P
Calcium		104168.6600		106528.1500		2		P
Chromium		5.3000	U	26.5000	U			P
Cobalt		37.9300		43.9000	B	16		P
Lithium		12.4400	B	55.0000	U	100		P
Selenium		210.0000	U	1050.0000	U			P
Thallium		14.0000	U	70.0000	U			P

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ47
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: *46739BKG Serial Dilution Lab Sample ID: *46739L
Batch Number(s): 182261404701
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Antimony	121	1.1850	B	2.0300	U	100		MS
Arsenic	75	30.0000		27.9550		7		MS
Beryllium	9	0.0910	U	0.4550	U			MS
Cadmium	111	0.1601	B	0.7550	U	100		MS
Lead	208	1.5110	B	5.3500	U	100		MS
Molybdenum	98	4.2440		5.0700	B	19		MS

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

Method: P
Instrument ID: 16315
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium	455.40		0.64
Boron			
Calcium	317.93		33.4
Chromium	267.72		1.2
Cobalt	228.62		0.76
Lithium	670.78		4.0
Selenium			
Thallium	190.86		7.3

Comments:

_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 10
INSTRUMENT DETECTION LIMITS (QUARTERLY)
SDG No.: GEJ47

Method: P
Instrument ID: 16417
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium			
Boron	249.67		8.4
Calcium			
Chromium			
Cobalt			
Lithium			
Selenium	196.09		5.8
Thallium			

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 10
INSTRUMENT DETECTION LIMITS (QUARTERLY)
SDG No.: GEJ47

Method: P
Instrument ID: 23290
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium			
Boron	249.67		8.4
Calcium			
Chromium			
Cobalt			
Lithium			
Selenium	196.09		4.4
Thallium	190.86		5.4

Comments:

_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Instrument ID: 11332
Date: 07/2018

Analyte	MASS (amu)	Background	IDL (UG/L)
Antimony	121		0.34
Arsenic	75		0.40
Beryllium	9		0.018
Cadmium	111		0.14
Lead	208		0.20
Molybdenum	98		0.25

Comments:

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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Instrument ID: 17384
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Mercury	254.00		0.050

Comments:

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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ47
Matrix: WATER

Method: P
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium	455.40		10.0	1.0
Boron	249.67		100	12.0
Calcium	317.93		1000	33.0
Chromium	267.72		30.0	5.3
Cobalt	228.62		10.0	1.5
Lithium	670.78		100	11.0
Selenium	196.09		100	21.0
Thallium	190.86		60.0	14.0

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ47
Matrix: WATER

Method: MS
Date: 07/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony	121		4.0	0.41
Arsenic	75		4.0	0.68
Beryllium	9		1.0	0.091
Cadmium	111		2.0	0.15
Lead	208		6.0	1.1
Molybdenum	98		4.0	0.31

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ47
Matrix: WATER

Method: CV
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Mercury	254.00		0.20	0.050

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
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_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 15
ICP-MS TUNE
SDG No.: GEJ47
Matrix: WATER

Instrument ID: 11332
Date: 08/28/2018

Analyte	Mass	Avg. Measured Mass (amu)	Avg. Peak Width at 5% Peak Height (amu)	%RSD
Lithium	6.000	6.10	0.60	1.0
Magnesium	24.000	24.05	0.65	1.0
Rhodium	103.000	103.00	0.60	1.5
Indium	115.000	114.95	0.60	1.5
Cerium	140.000	140.00	0.60	1.6
Lead	208.000	208.00	0.70	2.9
Uranium	238.000	238.05	0.70	1.7

Comments:

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QUALITY ASSURANCE SUMMARY
FORM 15
ICP-MS TUNE
SDG No.: GEJ47
Matrix: WATER

Instrument ID: 11332
Date: 08/30/2018

Analyte	Mass	Avg. Measured Mass (amu)	Avg. Peak Width at 5% Peak Height (amu)	%RSD
Lithium	6.000	6.05	0.65	1.9
Magnesium	24.000	24.00	0.65	1.6
Rhodium	103.000	102.95	0.60	1.7
Indium	115.000	115.00	0.60	2.2
Cerium	140.000	140.00	0.60	2.1
Lead	208.000	208.05	0.65	2.7
Uranium	238.000	238.10	0.70	2.6

Comments:

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QUALITY ASSURANCE SUMMARY
FORM 15
ICP-MS TUNE
SDG No.: GEJ47
Matrix: WATER

Instrument ID: 11332
Date: 09/05/2018

Analyte	Mass	Avg. Measured Mass (amu)	Avg. Peak Width at 5% Peak Height (amu)	%RSD
Lithium	6.000	6.05	0.65	1.9
Magnesium	24.000	23.95	0.65	3.3
Rhodium	103.000	102.95	0.60	3.2
Indium	115.000	115.00	0.55	4.0
Cerium	140.000	140.00	0.60	3.5
Lead	208.000	208.00	0.65	3.2
Uranium	238.000	238.05	0.70	1.9

Comments:

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ47

Instrument ID: 11332
Run Name: 1824106E03

Start Date: 08/29/2018
End Date: 08/29/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-2-209	PB	GE-1-72	BE
IN-2-115	CD		

Lab Sample ID	Time	Internal Standards %RI For: Element GE-1-72	Q	Element IN-2-115	Q	Element BI-2-209	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	15:28	100		100		100									
S	15:31	105		103		104									
ICV	15:33	100		100		101									
ICB	15:35	95		94		93									
LLC	15:38	101		101		103									
ICSA	15:40	99		95		96									
LRS2	15:42	99		92		92									
LRS3	15:44	99		95		100									
CCS	15:47	97		91		92									
CCS	15:49	94		94		97									
CCV	15:51	99		96		97									
CCB	15:54	97		98		99									
P22604AB	15:56	99		90		94									
P22604AQ	15:58	101		92		95									
*46739BKG	16:01	88		87		82									
ZZZZZZ	16:03														
ZZZZZZ	16:05														
ZZZZZZ	16:08														
ZZZZZZ	16:10														
*46739L	16:12	114		107		101									
9744060	16:14	115		108		104									
CCV	16:17	120		109		104									
CCB	16:19	113		111		106									
9744061	16:21	117		108		105									
9744062	16:24	120		105		103									
9744063	16:26	115		110		106									
ZZZZZZ	16:28														
ZZZZZZ	16:31														
ZZZZZZ	16:33														
ZZZZZZ	16:35														
ZZZZZZ	16:37														
ZZZZZZ	16:40														

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ47

Instrument ID: 11332 Start Date: 08/29/2018
Run Name: 1824106E03 End Date: 08/29/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-2-209	PB	GE-1-72	BE
IN-2-115	CD		

Lab Sample ID	Time	Internal Standards %RI For: Element GE-1-72	Q	Element IN-2-115	Q	Element BI-2-209	Q	Element	Q	Element	Q	Element	Q	Element	Q
CCV	16:42	120		113		111									
CCB	16:44	114		104		100									

LEGEND:
BKG = Background MS = Matrix Spike
DUP = Duplicate MSD = Matrix Spike Duplicate
L = Serial Dilution A = Post Digest Spike
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium LI = Lithium
BI = Bismuth SC = Scandium
GE = Germanium TB = Terbium
HO = Holmium Y = Yttrium
IN = Indium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ47

Instrument ID: 11332
Run Name: 1824210E03

Start Date: 08/30/2018
End Date: 08/30/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-2-115	AS,MO,SB		

Lab Sample ID	Time	Internal Standards %RI For: Element IN-2-115	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	22:23	100													
S	22:25	109													
ICV	22:27	106													
ICB	22:30	102													
LLC	22:32	96													
ICSA	22:34	99													
LRS2	22:37	95													
LRS3	22:39	97													
CCS	22:41	93													
CCS	22:44	90													
CCV	22:46	99													
CCB	22:48	92													
P22604AB	22:51	100													
P22604AQ	22:53	102													
*46739BKG	22:55	87													
ZZZZZZ	22:57														
ZZZZZZ	23:00														
ZZZZZZ	23:02														
ZZZZZZ	23:04														
*46739L	23:07	109													
9744060	23:09	118													
CCV	23:11	119													
CCB	23:14	112													
9744061	23:16	113													
9744062	23:18	111													
9744063	23:21	115													
ZZZZZZ	23:23														
ZZZZZZ	23:25														
ZZZZZZ	23:27														
ZZZZZZ	23:30														
ZZZZZZ	23:32														
CCV	23:34	114													

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ47

Instrument ID: 11332 Start Date: 08/30/2018
Run Name: 1824210E03 End Date: 08/30/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-2-115	AS,MO,SB		

Lab Sample ID	Time	Internal Standards %RI For: Element IN-2-115	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
CCB	23:37	110													

LEGEND:
BKG = Background MS = Matrix Spike
DUP = Duplicate MSD = Matrix Spike Duplicate
L = Serial Dilution A = Post Digest Spike
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium LI = Lithium
BI = Bismuth SC = Scandium
GE = Germanium TB = Terbium
HO = Holmium Y = Yttrium
IN = Indium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ47

Instrument ID: 11332
Run Name: 1824808E03

Start Date: 09/05/2018
End Date: 09/05/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-2-115	AS,SB	SC-1-45	BE

Lab Sample ID	Time	Internal Standards %RI For: Element SC-1-45	Q	Element IN-2-115	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	17:48	100		100											
S	17:51	99		112											
ICV	17:53	97		106											
ICB	17:55	88		100											
LLC	17:58	92		103											
ICSA	18:00	88		98											
LRS2	18:02	92		110											
LRS3	18:04	95		101											
CCS	18:07	85		93											
CCS	18:09	86		92											
CCV	18:11	99		106											
CCB	18:14	90		98											
P22604AB	18:16	91		102											
P22604AQ	18:18	96		100											
*46739BKG	18:21			87											
ZZZZZZ	18:23														
ZZZZZZ	18:25														
ZZZZZZ	18:28														
ZZZZZZ	18:30														
*46739L	18:32			108											
9744060	18:34			101											
CCV	18:37	106		110											
CCB	18:39	107		101											
9744061	18:41			115											
9744062	18:44			107											
9744063	18:46			113											
ZZZZZZ	18:48														
ZZZZZZ	18:51														
ZZZZZZ	18:53														
ZZZZZZ	18:55														
ZZZZZZ	18:58														
CCV	19:00	107		113											

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ47

Instrument ID: 11332 Start Date: 09/05/2018
Run Name: 1824808E03 End Date: 09/05/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-2-115	AS,SB	SC-1-45	BE

Lab Sample ID	Time	Internal Standards %RI For: Element SC-1-45	Q	Element IN-2-115	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
CCB	19:02	98		112											

LEGEND:
BKG = Background MS = Matrix Spike
DUP = Duplicate MSD = Matrix Spike Duplicate
L = Serial Dilution A = Post Digest Spike
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium LI = Lithium
BI = Bismuth SC = Scandium
GE = Germanium TB = Terbium
HO = Holmium Y = Yttrium
IN = Indium

Preparation and Run Logs

Metals in Liquid

Method: P
Batch Number: 182261404403

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9744060	08/14/2018	50.00	50
9744061	08/14/2018	50.00	50
9744062	08/14/2018	50.00	50
9744063	08/14/2018	50.00	50
*44390BKG	08/14/2018	50.00	50
P22604CB	08/14/2018	50.00	50
P22604CQ	08/14/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: MS
Batch Number: 182261404701

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9744060	08/14/2018	50.00	50
9744061	08/14/2018	50.00	50
9744062	08/14/2018	50.00	50
9744063	08/14/2018	50.00	50
*46739BKG	08/14/2018	50.00	50
P22604AB	08/14/2018	50.00	50
P22604AQ	08/14/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: CV
Batch Number: 182250571302

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9744060	08/13/2018	40.00	40
9744061	08/13/2018	40.00	40
9744062	08/13/2018	40.00	40
9744063	08/13/2018	40.00	40
*44386BKG	08/13/2018	40.00	40
P22571BB	08/13/2018	40.00	40
P22571BQ	08/13/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: P
Instrument ID: 16315
Run Name: 1822702T71

Run Start Date: 08/15/2018
Run End Date: 08/15/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: P
Instrument ID: 16315
Run Name: 1822702T71

Run Start Date: 08/15/2018
Run End Date: 08/15/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
CCV	1.00	06:08			X				X	X	X		X				X																								
CCB	1.00	06:10			X				X	X	X		X				X																								

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: P
Instrument ID: 23290
Run Name: 1823408T75

Run Start Date: 08/22/2018
Run End Date: 08/22/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: P
Instrument ID: 16417
Run Name: 1823410T72

Run Start Date: 08/22/2018
Run End Date: 08/23/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: MS
Instrument ID: 11332
Run Name: 1824106E03

Run Start Date: 08/29/2018
Run End Date: 08/29/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
S0	1.00	15:28				X		X				X																													
S	1.00	15:31				X		X				X																													
ICV	1.00	15:33				X		X				X																													
ICB	1.00	15:35				X		X				X																													
LLC	1.00	15:38				X		X				X																													
ICSA	1.00	15:40				X		X				X																													
LRS2	1.00	15:42				X		X				X																													
LRS3	1.00	15:44				X		X				X																													
CCS	1.00	15:47				X		X				X																													
CCS	1.00	15:49				X		X				X																													
CCV	1.00	15:51				X		X				X																													
CCB	1.00	15:54				X		X				X																													
P22604AB	1.00	15:56						X				X																													
P22604AQ	1.00	15:58						X				X																													
*46739BKG	1.00	16:01				X		X				X																													
ZZZZZZ	1.00	16:03																																						
ZZZZZZ	1.00	16:05																																						
ZZZZZZ	1.00	16:08																																						
ZZZZZZ	1.00	16:10																																						
*46739L	5.00	16:12				X		X				X																													
9744060	1.00	16:14				X		X				X																													
CCV	1.00	16:17				X		X				X																													
CCB	1.00	16:19				X		X				X																													
9744061	1.00	16:21				X		X				X																													
9744062	1.00	16:24				X		X				X																													
9744063	1.00	16:26				X		X				X																													
ZZZZZZ	1.00	16:28																																						
ZZZZZZ	1.00	16:31																																						
ZZZZZZ	1.00	16:33																																						
ZZZZZZ	1.00	16:35																																						
ZZZZZZ	1.00	16:37																																						
ZZZZZZ	1.00	16:40																																						
CCV	1.00	16:42				X		X				X																													
CCB	1.00	16:44				X		X				X																													

METHODS:	LEGEND:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	BKG = Background DUP = Duplicate MS = Matrix Spike MSD = Matrix Spike Duplicate A = Post Digest Spike L = Serial Dilution B = Blank Q = Laboratory Control Sample Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: MS
Instrument ID: 11332
Run Name: 1824210E03

Run Start Date: 08/30/2018
Run End Date: 08/30/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: MS
Instrument ID: 11332
Run Name: 1824808E03

Run Start Date: 09/05/2018
Run End Date: 09/05/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
S0	1.00	17:48	X	X		X																																			
S	1.00	17:51	X	X		X																																			
ICV	1.00	17:53	X	X		X																																			
ICB	1.00	17:55	X	X		X																																			
LLC	1.00	17:58	X	X		X																																			
ICSA	1.00	18:00	X	X		X																																			
LRS2	1.00	18:02	X	X		X																																			
LRS3	1.00	18:04	X	X		X																																			
CCS	1.00	18:07	X	X		X																																			
CCS	1.00	18:09	X	X		X																																			
CCV	1.00	18:11	X	X		X																																			
CCB	1.00	18:14	X	X		X																																			
P22604AB	1.00	18:16	X			X																																			
P22604AQ	1.00	18:18	X	X		X																																			
*46739BKG	1.00	18:21	X	X																																					
ZZZZZZ	1.00	18:23																																							
ZZZZZZ	1.00	18:25																																							
ZZZZZZ	1.00	18:28																																							
ZZZZZZ	1.00	18:30																																							
*46739L	5.00	18:32	X	X																																					
9744060	1.00	18:34		X																																					
CCV	1.00	18:37	X	X		X																																			
CCB	1.00	18:39	X	X		X																																			
9744061	1.00	18:41		X																																					
9744062	1.00	18:44		X																																					
9744063	1.00	18:46		X																																					
ZZZZZZ	1.00	18:48																																							
ZZZZZZ	1.00	18:51																																							
ZZZZZZ	1.00	18:53																																							
ZZZZZZ	1.00	18:55																																							
ZZZZZZ	1.00	18:58																																							
CCV	1.00	19:00		X																																					
CCB	1.00	19:02		X																																					

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: CV
Instrument ID: 17384
Run Name: 1822601M07

Run Start Date: 08/14/2018
Run End Date: 08/14/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ47

Method: CV
Instrument ID: 17384
Run Name: 1822601M07

Run Start Date: 08/14/2018
Run End Date: 08/14/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
P22571BB	1.00	08:34												X																											
P22571BQ	1.00	08:36												X																											
*44386BKG	1.00	08:38												X																											
ZZZZZZ	1.00	08:40																																							
ZZZZZZ	1.00	08:42																																							
ZZZZZZ	1.00	08:44																																							
9744060	1.00	08:46												X																											
CCV	1.00	08:48												X																											
CCB	1.00	08:50												X																											
9744061	1.00	08:52												X																											
9744062	1.00	08:55												X																											
9744063	1.00	08:57												X																											
ZZZZZZ	1.00	08:59																																							
ZZZZZZ	1.00	09:01																																							
ZZZZZZ	1.00	09:03																																							
ZZZZZZ	1.00	09:05																																							
ZZZZZZ	1.00	09:07																																							
ZZZZZZ	1.00	09:09																																							
ZZZZZZ	1.00	09:11																																							
CCV	1.00	09:13												X																											
CCB	1.00	09:15												X																											

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

Instrumental Wet Chemistry Data

Case Narrative/Conformance Summary

Instrumental Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

Sample #	Client ID	Matrix Liquid	Solid	Comments
9744060	MW-3	X		
9744061	MW-4	X		
9744062	MW-5	X		
9744063	FB-20180807	X		Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

SAMPLE ANALYSIS:

Samples	Chloride	Fluoride	Sulfate
9744060	DF100	DF5	DF5
9744061	DF5	DF5	DF5

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

Samples	Chloride	Fluoride	Sulfate
9744062	DF50	DF5	DF10
9744063	DF1	DF1	DF1

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

Quality Control and Calibration Summary Forms

Instrumental Wet Chemistry

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Quality Control Reference List
Instrumental Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

Fraction: Instrumental Wet Chemistry

Batch Number	Sample Number	Analysis Date	Chloride	Fluoride	Sulfate
18227837109A	P22737IB	08/15/2018 11:40:00	X	X	X
	P22737IQ	08/15/2018 11:22:00	X	X	X
18227837109B	9744060	08/15/2018 20:48:00		X	X
	9744060	08/18/2018 19:14:00	X		
	9744061	08/15/2018 21:41:00	X	X	X
	9744062	08/15/2018 22:34:00		X	
	9744062	08/18/2018 19:49:00			X
	9744062	08/18/2018 20:06:00	X		
	9744063	08/15/2018 23:45:00	X	X	X

Quality Control Summary
Method Blank
Instrumental Water Quality
SDG: GEJ47
Matrix: LIQUID

Fraction: Instrumental Wet Chemistry

18227837109A / P22737IB Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Chloride	IC	08/15/18	N.D.	mg/l	0.20	0.40
Fluoride	IC	08/15/18	N.D.	mg/l	0.050	0.10
Sulfate	IC	08/15/18	N.D.	mg/l	0.30	1.0

Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ47
Matrix: LIQUID

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

LCS: P22737IQ	Batch: **18227837109B** (Sample number(s): 9744060-9744063)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	3.00	2.77	NA	92	NA	90-110	NA	NA
Fluoride	IC	0.750	0.701	NA	94	NA	90-110	NA	NA
Sulfate	IC	7.50	7.01	NA	93	NA	90-110	NA	NA

Instrument ID: 18919
Calibration Date: 07/20/2018

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	0.625258	1.165384	3.007012	5.849180	9.033771	0.9990	0.9995
Sulfate	0.363846	0.720188	1.866154	3.669929	5.760123	0.9994	0.9997

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18227837109B
Run Start Dates: 08/17/2018
Run Names: 1822902D12

	Chloride			Sulfate		
Sample	True	Result	%Rec	True	Result	%Rec
ICV	3	3.1344	104	7.5	7.8963	105
ICB	0	ND	NA	0	ND	NA
CCV2	3	2.9693	99	7.5	7.5874	101
CCB	0	ND	NA	0	ND	NA
CCV2	3	2.9839	99	7.5	7.5816	101
CCB	0	ND	NA	0	ND	NA

* = Out of Specifications

Instrument ID: 17694
Calibration Date: 08/08/2018

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18227837109B
Run Start Dates: 08/15/2018
Run Names: 1822701D09

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	0.572015	1.115551	2.842117	5.688816	8.540717	0.9995	0.9998
Fluoride	0.140763	0.562585	1.505117	3.218560	5.073797	0.9993	0.9997
Sulfate	0.349346	0.717126	1.872626	3.881805	6.020595	0.9998	0.9999

	Chloride			Sulfate			Fluoride		
Sample	True	Result	%Rec	True	Result	%Rec	True	Result	%Rec
ICV	3	2.9657	99	7.5	7.1851	96	0.75	0.7460	99
ICB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7890	93	7.5	7.0997	95	0.75	0.7050	94
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7738	92	7.5	7.0887	95	0.75	0.6906	92
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7570	92	7.5	6.9972	93	0.75	0.7283	97
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7560	92	7.5	7.0150	94	0.75	0.7231	96
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7695	92	7.5	7.0281	94	0.75	0.7076	94
CCB	0	ND	NA	0	ND	NA	0	ND	NA

* = Out of Specifications

Fraction: Instrumental Wet Chemistry

00224: Chloride Analyte Name	Default MDL	Default LOQ	Units
Chloride	0.20	0.40	mg/l

01504: Fluoride Analyte Name	Default MDL	Default LOQ	Units
Fluoride	0.050	0.10	mg/l

00228: Sulfate Analyte Name	Default MDL	Default LOQ	Units
Sulfate	0.30	1.0	mg/l

Wet Chemistry Data

Case Narrative/Conformance Summary

Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

Water Quality

Fraction: Wet Chemistry

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9744060	MW-3	X		1	
9744061	MW-4	X		1	
9744062	MW-5	X		1	
9744063	FB-20180807	X		1	Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

Sample Duplicate

Method defined actions are taken for any failed matrix QC.

Batch#: 18225921202A (Sample number(s): 9744060, 9744062-9744063, BKG: 9744062)
The duplicate RPD for the following analyte(s) is outside the acceptance window: Total Dissolved Solids

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

Water Quality

Fraction: Wet Chemistry

SAMPLE ANALYSIS:

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

QC Summary

Wet Chemistry

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

Fraction: Wet Chemistry

Analysis	Batch Number	Sample Number	Analysis Date
Total Dissolved Solids	18221921202A	B221872B	08/09/2018 16:27
		L221872Q	08/09/2018 16:27
		9744061	08/09/2018 16:26
Total Dissolved Solids	18225921202A	B225872B	08/13/2018 15:10
		L225872Q	08/13/2018 15:10
		9744060	08/13/2018 15:08
		9744062 BKG	08/13/2018 15:10
		9744062 DUP	08/13/2018 15:11
		9744063	08/13/2018 15:08

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ47

Fraction: Wet Chemistry

Batch Number	Sample Number	Analysis Date	pH	Temperature of pH
18221009206A	9744061	08/10/2018 11:22:00	X	X
	9744063	08/10/2018 11:33:00	X	X
	P009206Q	08/10/2018 10:32:00	X	
18221009207A	9744062	08/10/2018 12:40:00	X	X
	P009207Q	08/10/2018 12:13:00	X	
18225121521A	9744060	08/13/2018 17:20:00	X	X
	P225121Q	08/13/2018 17:20:00	X	

Quality Control Summary
Method Blank
Water Quality
SDG: GEJ47
Matrix: LIQUID

Fraction: Wet Chemistry

18221921202A / B221872B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	08/09/18	N.D.	mg/l	20.0	60.0

18225921202A / B225872B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	08/13/18	N.D.	mg/l	20.0	60.0

Water Quality
Fraction: Wet Chemistry

BKG: 9744062 DUP: 9744062 **Parameter**	Batch: **18225921202A** (Sample number(s): 9744060, 9744062-9744063) **ME**	**Unspiked Conc mg/l**	**DUP Conc mg/l**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	614.	662.	8* (1)	5

Comments:
(1) The sample and/or duplicate result is less than five times the LOQ.
* = Out of Specification

Results are being reported on an as received basis.

Water Quality
Fraction: Wet Chemistry

LCS: P009206Q	Batch: **18221009206A** (Sample number(s): 9744061, 9744063)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	7.07	NA	101	NA	95-105	NA	NA

LCS: P009207Q	Batch: **18221009207A** (Sample number(s): 9744062)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	7.05	NA	101	NA	95-105	NA	NA

LCS: L221872Q	Batch: **18221921202A** (Sample number(s): 9744061)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	202	NA	101	NA	62-127	NA	NA

LCS: P225121Q	Batch: **18225121521A** (Sample number(s): 9744060)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	6.99	NA	100	NA	95-105	NA	NA

LCS: L225872Q	Batch: **18225921202A** (Sample number(s): 9744060, 9744062-9744063)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	188	NA	94	NA	62-127	NA	NA

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LOQ/MDL Summary
Water Quality

SDG: GEJ47

Fraction: Wet Chemistry

12152: pH Analyte Name	Default MDL	Default LOQ	Units
pH	0.010	0.010	Std. Units

12151: Temperature of pH Analyte Name	Default MDL	Default LOQ	Units
Temperature of pH	0.010	0.010	Degrees C

00212: Total Dissolved Solids Analyte Name	Default MDL	Default LOQ	Units
Total Dissolved Solids	20.0	60.0	mg/l

GEL Laboratories LLC
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September 10, 2018

Ms. Madeline Ratcliff
Eurofins Lancaster Laboratories
2425 New Holland Pike
P.O. Box 12425
Lancaster, Pennsylvania 17601-5994

Re: Radiochemistry Analyses - GELP15-1046
Work Order: 456946

Dear Ms. Ratcliff:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 10, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Taylor Cannon for
Julie Robinson
Project Manager

Purchase Order: GELP15-0603
Chain of Custody: 1974425
Enclosures

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis Report
for

LANC001 Eurofins Lancaster Laboratories

Client SDG: 456946 GEL Work Order: 456946

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by _____

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 10, 2018

Company :	Eurofins Lancaster Laboratories
Address :	2425 New Holland Pike P.O. Box 12425 Lancaster, Pennsylvania 17601--5994
Contact:	Ms. Madeline Ratcliff
Project:	Radiochemistry Analyses - GELP15-1046

Client Sample ID:	MW-3	Project:	LANC00115
Sample ID:	456946001	Client ID:	LANC001
Matrix:	Water		
Collect Date:	07-AUG-18 14:35		
Receive Date:	10-AUG-18		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Ra228, Liquid "As Received"													
Radium-228		2.55	+/-1.05	1.40	3.00	pCi/L			JXC9	08/28/18	1114	1792303	1
Rad Radium-226													
Lucas Cell, Ra226, liquid "As Received"													
Radium-226		1.42	+/-0.419	0.378	1.00	pCi/L			PCW	08/21/18	0725	1792029	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			90.4	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 10, 2018

Company :	Eurofins Lancaster Laboratories
Address :	2425 New Holland Pike P.O. Box 12425 Lancaster, Pennsylvania 17601--5994
Contact:	Ms. Madeline Ratcliff
Project:	Radiochemistry Analyses - GELP15-1046

Client Sample ID:	MW-4	Project:	LANC00115
Sample ID:	456946002	Client ID:	LANC001
Matrix:	Water		
Collect Date:	07-AUG-18 09:30		
Receive Date:	10-AUG-18		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Ra228, Liquid "As Received"													
Radium-228	U	0.705	+/-0.818	1.37	3.00	pCi/L			JXC9	08/28/18	1114	1792303	1
Rad Radium-226													
Lucas Cell, Ra226, liquid "As Received"													
Radium-226	U	0.0235	+/-0.138	0.289	1.00	pCi/L			PCW	08/21/18	0725	1792029	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			85.8	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 10, 2018

Company :	Eurofins Lancaster Laboratories
Address :	2425 New Holland Pike P.O. Box 12425 Lancaster, Pennsylvania 17601--5994
Contact:	Ms. Madeline Ratcliff
Project:	Radiochemistry Analyses - GELP15-1046

Client Sample ID:	MW-5	Project:	LANC00115
Sample ID:	456946003	Client ID:	LANC001
Matrix:	Water		
Collect Date:	07-AUG-18 11:25		
Receive Date:	10-AUG-18		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Ra228, Liquid "As Received"													
Radium-228		1.36	+/-0.829	1.20	3.00	pCi/L			JXC9	08/28/18	1114	1792303	1
Rad Radium-226													
Lucas Cell, Ra226, liquid "As Received"													
Radium-226		0.426	+/-0.273	0.383	1.00	pCi/L			PCW	08/21/18	0725	1792029	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			81.1	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 10, 2018

Company :	Eurofins Lancaster Laboratories
Address :	2425 New Holland Pike P.O. Box 12425 Lancaster, Pennsylvania 17601--5994
Contact:	Ms. Madeline Ratcliff
Project:	Radiochemistry Analyses - GELP15-1046

Client Sample ID:	FB-20180807	Project:	LANC00115
Sample ID:	456946004	Client ID:	LANC001
Matrix:	Water		
Collect Date:	07-AUG-18 12:30		
Receive Date:	10-AUG-18		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Ra228, Liquid "As Received"													
Radium-228	U	0.465	+/-0.752	1.31	3.00	pCi/L			JXC9	08/28/18	1115	1792303	1
Rad Radium-226													
Lucas Cell, Ra226, liquid "As Received"													
Radium-226	U	0.166	+/-0.154	0.227	1.00	pCi/L			PCW	08/21/18	0725	1792029	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			84.6	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC
2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: September 10, 2018

Eurofins Lancaster Laboratories
2425 New Holland Pike
P.O. Box 12425
Lancaster, Pennsylvania

Contact: **Ms. Madeline Ratcliff**

Workorder: **456946**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch 1792303											
QC1204091407 456941002 DUP											
Radium-228	U	0.243	U	1.20	pCi/L	N/A		N/A	JXC9	08/28/18	11:22
	Uncertainty	+/-0.825		+/-1.10							
QC1204091408 LCS											
Radium-228	17.6			15.3	pCi/L		87.2	(75%-125%)		08/28/18	11:22
	Uncertainty			+/-2.06							
QC1204091406 MB											
Radium-228			U	0.648	pCi/L					08/28/18	11:22
	Uncertainty			+/-1.05							
Rad Ra-226											
Batch 1792029											
QC1204090851 456941002 DUP											
Radium-226		1.20		1.05	pCi/L	12.9		(0% - 100%)	PCW	08/21/18	08:00
	Uncertainty	+/-0.365		+/-0.357							
QC1204090854 LCS											
Radium-226	26.0			22.9	pCi/L		88.3	(75%-125%)		08/21/18	08:35
	Uncertainty			+/-1.56							
QC1204090850 MB											
Radium-226			U	0.0736	pCi/L					08/21/18	08:00
	Uncertainty			+/-0.186							
QC1204090852 456941002 MS											
Radium-226	130	1.20		103	pCi/L		78.4	(75%-125%)		08/21/18	08:35
	Uncertainty	+/-0.365		+/-6.90							
QC1204090853 456941002 MSD											
Radium-226	130	1.20		112	pCi/L	8.4	85.4	(0%-20%)		08/21/18	08:35
	Uncertainty	+/-0.365		+/-7.25							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

** Analyte is a Tracer compound

< Result is less than value reported

QC Summary

Workorder: **456946**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Radiochemistry
Technical Case Narrative
Eurofins Lancaster Laboratories (LEANC)
SDG #: 456946

Product: **GFPC, Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 2
Analytical Batch: 1792303

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
456946001	MW-3
456946002	MW-4
456946003	MW-5
456946004	FB-20180807
1204091406	Method Blank (MB)
1204091407	456941002(NonSDG) Sample Duplicate (DUP)
1204091408	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Samples were re-eluted and recounted due to a suspected blank false positive. The recounts are reported.

Product: **Lucas Cell, Ra226, liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 1792029

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
456946001	MW-3
456946002	MW-4
456946003	MW-5
456946004	FB-20180807
1204090850	Method Blank (MB)
1204090851	456941002(NonSDG) Sample Duplicate (DUP)
1204090852	456941002(NonSDG) Matrix Spike (MS)

1204090853	456941002(NonSDG) Matrix Spike Duplicate (MSD)
1204090854	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204090852 (Non SDG 456941002MS) and 1204090853 (Non SDG 456941002MSD), aliquots were reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

4569416

Acct. # _____ Group # 1974425 Sample # 9744066-69

| | | |

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: LANC	**SDG/AR/COC/Work Order:** 456946
Received By: ZKW	**Date Received:** 8/10/18
Carrier and Tracking Number	Circle Applicable: (FedEx Express) FedEx Ground UPS Field Services Courier Other 5035 4244 9071 5035 4244 9060

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 (CPM) / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	**Comments/Qualifiers (Required for Non-Conforming Items)**
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		✓		Preservation Method: Wet Ice Ice Packs Dry ice (None) Other: *all temperatures are recorded in Celsius TEMP: 12°c
4	Daily check performed and passed on IR temperature gun?	✓			**Temperature Device Serial #:** IR3-18 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	✓			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes___ No___ N/A___ (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials TMC Date 8/13/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

List of current GEL Certifications as of 10 September 2018

State	Certification
Alaska	17−018
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

eurofins | Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 | 717-656-2300 | Fax: 717-656-2681 | www.LancasterLabs.com

Type III Data Package

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Project: PSEG Mercer
Groundwater and Water Samples
Collected on 09/04/18

SDG# GEJ52

GROUP	SAMPLE NUMBERS
1984789	9792212-9792218

PA Cert. # 36-00037
NY Cert. # 10670
NJ Cert. # PA011
NC Cert. # 521
TX Cert. # T104704194-13-10
AZ Cert. # AZ0780

Through our technical processes and second person review of data, we have established that our data/deliverables are in compliance with the methods and project requirements unless otherwise noted or previously resolved with the client.

Authorized by: Dana M Kauffman **Date:** **09/24/2018**

Dana M. Kauffman
Manager

Any questions or concerns you might have regarding this data package should be directed to your client representative, Kerri Sachtleben at (717)-556-7376.

2425 New Holland Pike, Lancaster, PA 17601 | 717-656-2300 | Fax: 717-656-2681 | www.LancasterLabs.com

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Sample Reference List for SDG Number GEJ52 with a Data Package Type of III

07701 - GEI Consultants, Inc.

Project: PSEG Mercer

Lab Sample Number	Client Sample ID	Collection Date	Date Received
9792212	MW-4	09/04/2018 11:25	09/07/2018 17:00
9792213	MW-6	09/04/2018 11:30	09/07/2018 17:00
9792214	MW-2	09/04/2018 13:30	09/07/2018 17:00
9792215	MW-5	09/04/2018 13:50	09/07/2018 17:00
9792216	MW-1	09/04/2018 15:45	09/07/2018 17:00
9792217	MW-3	09/04/2018 15:50	09/07/2018 17:00
9792218	FB-09042018	09/04/2018 13:15	09/07/2018 17:00

eurofins | Lancaster Laboratories

Sample pH Log

SDG: GEJ52

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9792212	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:32:59PM	12190
9792212	015A	9	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:17:55PM	25804
9792212	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:57:29PM	12665
9792212	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:57:49PM	12665
9792212	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 2:56:09PM	12190
9792212	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/10/2018 12:52:39PM	12644
9792212	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:32:59PM	12190
9792212	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:32:59PM	12190
9792213	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:44:15PM	12190
9792213	015A	9	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:21:40PM	25804
9792213	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:56:52PM	12665
9792213	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:57:09PM	12665
9792213	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 2:57:14PM	12190
9792213	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/10/2018 5:56:17PM	1532
9792213	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:44:15PM	12190
9792213	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:44:15PM	12190
9792214	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:01:25PM	12190
9792214	015A	9	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:17:04PM	25804
9792214	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:56:11PM	12665
9792214	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:56:35PM	12665
9792214	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:04:15PM	12190
9792214	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/10/2018 12:40:18PM	12644
9792214	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:01:25PM	12190
9792214	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:01:25PM	12190
9792215	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:31:02PM	12190
9792215	015A	9	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:19:17PM	25804
9792215	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:55:31PM	12665
9792215	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:55:50PM	12665
9792215	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 2:55:33PM	12190
9792215	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/10/2018 1:45:58PM	12644
9792215	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:31:02PM	12190
9792215	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:31:02PM	12190
9792216	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:35:36PM	12190
9792216	015A	9	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:20:52PM	25804
9792216	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:53:23PM	12665
9792216	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:55:15PM	12665
9792216	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 2:56:43PM	12190
9792216	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/10/2018 1:30:33PM	12644

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9792216	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:35:36PM	12190
9792216	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:35:36PM	12190
9792217	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:46:38PM	12190
9792217	015A	9	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:11:33PM	25804
9792217	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:52:50PM	12665
9792217	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:53:06PM	12665
9792217	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 2:58:26PM	12190
9792217	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/10/2018 5:58:44PM	1532
9792217	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:46:38PM	12190
9792217	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:46:38PM	12190
9792218	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 1:54:11PM	12190
9792218	015A	9	5-7	PC	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:15:52PM	25804
9792218	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:52:07PM	12665
9792218	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 12:52:33PM	12665
9792218	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 3:09:55PM	12190
9792218	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/10/2018 12:30:47PM	12644
9792218	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 1:54:11PM	12190
9792218	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	9/8/2018 1:54:11PM	12190

***pH Check Code Key**
PK = Original container checked - pH is within the correct range. (No preservative was added)
PA = Original container checked - pH adjusted to correct range. (Preservative was added)
PV = Volatile container checked
PC = pH checked (unpreserved container)
SPK = Subsampled from an original container. Original container checked - pH is within correct range
SPA = Subsampled from an original container. Subsample container checked - pH adjusted to correct range.
SPC = Subsampled from an original container. pH checked (unpreserved container).
SUP = Subsampled from original container. Unable to be preserved due to the matrix of the sample.
UP = Unable to preserve due to matrix of the sample.
NA = Not applicable

****Chlorine Present Code Key**
NA = Chlorine Not Checked
Y = Chlorine Present
N = Chlorine Not Present

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00259 Mercury

The solution resulting from the mercury digestion is analyzed by Cold Vapor AA.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

14044 ICP-WW, 3005A (tot rec) - U5

The sample is digested with nitric acid and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3005A, July 1992

14047 ICPMS - Water, 3020A - U5

The sample is digested with nitric and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3020A, July 1992

05713 WW SW846 Hg Digest

The sample is heated at 95 c with nitric acid, sulfuric acid, potassium persulfate, and potassium permanganate. Excess potassium permanganate is reduced with sodium chloride/hydroxylamine hydrochloride. Mercuric ions are reduced to mercury metal using stannous chloride.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

07046 Barium
08014 Boron
01750 Calcium
07051 Chromium
07052 Cobalt
01756 Lithium
07036 Selenium
07022 Thallium

The solution resulting from the metals digestion is analyzed by Trace ICP.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6010D, Rev. 4, July 2014.

06024 Antimony
06025 Arsenic
06027 Beryllium
06028 Cadmium
06035 Lead
06038 Molybdenum

The solution resulting from the metals digestion is analyzed by ICP/MS.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6020B, Rev.2, July 2014.

00224 Chloride
01504 Fluoride
00228 Sulfate

A small volume of sample is introduced into an ion chromatograph. The anions are then separated and measured by a system consisting of a guard column, separator column, suppressor, and conductivity detector.

Reference: Method 300.0, Revision 2.1 (1993), Methods for Chemical Analysis of Water and Wastes USEPA 600.

12152 pH

The activity of hydrogen ions in the sample is measured using a glass electrode and a reference electrode.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 4500-H+ B-2011

00212 Total Dissolved Solids

A well-mixed sample is filtered through a glass fiber filter. The filtrate is collected in a tared beaker, evaporated in a steam bath and dried in an oven at 180C +/- 2C to a constant weight. The increase in weight is the total dissolved solids.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2540 C-2011

12151 Temperature of pH

The temperature of the sample measured during the pH analysis.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2550 B-2010

Analysis Reports / Field Chain of Custody

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Report Date: September 21, 2018 16:44

Project: PSEG Mercer

Account #: 07701
Group Number: 1984789
SDG: GEJ52
PO Number: 1504710
State of Sample Origin: NJ

Electronic Copy To	GEI Consultants, Inc.	Attn: Jason Kohl
Electronic Copy To	GEI Consultants, Inc.	Attn: Data Group

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-4 Grab Groundwater	09/04/2018 11:25	9792212
MW-6 Grab Groundwater	09/04/2018 11:30	9792213
MW-2 Grab Groundwater	09/04/2018 13:30	9792214
MW-5 Grab Groundwater	09/04/2018 13:50	9792215
MW-1 Grab Groundwater	09/04/2018 15:45	9792216
MW-3 Grab Groundwater	09/04/2018 15:50	9792217
FB-09042018 Grab Water	09/04/2018 13:15	9792218

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: GEI Consultants, Inc.
Project: PSEG Mercer
Sampling Date(s): 09/04/18
Laboratory Sample ID(s): 9792212-9792218
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	Yes
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No
Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality." *The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.		

Christiane S. Swelgart
Senior Specialist

09/21/2018



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Project Name: PSEG Mercer
ELLE Group #: 1984789

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Sample #s: 9792212-9792217

The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 9792212, 9792213, 9792214, 9792215, 9792216, 9792217, 9792218

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.

Sample Description: **MW-4 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 11:25
SDG#: GEJ52-01

GEI Consultants, Inc.
ELLE Sample #: GW 9792212
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0186	0.0010	0.0100	1
08014	Boron	7440-42-8	0.0388 J	0.0120	0.100	1
01750	Calcium	7440-70-2	6.17	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
07052	Cobalt	7440-48-4	0.0022 J	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.100	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0040	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.0010	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0012 J	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	1.8 J	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	3.5 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	45.5 J	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 11:25
SDG#: GEJ52-01

GEI Consultants, Inc.
ELLE Sample #: GW 9792212
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.8	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:11	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:34	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:34	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:34	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:34	Patrick J Engle	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 11:25
SDG#: GEJ52-01

GEI Consultants, Inc.
ELLE Sample #: GW 9792212
ELLE Group #: 1984789
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:34	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182541404701C	09/20/2018 14:34	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	182540571302	09/12/2018 08:09	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182541404402	09/12/2018 06:23	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182541404701	09/12/2018 06:17	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182540571302	09/11/2018 16:10	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18253520206B	09/11/2018 09:13	Ashlynn M Cornelius	5
01504	Fluoride	EPA 300.0	1	18253520206B	09/11/2018 09:13	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	18253520206B	09/11/2018 09:13	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18253921201A	09/10/2018 15:31	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18254006204B	09/12/2018 01:25	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18254006204B	09/12/2018 01:25	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 11:30
SDG#: GEJ52-02

GEI Consultants, Inc.
ELLE Sample #: GW 9792213
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.193	0.0010	0.0100	1
08014	Boron	7440-42-8	0.0990 J	0.0120	0.100	1
01750	Calcium	7440-70-2	29.9	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.100	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0040	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.0010	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.00076 J	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	226	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	2.4 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	434	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 11:30
SDG#: GEJ52-02

GEI Consultants, Inc.
ELLE Sample #: GW 9792213
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.9	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.6	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:14	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:37	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:37	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:37	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:37	Patrick J Engle	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 11:30
SDG#: GEJ52-02

GEI Consultants, Inc.
ELLE Sample #: GW 9792213
ELLE Group #: 1984789
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:37	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182541404701C	09/20/2018 14:37	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	182540571302	09/12/2018 08:11	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182541404402	09/12/2018 06:23	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182541404701	09/12/2018 06:17	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182540571302	09/11/2018 16:10	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18253520206B	09/11/2018 10:07	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18253520206B	09/11/2018 09:49	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	18253520206B	09/11/2018 09:49	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18253921203A	09/10/2018 16:10	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18254006204A	09/12/2018 02:11	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18254006204A	09/12/2018 02:11	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:30
SDG#: GEJ52-03

GEI Consultants, Inc.
ELLE Sample #: GW 9792214
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.200	0.0010	0.0100	1
08014	Boron	7440-42-8	0.898	0.0120	0.100	1
01750	Calcium	7440-70-2	108	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
07052	Cobalt	7440-48-4	0.0087 J	0.0015	0.0100	1
01756	Lithium	7439-93-2	0.0831 J	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.100	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0040	1
06025	Arsenic	7440-38-2	0.00079 J	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.0010	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0880	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	86.8	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	171	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	603	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:30
SDG#: GEJ52-03

GEI Consultants, Inc.
ELLE Sample #: GW 9792214
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.9	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:21	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:40	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:40	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:40	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:40	Patrick J Engle	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:30
SDG#: GEJ52-03

GEI Consultants, Inc.
ELLE Sample #: GW 9792214
ELLE Group #: 1984789
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:40	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182541404701C	09/20/2018 14:40	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	182540571302	09/12/2018 08:13	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182541404402	09/12/2018 06:23	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182541404701	09/12/2018 06:17	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182540571302	09/11/2018 16:10	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18253520206B	09/11/2018 10:44	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18253520206B	09/11/2018 10:26	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	18253520206B	09/11/2018 10:44	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18253921202A	09/10/2018 15:53	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18254006204A	09/12/2018 01:55	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18254006204A	09/12/2018 01:55	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:50
SDG#: GEJ52-04

GEI Consultants, Inc.
ELLE Sample #: GW 9792215
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.201	0.0010	0.0100	1
08014	Boron	7440-42-8	0.400	0.0120	0.100	1
01750	Calcium	7440-70-2	90.7	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.100	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0040	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.0010	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0175	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals** The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	115	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	110	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	626	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:50
SDG#: GEJ52-04

GEI Consultants, Inc.
ELLE Sample #: GW 9792215
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.9	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:24	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:42	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:42	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:42	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:42	Patrick J Engle	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:50
SDG#: GEJ52-04

GEI Consultants, Inc.
ELLE Sample #: GW 9792215
ELLE Group #: 1984789
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:42	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182541404701C	09/20/2018 14:42	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	182540571302	09/12/2018 08:15	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182541404402	09/12/2018 06:23	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182541404701	09/12/2018 06:17	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182540571302	09/11/2018 16:10	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18253520206B	09/11/2018 11:57	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18253520206B	09/11/2018 11:02	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	18253520206B	09/11/2018 11:57	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18253921201A	09/10/2018 15:31	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18254006204A	09/12/2018 01:59	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18254006204A	09/12/2018 01:59	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 15:45
SDG#: GEJ52-05

GEI Consultants, Inc.
ELLE Sample #: GW 9792216
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.174	0.0010	0.0100	1
08014	Boron	7440-42-8	1.00	0.0120	0.100	1
01750	Calcium	7440-70-2	197	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.100	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0040	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.0010	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0035 J	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals** The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	163	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	328	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,160	160	480	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 15:45
SDG#: GEJ52-05

GEI Consultants, Inc.
ELLE Sample #: GW 9792216
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.9	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.9	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:27	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:45	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:45	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:45	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:45	Patrick J Engle	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 15:45
SDG#: GEJ52-05

GEI Consultants, Inc.
ELLE Sample #: GW 9792216
ELLE Group #: 1984789
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:45	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182541404701C	09/20/2018 14:45	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	182540571302	09/12/2018 08:17	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182541404402	09/12/2018 06:23	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182541404701	09/12/2018 06:17	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182540571302	09/11/2018 16:10	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18253520206B	09/11/2018 12:33	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18253520206B	09/11/2018 12:15	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	18253520206B	09/11/2018 12:33	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18253921201A	09/10/2018 15:31	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18254006204A	09/12/2018 02:03	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18254006204A	09/12/2018 02:03	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 15:50
SDG#: GEJ52-06

GEI Consultants, Inc.
ELLE Sample #: GW 9792217
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.181	0.0010	0.0100	1
08014	Boron	7440-42-8	0.285	0.0120	0.100	1
01750	Calcium	7440-70-2	61.6	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0100	1
01756	Lithium	7439-93-2	0.0156 J	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.100	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0040	1
06025	Arsenic	7440-38-2	0.0013 J	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.0010	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	0.0036 J	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	205	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	16.2	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	548	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 15:50
SDG#: GEJ52-06

GEI Consultants, Inc.
ELLE Sample #: GW 9792217
ELLE Group #: 1984789
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.8	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.9	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:30	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:48	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:48	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:48	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:48	Patrick J Engle	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 15:50
SDG#: GEJ52-06

GEI Consultants, Inc.
ELLE Sample #: GW 9792217
ELLE Group #: 1984789
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:48	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182541404701C	09/20/2018 14:48	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	182540571302	09/12/2018 08:19	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182541404402	09/12/2018 06:23	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182541404701	09/12/2018 06:17	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182540571302	09/11/2018 16:10	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18253520206B	09/11/2018 13:10	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18253520206B	09/11/2018 12:52	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	18253520206B	09/11/2018 12:52	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18253921201A	09/10/2018 15:31	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18254006204A	09/12/2018 01:48	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18254006204A	09/12/2018 01:48	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-09042018 Grab Water**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:15
SDG#: GEJ52-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9792218
ELLE Group #: 1984789
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D.	0.0010	0.0100	1
08014	Boron	7440-42-8	N.D.	0.0120	0.100	1
01750	Calcium	7440-70-2	0.0492 J	0.0330	1.00	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0300	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0100	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.100	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.100	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0600	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0040	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0040	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.0010	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0020	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0060	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0040	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **FB-09042018 Grab Water**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:15
SDG#: GEJ52-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9792218
ELLE Group #: 1984789
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.8	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	5.7	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182541404402	09/17/2018 13:32	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:51	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:51	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:51	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:51	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182541404701A	09/20/2018 14:51	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182541404701C	09/20/2018 14:51	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	182540571302	09/12/2018 08:21	Damary Valentin	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-09042018 Grab Water**
PSEG - Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 09/07/2018 17:00
Collection Date/Time: 09/04/2018 13:15
SDG#: GEJ52-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9792218
ELLE Group #: 1984789
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182541404402	09/12/2018 06:23	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182541404701	09/12/2018 06:17	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182540571302	09/11/2018 16:10	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18253520206B	09/11/2018 13:28	Ashlynn M Cornelius	1
01504	Fluoride	EPA 300.0	1	18253520206B	09/11/2018 13:28	Ashlynn M Cornelius	1
00228	Sulfate	EPA 300.0	1	18253520206B	09/11/2018 13:28	Ashlynn M Cornelius	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	18253921202A	09/10/2018 15:53	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18254006203A	09/12/2018 00:48	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18254006203A	09/12/2018 00:48	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1984789
Reported: 09/21/2018 16:44

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 182540571302	Sample number(s): 9792212-9792218		
Mercury	N.D.	0.000050	0.00020
Batch number: 182541404402	Sample number(s): 9792212-9792218		
Barium	N.D.	0.0010	0.0100
Boron	N.D.	0.0120	0.100
Calcium	N.D.	0.0330	1.00
Chromium	N.D.	0.0053	0.0300
Cobalt	N.D.	0.0015	0.0100
Lithium	N.D.	0.0110	0.100
Selenium	N.D.	0.0210	0.100
Thallium	N.D.	0.0140	0.0600
Batch number: 182541404701A	Sample number(s): 9792212-9792218		
Antimony	N.D.	0.00041	0.0040
Arsenic	N.D.	0.00068	0.0040
Beryllium	N.D.	0.000091	0.0010
Cadmium	N.D.	0.00015	0.0020
Lead	N.D.	0.0011	0.0060
Batch number: 182541404701C	Sample number(s): 9792212-9792218		
Molybdenum	N.D.	0.00031	0.0040
Batch number: 18253520206B	Sample number(s): 9792212-9792218		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 18253921201A	Sample number(s): 9792212,9792215-9792217		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 18253921202A	Sample number(s): 9792214,9792218		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 18253921203A	Sample number(s): 9792213		
Total Dissolved Solids	N.D.	20.0	60.0

LCS/LCSD

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1984789
Reported: 09/21/2018 16:44

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 182540571302	Sample number(s): 9792212-9792218								
Mercury	0.00100	0.000976			98		80-120		
Batch number: 182541404402	Sample number(s): 9792212-9792218								
Barium	2.00	2.02			101		80-120		
Boron	2.00	1.90			95		80-120		
Calcium	4.00	3.97			99		80-120		
Chromium	0.200	0.200			100		80-120		
Cobalt	0.500	0.513			103		80-120		
Lithium	1.00	1.01			101		80-120		
Selenium	0.150	0.136			91		80-120		
Thallium	0.150	0.160			106		80-120		
Batch number: 182541404701A	Sample number(s): 9792212-9792218								
Antimony	0.00600	0.00674			112		80-120		
Arsenic	0.0100	0.00924			92		80-120		
Beryllium	0.00400	0.00391			98		80-120		
Cadmium	0.00500	0.00474			95		80-120		
Lead	0.0150	0.0151			101		80-120		
Batch number: 182541404701C	Sample number(s): 9792212-9792218								
Molybdenum	0.0500	0.0456			91		80-120		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18253520206B	Sample number(s): 9792212-9792218								
Chloride	3.00	2.98			99		90-110		
Fluoride	0.750	0.717			96		90-110		
Sulfate	7.50	7.46			99		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18253921201A	Sample number(s): 9792212,9792215-9792217								
Total Dissolved Solids	200	208			104		62-127		
Batch number: 18253921202A	Sample number(s): 9792214,9792218								
Total Dissolved Solids	200	204			102		62-127		
Batch number: 18253921203A	Sample number(s): 9792213								
Total Dissolved Solids	200	199			100		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 18254006203A	Sample number(s): 9792218								
pH	7.00	7.01			100		95-105		
Batch number: 18254006204A	Sample number(s): 9792213-9792217								
pH	7.00	7.01			100		95-105		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1984789
Reported: 09/21/2018 16:44

LCS/LCSD (continued)

Analysis Name	LCS Spike Added Std. Units	LCS Conc Std. Units	LCSD Spike Added Std. Units	LCSD Conc Std. Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18254006204B	Sample number(s): 9792212								
pH	7.00	7.01			100		95-105		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18253921201A	Sample number(s): 9792212,9792215-9792217 UNSPK: 9792216									
Total Dissolved Solids	1164	1600	2728			98		62-127		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	Degrees C	Degrees C		
Batch number: 18254006204B	Sample number(s): 9792212 BKG: 9792212			
Temperature of pH	23.84	23.83	0	5
	mg/l	mg/l		
Batch number: 18253921201A	Sample number(s): 9792212,9792215-9792217 BKG: 9792216			
Total Dissolved Solids	1164	1120	4 (1)	5
	Std. Units	Std. Units		
Batch number: 18254006204B	Sample number(s): 9792212 BKG: 9792212			
pH	6.78	6.80	0	4

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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For Eurofins Lancaster Laboratories Environmental use only

Acct. # 7701 Group # 484789 Sample # 979212-18

COC # 579872

Client Information

Client: GEI Consultants	Acct. #:
Project Name/#: PSEG Mercer	PWSID #:
Project Manager: Jason Kohl	P.O. #:
Sampler: C. Kincaid / S. Wagner	Quote #:
State where samples were collected: NJ	For Compliance: Yes ☐ No ☐

Sample Identification	Collected Date	Collected Time	Grab	Composite	Matrix: Soil	Sediment	Tissue	Water: Potable	Ground	Surface	NPDES	Other:	Total # of Containers	Metals	Mercury	Chloride	Fluoride	Sulfate	pH	Total Dissolved Solids	Ra 226	Ra 228
MW-4	9/4/18	1125	X					X					7	X	X	X	X	X	X	X	X	X
MW-6		1130	X					X					7	X	X	X	X	X	X	X	X	X
MW-2		1330	X					X					7	X	X	X	X	X	X	X	X	X
MW-5		1350	X					X					7	X	X	X	X	X	X	X	X	X
MW-1		1545	X					X					7	X	X	X	X	X	X	X	X	X
MW-3		1550	X					X					7	X	X	X	X	X	X	X	X	X
FB-09042018	9/4/18	1315	X					X				X	7	X	X	X	X	X	X	X	X	X

Analysis Requested — Preservation and Filtration Codes

For Lab Use Only

FSC:

SCR#: 230110

Preservation Codes

H=HCl	T=Thiosulfate
N=HNO_3	B=NaOH
S=H_2SO_4	P=H_3PO_4
F=Field Filtered	O=Other

Remarks

Metals include: As, B, Ba, Be, Ca, Cd, Co, Cr, Li, Mn, Pb, Sb, Se, Th

Turnaround Time (TAT) Requested (please circle)

Standard Rush

(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days:

E-mail address: jkohl@geiconsultants.com

Data Package Options (circle if required)

Type I (EPA Level 3 Equivalent/non-CLP) | Type VI (Raw Data Only)

Type III (Reduced non-CLP) | NJ DKQP | TX TRRP-13

NYSDEC Category A or B | MA MCP | CT RCP

	Date	Time		Date	Time
Relinquished by: Bottle Storage GBH	9/31/18		Received by:	8/31/18	1600
Relinquished by:			Received by:	9/7/18	1130
Relinquished by:	9/7/18	1700	Received by:		
Relinquished by:			Received by:		
Relinquished by:			Received by:	9-7-18	1708

EDD Required? Yes No

If yes, format:

Site-Specific QC (MS/MSD/Dup)? Yes No

(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:

UPS FedEx Other

Temperature upon receipt 0.7 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 226446

Group Number(s): 1984789

Client: GEI Consultants

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	09/07/2018 17:00
Number of Packages:	4	Number of Projects:	2
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Melvin Sanchez (8943) at 19:30 on 09/07/2018

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	0.7	DT	Wet	Y	Bagged	N
2	DT146	0.7	DT	Wet	Y	Bagged	N
3	DT146	4.3	DT	Wet	Y	Bagged	N
4	DT146	5.1	DT	Wet	Y	Bagged	N

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Lancaster, PA 17605-2425
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F | 717-656-2681
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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Metals in Liquid Data

Case Narrative/Conformance Summary

Metals in Liquid

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

ICP Metals

Fraction: Metals in Liquid

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9792212	MW-4	X		1	
9792213	MW-6	X		1	
9792214	MW-2	X		1	
9792215	MW-5	X		1	
9792216	MW-1	X		1	
9792217	MW-3	X		1	
9792218	FB-09042018	X		1	Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

SAMPLE ANALYSIS:

The instrument detection limits (IDLs) are used for determining the U flags on the initial and continuing calibration blanks. The highest IDL is selected when multiple

Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

ICP Metals

Fraction: Metals in Liquid

instruments are used for an analysis. The method detection limits (MDLs) are used for determining all other U flags.

(Sample number(s): 9792212-9792218: Analysis: 07036)
The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Arsenic, Lead, Selenium, Thallium.

No other problems were encountered with the analysis of the samples.

Abbreviation Key

BKG – Background	AF - Cold Vapor Atomic Fluorescence
DUP – Duplicate	U - Below MDL
MS - Matrix Spike	B - Below LOQ
MSD - Matrix Spike Dup	N - Matrix Spike out of specifications
B – Blank	* - Duplicate out of specifications
Q - Laboratory Control Sample	E - Matrix Effects exist as proven by Serial Dilution or Spiked Dilution
Y - Laboratory Control Sample Duplicate	A - Post Digestion Spike
P - ICP Atomic Emission Spectrometer	L - Serial Dilution
MS - ICP Mass Spectrometry	R - Internal Standard Relative Intensity OOS
CV - Cold Vapor	NR - Not Required

Sample Data

Metals in Liquid

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9792212 % Solids: 0.0
Concentration Units: UG/L Date Received: 09/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	18.6			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	38.8	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	6170			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	2.2	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	1.2	B		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9792213 % Solids: 0.0
Concentration Units: UG/L Date Received: 09/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	193			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	99.0	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	29900			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	0.76	B		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9792214 % Solids: 0.0
Concentration Units: UG/L Date Received: 09/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.79	B		MS
7440-39-3	Barium	200			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	898			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	108000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	8.7	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	83.1	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	88.0			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9792215 % Solids: 0.0
Concentration Units: UG/L Date Received: 09/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	201			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	400			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	90700			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	17.5			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9792216 % Solids: 0.0
Concentration Units: UG/L Date Received: 09/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	174			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	1000			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	197000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	3.5	B		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9792217 % Solids: 0.0
Concentration Units: UG/L Date Received: 09/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	1.3	B		MS
7440-39-3	Barium	181			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	285			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	61600			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	15.6	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	3.6	B		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9792218 % Solids: 0.0
Concentration Units: UG/L Date Received: 09/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	12.0	U		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	49.2	B		P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	0.31	U		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

Quality Control and Calibration Summary Forms

Metals in Liquid

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ52
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Barium	182541404402	*92194BKG
Boron		9792212
Calcium		9792213
Chromium		9792214
Cobalt		9792215
Lithium		9792216
Selenium		9792217
Thallium		9792218
		P25404BB
		P25404BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ52
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Antimony	182541404701	*92194BKG
Arsenic		9792212
Beryllium		9792213
Cadmium		9792214
Lead		9792215
Molybdenum		9792216
		9792217
		9792218
		P25404AB
		P25404AQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ52
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Mercury	182540571302	*92194BKG
		9792212
		9792213
		9792214
		9792215
		9792216
		9792217
		9792218
		P25471BB
		P25471BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: P
Run Name: 1826003T73
Calibration Date(s): 09/17/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium		600.0	596.34	99.4	500.0	493.74	98.7	500.0	499.33	99.9
Boron		600.0	598.41	99.7	500.0	491.86	98.4	500.0	496.75	99.4
Calcium		30000.0	29324.00	97.7	25000.0	24528.12	98.1	25000.0	24483.96	97.9
Chromium		600.0	588.92	98.2	500.0	483.80	96.8	500.0	483.45	96.7
Cobalt		600.0	588.46	98.1	500.0	485.68	97.1	500.0	483.09	96.6
Lithium		600.0	597.03	99.5	500.0	497.15	99.4	500.0	496.47	99.3
Selenium		600.0	576.47	96.1	500.0	460.48	92.1	500.0	479.62	95.9
Thallium		600.0	598.64	99.8	500.0	492.37	98.5	500.0	492.82	98.6

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: P
Run Name: 1826003T73
Calibration Date(s): 09/17/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	492.70	98.5	500.0	497.80	99.6
Boron					500.0	495.94	99.2	500.0	490.08	98.0
Calcium					25000.0	24224.07	96.9	25000.0	24172.54	96.7
Chromium					500.0	478.47	95.7	500.0	480.62	96.1
Cobalt					500.0	483.26	96.7	500.0	484.61	96.9
Lithium					500.0	499.79	100.0	500.0	499.99	100.0
Selenium					500.0	483.97	96.8	500.0	478.31	95.7
Thallium					500.0	496.79	99.4	500.0	495.75	99.2

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: P
Run Name: 1826003T73
Calibration Date(s): 09/17/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	501.69	100.3			
Boron					500.0	487.55	97.5			
Calcium					25000.0	24098.94	96.4			
Chromium					500.0	483.20	96.6			
Cobalt					500.0	483.02	96.6			
Lithium					500.0	501.78	100.4			
Selenium					500.0	459.05	91.8			
Thallium					500.0	490.90	98.2			

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: MS
Run Name: 1826301E05
Calibration Date(s): 09/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Antimony	121	50.0	51.13	102.3	25.0	23.30	93.2	25.0	22.59	90.4
Arsenic	75	500.0	494.29	98.9	250.0	244.67	97.9	250.0	237.87	95.1
Beryllium	9	50.0	51.48	103.0	25.0	24.53	98.1	25.0	26.43	105.7
Cadmium	111	50.0	49.46	98.9	25.0	24.04	96.2	25.0	23.02	92.1
Lead	208	50.0	50.80	101.6	25.0	24.89	99.6	25.0	25.61	102.4
Molybdenum	98	50.0	48.56	97.1	25.0	23.43	93.7	25.0	23.28	93.1

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: MS
Run Name: 1826301E05
Calibration Date(s): 09/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121				25.0	26.27	105.1	25.0	25.28	101.1
Arsenic	75				250.0	254.45	101.8	250.0	248.76	99.5
Beryllium	9				25.0	24.35	97.4	25.0	26.68	106.7
Cadmium	111				25.0	24.74	99.0	25.0	24.48	97.9
Lead	208				25.0	25.38	101.5	25.0	25.79	103.2
Molybdenum	98				25.0	23.70	94.8	25.0	24.81	99.2

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: CV
Run Name: 1825501M09
Calibration Date(s): 09/12/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Mercury		2.5	2.56	102.4	1.0	1.00	100.0	1.0	0.98	98.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: CV
Run Name: 1825501M09
Calibration Date(s): 09/12/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.98	98.0	1.0	0.98	98.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ52

Method: CV
Run Name: 1825501M09
Calibration Date(s): 09/12/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.97	97.0	1.0	0.98	98.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1826003T73
Calibration Date(s): 09/17/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium		10.0	10.43	104.3		
Boron		100.0	95.68	95.7		
Calcium		1000.0	982.34	98.2		
Chromium		30.0	29.12	97.1		
Cobalt		10.0	10.10	101.0		
Lithium		100.0	96.61	96.6		
Selenium		100.0	88.20	88.2		
Thallium		60.0	63.74	106.2		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1826301E05
Calibration Date(s): 09/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony	121	4.0	4.36	109.0		
Arsenic	75	4.0	3.74	93.5		
Beryllium	9	1.0	1.04	104.0		
Cadmium	111	2.0	1.84	92.0		
Lead	208	6.0	6.22	103.7		
Molybdenum	98	4.0	3.85	96.3		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Run Name: 1825501M09
Calibration Date(s): 09/12/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Mercury		0.2	0.20	100.0		

Control limits: 50% - 150%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1826003T73
Calibration Date(s): 09/17/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium		0.33	U	0.33	U	0.33	U	0.33	U		1.000	U	182541404402
Boron		8.4	U	8.4	U	8.4	U	8.4	U		12.000	U	182541404402
Calcium		33.4	U	33.4	U	33.4	U	33.4	U		33.000	U	182541404402
Chromium		-0.76	B	0.55	U	-0.56	B	0.55	U		5.300	U	182541404402
Cobalt		0.40	U	0.40	U	0.40	U	0.40	U		1.500	U	182541404402
Lithium		5.3	U	5.3	U	5.3	U	5.3	U		11.000	U	182541404402
Selenium		9.2	U	-9.4	B	-15.6	B	-10.4	B		21.000	U	182541404402
Thallium		3.1	U	3.1	U	3.1	U	3.1	B		14.000	U	182541404402

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ52

Method: P
Run Name: 1826003T73
Calibration Date(s): 09/17/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium				0.33	U	0.33	U						
Boron				8.4	U	8.4	U						
Calcium				33.4	U	33.4	U						
Chromium				0.55	U	0.55	U						
Cobalt				0.40	U	0.40	U						
Lithium				5.3	U	5.3	U						
Selenium				-10.4	B	-10.1	B						
Thallium				3.1	U	3.1	U						

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ52

Method: MS
Run Name: 1826301E05
Calibration Date(s): 09/20/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121	0.52	U	0.52	U	0.52	U	0.52	U	121	0.410	U	182541404701A
Arsenic	75	0.40	U	0.40	U	0.40	U	0.40	U	75	0.680	U	182541404701A
Beryllium	9	0.067	U	0.067	U	0.067	U	0.067	U	9	0.091	U	182541404701A
Cadmium	111	0.17	U	0.17	U	0.17	U	0.17	U	111	0.150	U	182541404701A
Lead	208	0.21	U	0.21	U	0.21	U	0.21	U	208	1.100	U	182541404701A
Molybdenum	98	0.36	U	0.36	U	0.36	U	0.36	U	98	0.310	U	182541404701A

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ52

Method: MS
Run Name: 1826301E05
Calibration Date(s): 09/20/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121			0.52	U								
Arsenic	75			0.40	U								
Beryllium	9			0.067	U								
Cadmium	111			0.17	U								
Lead	208			0.21	U								
Molybdenum	98			0.36	U								

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ52

Method: CV
Run Name: 1825501M09
Calibration Date(s): 09/12/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury		0.050	U	0.050	U	0.050	U	0.050	U		0.050	U	182540571302

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ52

Method: CV
Run Name: 1825501M09
Calibration Date(s): 09/12/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U	0.050	U				

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ52

Instrument ID: 18255
Run Name: 1826003T73
Concentration Units: ug/L

Analyte	True		Initial Found				Final Found			
	Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R	Sol. A	%R	Sol. AB	%R
Aluminum	500000		488335	97.7						
Barium	0		0							
Boron	0		-17							
Calcium	500000		487678	97.5						
Chromium	0		-1							
Cobalt	0		0							
Iron	200000		196951	98.5						
Lithium	0		-11							
Magnesium	500000		492845	98.6						
Selenium	0		-27							
Thallium	0		8							

Control Limits: All Metals 80%-120%

Instrument ID: 19204
Run Name: 1826301E05
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		98651	98.7		
Antimony	121	0		1			
Arsenic	75	0		1			
Beryllium	9	0		0			
Cadmium	111	0		0			
Calcium	44	300000		283624	94.5		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		267801	107.1		
Lead	208	0		1			
Magnesium	24	100000		106542	106.5		
Molybdenum	98	2000		2065	103.3		
Phosphorus	31	10000		NA			
Potassium	39	100000		96860	96.9		
Sodium	23	250000		257408	103.0		
Sulfur	34	10000		NA			
Titanium	47	2000		2047	102.4		

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 7
LABORATORY CONTROL SAMPLE
SDG No.: GEJ52
Matrix: WATER

Analyte	Mass	Batch Number	Units	True	Found	C	Control Limits (%)	%R	M	In Spec
Antimony	121	182541404701	UG/L	6.000	6.735		80 - 120	112	MS	Yes
Arsenic	75	182541404701	UG/L	10.000	9.240		80 - 120	92	MS	Yes
Barium		182541404402	UG/L	2000.000	2015.390		80 - 120	101	P	Yes
Beryllium	9	182541404701	UG/L	4.000	3.905		80 - 120	98	MS	Yes
Boron		182541404402	UG/L	2000.000	1897.780		80 - 120	95	P	Yes
Cadmium	111	182541404701	UG/L	5.000	4.741		80 - 120	95	MS	Yes
Calcium		182541404402	UG/L	4000.000	3971.070		80 - 120	99	P	Yes
Chromium		182541404402	UG/L	200.000	200.040		80 - 120	100	P	Yes
Cobalt		182541404402	UG/L	500.000	513.210		80 - 120	103	P	Yes
Lead	208	182541404701	UG/L	15.000	15.133		80 - 120	101	MS	Yes
Lithium		182541404402	UG/L	1000.000	1007.790		80 - 120	101	P	Yes
Mercury		182540571302	UG/L	1.000	0.976		80 - 120	98	CV	Yes
Molybdenum	98	182541404701	UG/L	50.000	45.571		80 - 120	91	MS	Yes
Selenium		182541404402	UG/L	150.000	136.280		80 - 120	91	P	Yes
Thallium		182541404402	UG/L	150.000	159.690		80 - 120	106	P	Yes

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ52
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: *92194BKG Serial Dilution Lab Sample ID: *92194L
Batch Number(s): 182541404701, 182541404402
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Antimony	121	0.4060	U	2.0300	U			MS
Arsenic	75	3.0080	B	3.4000	U	100		MS
Barium		108.1000		110.0500		2		P
Beryllium	9	0.0910	U	0.4550	U			MS
Boron		968.6800		980.7500		1		P
Cadmium	111	0.1510	U	0.7550	U			MS
Calcium		136103.2800		136053.6500		0		P
Chromium		5.3000	U	26.5000	U			P
Cobalt		1.5000	U	7.5000	U			P
Lead	208	1.0700	U	5.3500	U			MS
Lithium		18.5800	B	55.0000	U	100		P
Molybdenum	98	0.3090	U	1.5450	U			MS
Selenium		21.0000	U	105.0000	U			P
Thallium		14.0000	U	70.0000	U			P

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

Method: P
Instrument ID: 18255
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium	455.40		0.33
Boron	249.67		8.4
Calcium	317.93		33.4
Chromium	267.72		0.55
Cobalt	228.62		0.40
Lithium	670.78		5.3
Selenium	196.09		9.2
Thallium	190.86		3.1

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Instrument ID: 19204
Date: 07/2018

Analyte	MASS (amu)	Background	IDL (UG/L)
Antimony	121		0.52
Arsenic	75		0.40
Beryllium	9		0.067
Cadmium	111		0.17
Lead	208		0.21
Molybdenum	98		0.36

Comments:

_____
_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Instrument ID: 23283
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Mercury			0.050

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ52
Matrix: WATER

Method: P
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium	455.40		10.0	1.0
Boron	249.67		100	12.0
Calcium	317.93		1000	33.0
Chromium				
Cobalt	228.62		10.0	1.5
Lithium	670.78		100	11.0
Selenium				
Thallium				

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ52
Matrix: WATER

Method: P
Date: 09/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium				
Boron				
Calcium				
Chromium	267.72		30.0	5.3
Cobalt				
Lithium				
Selenium	196.09		100	21.0
Thallium	190.86		60.0	14.0

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
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_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ52
Matrix: WATER

Method: MS
Date: 07/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony	121		4.0	0.41
Arsenic				
Beryllium	9		1.0	0.091
Cadmium	111		2.0	0.15
Lead				
Molybdenum	98		4.0	0.31

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ52
Matrix: WATER

Method: MS
Date: 09/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony				
Arsenic	75		4.0	0.68
Beryllium				
Cadmium				
Lead	208		6.0	1.1
Molybdenum				

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ52
Matrix: WATER

Method: CV
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Mercury			0.20	0.050

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Tune Report

Batch Folder D:\Agilent\ICPMH\1\DATA\~EPATUNEaa.b
Report Comment ICP-MS #19204 (E05) Daily Tune Check
Instrument Name G3281A JP12071581

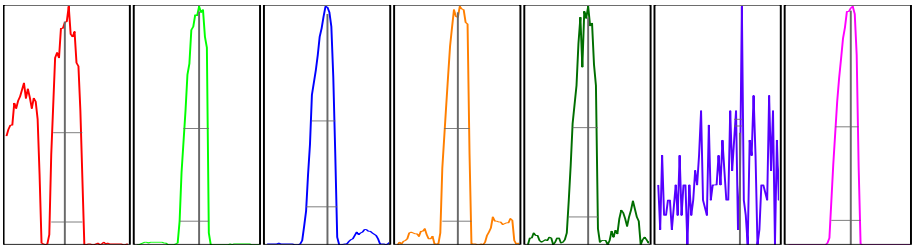
[No Gas]

Mass	Range	Count (Actual)	Response (Actual) [cps/ug/l]	Response (Required) [cps/ug/l]	Response (Flag)	Resp Ratio (Actual)	Resp Ratio (Required)	Resp Ratio (Flag)
7		1244	12443.47	2000.00		0.02	-	
89		8849	88489.03	6000.00		0.12	-	
205		3497	34965.06	3000.00		0.05	-	
70		1095	10950.34	0.00		0.01	0 - 0.015	
156		191	1912.14	0.00		0.00	0 - 0.03	
220		12	119.01	0.00		0.00	-	
140		75135	751345.15	0.00		1.00	1 - 1	

Mass	RSD% (Actual)	RSD% (Required)	RSD% (Flag)	Background (Actual)	Background (Required)	Background (Flag)
7	3.14	5.00				
89	1.51	5.00				
205	1.05	5.00				
70	1.67					
156	2.79					
220	33.67					
140	1.08					

Mass	Replicate 1 Count	Replicate 2 Count	Replicate 3 Count	Replicate 4 Count	Replicate 5 Count
7	1198	1215	1249	1264	1296
89	8669	8965	8901	8747	8962
205	3438	3518	3522	3522	3482
70	1070	1093	1107	1087	1118
156	188	188	190	201	191
220	7	18	10	14	11
140	73989	74934	74930	75798	76020

Integration Time [sec] 0.1



Mass	Peak Height	Axis (Actual)	Axis (Required)	Axis (Flag)	W-50%	W-X% (Actual)	W-X% (Required)	W-X% (Flag)
7	190.94	6.95	6.9 - 7.1		0.70	0.784	0.800	
89	1587.03	89.05	88.9 - 89.1		0.59	0.696	0.800	
205	637.12	205.00	204.9 - 205.1		0.55	0.725	0.800	
70	185.42	70.00	-		0.61	0.729		
156	34.56	156.00	-		0.57	0.720		
220	1.70	220.50	-		0.19	0.187		
140	14127.72	140.05	-		0.55	0.712		

X = 10 **Integration Time [sec]** 0.1 **Acquisition Time [sec]** 260.3 **Y Axis** Linear

Tune Parameters
Plasma Paramters

RF Power	1600 W	Carrier Gas	0.25 L/min	S/C Temp	20 ℃
RF Matching	1.60 V	Option Gas	0.0 %	Makeup/Dilution Gas	0.70 L/min
Smpl Depth	10.0 mm	Nebulizer Pump	0.10 rps	Gas Switch	Dilution Gas

Lenses Parameters

Tune Report

Extract 1	0.0 V	Omega Lens	8.1 V	Deflect	16.4 V				
Extract 2	-190.0 V	Cell Entrance	-32 V	Plate Bias	-40 V				
Mass	**Peak Height**	**Axis (Actual)**	**Axis (Required)**	**Axis (Flag)**	**W-50%**	**W-X% (Actual)**	**W-X% (Required)**	**W-X% (Flag)**	
Omega Bias	-90 V	Cell Exit	-58 V						

Cell Parameters

OctP Bias	-8.0 V	He Flow	0.0 mL/min	Energy Discrimination	5.0 V
OctP RF	200 V	H2 Flow	0.0 mL/min		
Use Gas	false	3rd Gas Flow	0 %		

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ52

Instrument ID: 19204
Run Name: 1826301E05

Start Date: 09/20/2018
End Date: 09/20/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-1-209	PB	IN-1-115	AS,CD,MO
SC-2-45	BE	TB-1-159	SB

Lab Sample ID	Time	Internal Standards %RI For: Element SC-2-45	Q	Element IN-1-115	Q	Element TB-1-159	Q	Element BI-1-209	Q	Element	Q	Element	Q	Element	Q
S0	12:58	100		100		100		100							
S	13:01	101		98		98		99							
ICV	13:04	99		98		95		97							
ICB	13:07	96		101		97		97							
LLC	13:10	101		105		97		99							
ICSA	13:12	89		86		91		83							
LRS2	13:15	99		97		99		99							
LRS3	13:18	103		104		99		99							
CCS	13:21	105		108		103		105							
CCS	13:24	104		104		103		105							
CCV	13:26	103		105		103		104							
CCB	13:29	104		104		101		103							
P25404AB	13:32	102		101		101		101							
P25404AQ	13:35	101		107		99		100							
*92194BKG	13:38	94		99		99		97							
ZZZZZZ	13:41														
ZZZZZZ	13:43														
ZZZZZZ	13:46														
ZZZZZZ	13:49														
*92194L	13:52	103		107		102		105							
ZZZZZZ	13:55														
CCV	13:57	104		111		103		108							
CCB	14:00	106		109		101		104							
ZZZZZZ	14:03														
ZZZZZZ	14:06														
ZZZZZZ	14:09														
ZZZZZZ	14:11														
ZZZZZZ	14:14														
ZZZZZZ	14:17														
ZZZZZZ	14:20														
ZZZZZZ	14:23														
ZZZZZZ	14:26														

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ52

Instrument ID: 19204
Run Name: 1826301E05

Start Date: 09/20/2018
End Date: 09/20/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-1-209	PB	IN-1-115	AS,CD,MO
SC-2-45	BE	TB-1-159	SB

Lab Sample ID	Time	Internal Standards %RI For: Element SC-2-45	Q	Element IN-1-115	Q	Element TB-1-159	Q	Element BI-1-209	Q	Element	Q	Element	Q	Element	Q
CCV	14:28	96		100		93		91							
CCB	14:31	99		99		93		93							
9792212	14:34	105		111		98		97							
9792213	14:37	103		103		97		96							
9792214	14:40	109		106		99		97							
9792215	14:42	109		109		99		98							
9792216	14:45	110		104		102		97							
9792217	14:48	109		104		99		98							
9792218	14:51	113		108		100		101							
ZZZZZZ	14:54														
CCV	14:57	116		110		102		101							
CCB	14:59	116		112		103		105							

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

Preparation and Run Logs

Metals in Liquid

Method: P
Batch Number: 182541404402

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9792212	09/12/2018	50.00	50
9792213	09/12/2018	50.00	50
9792214	09/12/2018	50.00	50
9792215	09/12/2018	50.00	50
9792216	09/12/2018	50.00	50
9792217	09/12/2018	50.00	50
9792218	09/12/2018	50.00	50
*92194BKG	09/12/2018	50.00	50
P25404BB	09/12/2018	50.00	50
P25404BQ	09/12/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: MS
Batch Number: 182541404701

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9792212	09/12/2018	50.00	50
9792213	09/12/2018	50.00	50
9792214	09/12/2018	50.00	50
9792215	09/12/2018	50.00	50
9792216	09/12/2018	50.00	50
9792217	09/12/2018	50.00	50
9792218	09/12/2018	50.00	50
*92194BKG	09/12/2018	50.00	50
P25404AB	09/12/2018	50.00	50
P25404AQ	09/12/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: CV
Batch Number: 182540571302

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9792212	09/11/2018	40.00	40
9792213	09/11/2018	40.00	40
9792214	09/11/2018	40.00	40
9792215	09/11/2018	40.00	40
9792216	09/11/2018	40.00	40
9792217	09/11/2018	40.00	40
9792218	09/11/2018	40.00	40
*92194BKG	09/11/2018	40.00	40
P25471BB	09/11/2018	40.00	40
P25471BQ	09/11/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ52

Method: P
Instrument ID: 18255
Run Name: 1826003T73

Run Start Date: 09/17/2018
Run End Date: 09/17/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ52

Method: P
Instrument ID: 18255
Run Name: 1826003T73

Run Start Date: 09/17/2018
Run End Date: 09/17/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
CCV	1.00	13:16			X		X		X	X	X		X			X	X																								
CCB	1.00	13:19			X		X		X	X	X		X			X	X																								
9792214	1.00	13:21			X		X		X	X	X		X			X	X																								
9792215	1.00	13:24			X		X		X	X	X		X			X	X																								
9792216	1.00	13:27			X		X		X	X	X		X			X	X																								
9792217	1.00	13:30			X		X		X	X	X		X			X	X																								
9792218	1.00	13:32			X		X		X	X	X		X			X	X																								
ZZZZZZ	1.00	13:35																																						
CCV	1.00	13:38			X		X		X	X	X		X			X	X																								
CCB	1.00	13:40			X		X		X	X	X		X			X	X																								

METHODS:	LEGEND:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	BKG = Background DUP = Duplicate MS = Matrix Spike MSD = Matrix Spike Duplicate A = Post Digest Spike L = Serial Dilution B = Blank Q = Laboratory Control Sample Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ52

Method: MS
Instrument ID: 19204
Run Name: 1826301E05

Run Start Date: 09/20/2018
Run End Date: 09/20/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ52

Method: MS
Instrument ID: 19204
Run Name: 1826301E05

Run Start Date: 09/20/2018
Run End Date: 09/20/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
9792216	1.00	14:45	X	X		X		X				X			X																										
9792217	1.00	14:48	X	X		X		X				X			X																										
9792218	1.00	14:51	X	X		X		X				X			X																										
ZZZZZZ	1.00	14:54																																						
CCV	1.00	14:57	X	X		X		X				X			X																										
CCB	1.00	14:59	X	X		X		X				X			X																										

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ52

Method: CV
Instrument ID: 23283
Run Name: 1825501M09

Run Start Date: 09/12/2018
Run End Date: 09/12/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
S0	1.00	06:04												X																											
S0.2	1.00	06:07												X																											
S0.5	1.00	06:09												X																											
S1.0	1.00	06:11												X																											
S2.5	1.00	06:13												X																											
S5.0	1.00	06:15												X																											
ICV	1.00	06:17												X																											
ICB	1.00	06:19												X																											
CRA	1.00	06:21												X																											
CCV	1.00	06:23												X																											
CCB	1.00	06:25												X																											
ZZZZZZ	1.00	06:27																																							
ZZZZZZ	1.00	06:29																																							
ZZZZZZ	1.00	06:31																																							
ZZZZZZ	1.00	06:33																																							
ZZZZZZ	1.00	06:35																																							
ZZZZZZ	1.00	06:37																																							
ZZZZZZ	1.00	06:39																																							
ZZZZZZ	1.00	06:41																																							
ZZZZZZ	1.00	06:43																																							
ZZZZZZ	1.00	06:45																																							
CCV	1.00	06:47												X																											
CCB	1.00	06:49												X																											
ZZZZZZ	1.00	06:51																																							
ZZZZZZ	1.00	06:53																																							
ZZZZZZ	1.00	06:55																																							
ZZZZZZ	1.00	06:57																																							
ZZZZZZ	1.00	06:59																																							
ZZZZZZ	1.00	07:01																																							
ZZZZZZ	1.00	07:04																																							
ZZZZZZ	1.00	07:06																																							
ZZZZZZ	1.00	07:08																																							
ZZZZZZ	1.00	07:10																																							
CCV	1.00	07:12												X																											
CCB	1.00	07:14												X																											
ZZZZZZ	1.00	07:16																																							
ZZZZZZ	1.00	07:18																																							
ZZZZZZ	1.00	07:20																																							

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ52

Method: CV
Instrument ID: 23283
Run Name: 1825501M09

Run Start Date: 09/12/2018
Run End Date: 09/12/2018

| Lab Sample ID | D/F | Time | Analytes | | |

Instrumental Wet Chemistry Data

Case Narrative/Conformance Summary

Instrumental Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

Sample #	Client ID	Matrix Liquid	Matrix Solid	Comments
9792212	MW-4	X		
9792213	MW-6	X		
9792214	MW-2	X		
9792215	MW-5	X		
9792216	MW-1	X		
9792217	MW-3	X		
9792218	FB-09042018	X		Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

SAMPLE ANALYSIS:

Samples	Chloride	Fluoride	Sulfate
9792212	DF5	DF5	DF5
9792213	DF50	DF5	DF5
9792214	DF50	DF5	DF50
9792215	DF50	DF5	DF50
9792216	DF50	DF5	DF50
9792217	DF50	DF5	DF5
9792218	DF1	DF1	DF1

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

Quality Control and Calibration Summary Forms

Instrumental Wet Chemistry

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Quality Control Reference List
Instrumental Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

Fraction: Instrumental Wet Chemistry

Batch Number	Sample Number	Analysis Date	Chloride	Fluoride	Sulfate
18253520206A	P25320FB	09/10/2018 14:03:00	X	X	X
	P25320FQ	09/10/2018 13:44:00	X	X	X
18253520206B	9792212	09/11/2018 09:13:00	X	X	X
	9792213	09/11/2018 09:49:00		X	X
	9792213	09/11/2018 10:07:00	X		
	9792214	09/11/2018 10:26:00		X	
	9792214	09/11/2018 10:44:00	X		X
	9792215	09/11/2018 11:02:00		X	
	9792215	09/11/2018 11:57:00	X		X
	9792216	09/11/2018 12:15:00		X	
	9792216	09/11/2018 12:33:00	X		X
	9792217	09/11/2018 12:52:00		X	X
	9792217	09/11/2018 13:10:00	X		
	9792218	09/11/2018 13:28:00	X	X	X

Quality Control Summary
Method Blank
Instrumental Water Quality
SDG: GEJ52
Matrix: LIQUID

Fraction: Instrumental Wet Chemistry

18253520206A / P25320FB Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Chloride	IC	09/10/18	N.D.	mg/l	0.20	0.40
Fluoride	IC	09/10/18	N.D.	mg/l	0.050	0.10
Sulfate	IC	09/10/18	N.D.	mg/l	0.30	1.0

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Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ52
Matrix: LIQUID

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

LCS: P25320FQ	Batch: **18253520206B** (Sample number(s): 9792212-9792218)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	3.00	2.98	NA	99	NA	90-110	NA	NA
Fluoride	IC	0.750	0.717	NA	96	NA	90-110	NA	NA
Sulfate	IC	7.50	7.46	NA	99	NA	90-110	NA	NA

Instrument ID: 10913
Calibration Date: 08/20/2018

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18253520206B
Run Start Dates: 09/10/2018
Run Names: 1825301D06

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	0.475342	0.922655	2.377998	4.832213	7.523233	0.9985	0.9992
Fluoride	0.162212	0.502921	1.274630	2.670815	4.228668	0.9988	0.9994
Sulfate	0.338092	0.678324	1.782684	3.712438	5.884871	0.9992	0.9996

	Chloride			Sulfate			Fluoride		
Sample	True	Result	%Rec	True	Result	%Rec	True	Result	%Rec
ICV	3	2.9533	98	7.5	7.2183	96	0.75	0.7442	99
ICB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.9551	99	7.5	7.3400	98	0.75	0.7111	95
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.9953	100	7.5	7.4665	100	0.75	0.7360	98
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.0406	101	7.5	7.2198	96	0.75	0.7332	98
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.9536	98	7.5	7.4054	99	0.75	0.7223	96
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.9438	98	7.5	7.3636	98	0.75	0.7157	95
CCB	0	ND	NA	0	ND	NA	0	ND	NA

* = Out of Specifications

Fraction: Instrumental Wet Chemistry

00224: Chloride Analyte Name	Default MDL	Default LOQ	Units
Chloride	0.20	0.40	mg/l

01504: Fluoride Analyte Name	Default MDL	Default LOQ	Units
Fluoride	0.050	0.10	mg/l

00228: Sulfate Analyte Name	Default MDL	Default LOQ	Units
Sulfate	0.30	1.0	mg/l

Wet Chemistry Data

Case Narrative/Conformance Summary

Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

Water Quality

Fraction: Wet Chemistry

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9792212	MW-4	X		1	
9792213	MW-6	X		1	
9792214	MW-2	X		1	
9792215	MW-5	X		1	
9792216	MW-1	X		1	
9792217	MW-3	X		1	
9792218	FB-09042018	X		1	Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

All QC is within specification.

SAMPLE ANALYSIS:

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected

Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

Water Quality

Fraction: Wet Chemistry

BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

QC Summary

Wet Chemistry

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

Fraction: Wet Chemistry

Analysis	Batch Number	Sample Number	Analysis Date
Total Dissolved Solids	18253921201A	B253871B	09/10/2018 15:31
		L253871Q	09/10/2018 15:31
		9792212	09/10/2018 15:31
		9792215	09/10/2018 15:31
		9792216 UNSPK/BKG,MS,DUP	09/10/2018 15:31
		9792217	09/10/2018 15:31
Total Dissolved Solids	18253921202A	B253872B	09/10/2018 15:53
		L253872Q	09/10/2018 15:53
		9792214	09/10/2018 15:53
		9792218	09/10/2018 15:53
Total Dissolved Solids	18253921203A	B253873B	09/10/2018 16:10
		L253873Q	09/10/2018 16:10
		9792213	09/10/2018 16:10

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ52

Fraction: Wet Chemistry

Batch Number	Sample Number	Analysis Date	pH	Temperature of pH
18254006203A	9792218	09/12/2018 00:48:00	X	X
	P006203Q	09/11/2018 23:31:00	X	
18254006204A	9792213	09/12/2018 02:11:00	X	X
	9792214	09/12/2018 01:55:00	X	X
	9792215	09/12/2018 01:59:00	X	X
	9792216	09/12/2018 02:03:00	X	X
	9792217	09/12/2018 01:48:00	X	X
	P006204Q	09/12/2018 01:14:00	X	
18254006204B	9792212 BKG	09/12/2018 01:25:00	X	X
	9792212 DUP	09/12/2018 01:29:00	X	X

Quality Control Summary
Method Blank
Water Quality
SDG: GEJ52
Matrix: LIQUID

Fraction: Wet Chemistry

18253921201A / B253871B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	09/10/18	N.D.	mg/l	20.0	60.0

18253921202A / B253872B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	09/10/18	N.D.	mg/l	20.0	60.0

18253921203A / B253873B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	09/10/18	N.D.	mg/l	20.0	60.0

Water Quality
Fraction: Wet Chemistry

UNSPK: 9792216 MS: 9792216	Batch: **18253921201A** (Sample number(s): 9792212, 9792215-9792217)									
Parameter	**ME**	**Spike Added mg/l**	**Unspiked Conc mg/l**	**MS Conc mg/l**	**MSD Conc mg/l**	**MS %Rec**	**MSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	1600	1164.	2728.	NA	98	NA	62-127	NA	NA

Comments:
(2) The unspiked sample result is greater than four times the spike added.
* = Out of Specification

Results are being reported on an as received basis.

Water Quality
Fraction: Wet Chemistry

BKG: 9792216 DUP: 9792216	Batch: **18253921201A** (Sample number(s): 9792212, 9792215-9792217)				
Parameter	**ME**	**Unspiked Conc mg/l**	**DUP Conc mg/l**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	1164.	1120.	4 (1)	5

BKG: 9792212 DUP: 9792212	Batch: **18254006204B** (Sample number(s): 9792212)				
Parameter	**ME**	**Unspiked Conc Std. Units**	**DUP Conc Std. Units**	**%RPD**	**%RPD Limits**
pH	MTR	6.78	6.8	0	4

BKG: 9792212 DUP: 9792212	Batch: **18254006204B** (Sample number(s): 9792212)				
Parameter	**ME**	**Unspiked Conc Degrees C**	**DUP Conc Degrees C**	**%RPD**	**%RPD Limits**
Temperature of pH	MTR	23.84	23.83	0	5

Comments:
(1) The sample and/or duplicate result is less than five times the LOQ.
* = Out of Specification

Results are being reported on an as received basis.

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Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ52
Matrix: LIQUID

Water Quality
Fraction: Wet Chemistry

LCS: L253871Q	Batch: **18253921201A** (Sample number(s): 9792212, 9792215-9792217)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	208	NA	104	NA	62-127	NA	NA

LCS: L253872Q	Batch: **18253921202A** (Sample number(s): 9792214, 9792218)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	204	NA	102	NA	62-127	NA	NA

LCS: L253873Q	Batch: **18253921203A** (Sample number(s): 9792213)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	199	NA	100	NA	62-127	NA	NA

LCS: P006203Q	Batch: **18254006203A** (Sample number(s): 9792218)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	7.01	NA	100	NA	95-105	NA	NA

LCS: P006204Q	Batch: **18254006204A** (Sample number(s): 9792213-9792217) Batch: **18254006204B** (Sample number(s): 9792212)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	7.01	NA	100	NA	95-105	NA	NA

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LOQ/MDL Summary
Water Quality

SDG: GEJ52

Fraction: Wet Chemistry

12152: pH Analyte Name	Default MDL	Default LOQ	Units
pH	0.010	0.010	Std. Units

12151: Temperature of pH Analyte Name	Default MDL	Default LOQ	Units
Temperature of pH	0.010	0.010	Degrees C

00212: Total Dissolved Solids Analyte Name	Default MDL	Default LOQ	Units
Total Dissolved Solids	20.0	60.0	mg/l

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

October 03, 2018

Ms. Hannah Cottman
Eurofins Lancaster Laboratories
2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994

Re: NJ Radiochemistry Analyses
Work Order: 459193

Dear Ms. Cottman:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 11, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Taylor Cannon for
Julie Robinson
Project Manager

Purchase Order: 1984791
Chain of Custody: 1984791
Enclosures

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Case Narrative

Receipt Narrative
for
Eurofins Lancaster Laboratories
SDG: 459193

October 03, 2018

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on September 11, 2018 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
459193001	MW-4
459193002	MW-6
459193003	MW-2
459193004	MW-5
459193005	MW-1
459193006	MW-3
459193007	FB-09042018

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

Taylor Cannon for
Julie Robinson
Project Manager

Chain of Custody and Supporting Documentation

459193

Environmental Analysis Request/Chain of Custody

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Page 1 of 1

Acct. # _____ Group # _____ Sample #

Subcontractor:	GEL		
Project Name/#:	1984791	Site ID #:	
Requestor	Hannah Cottman	P.O. #:	NA
Sampler:		PWSID #:	
Phone #:	717-556-7383	Quote #:	
State where samples were collected:	NJ	For Compliance: Yes ☑ No ☐	

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil ☐ Sediment ☐ Tissue ☐ / Water: Potable ☐ Ground ☑ Surface ☐ NPDES ☐ / Other:	Total # of Containers	Analyses Requested: Radium-226 (EPA 903.1)	Analyses Requested: Radium-228 (EPA 904.0 mod/SW93920 mod)	Preservation and Filtration Codes	For Lab Use Only: Remarks
							N	N		
MW-4	9/4/2018	11:25	x		GW		X	X		
MW-6	9/4/2018	11:30	x		GW					NJ DKQP Samples
MW-2	9/4/2018	13:30	x		GW					
MW-5	9/4/2018	13:50	x		GW					
MW-1	9/4/2018	15:45	x		GW					
MW-3	9/4/2018	15:50	x		GW					
FB-09042018	9/4/2018	13:15	x		GW					Field Blank

Preservation Codes

H = HCl T = Thiosulfate
N = HNO_3 B = NaOH
S = H_2SO_4 P = H_3PO_4
F = Field Filtered O = Other

SF #: _____

SCR #: _____

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed: ~~Preservation Needed~~ Nitric preserved.

Rush results requested by (please check): E-Mail ☐ Phone ☐ NM 9/10/18

E-mail Address: ENVsubcontracting@EurofinsUS.com

Phone: 717-556-7383

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☑	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☑	NYSDEC Category	☐ A or ☐ B

Level IV DOD ☐

EDD Required? Yes ☑ No ☐ If yes, format: HazSite

Relinquished by:	Date	Time	Received by:	Date	Time
	9/10/18	16:58		9/11/18	9:50
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Relinquished by Commercial Carrier:

UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

GEL Laboratories LLC JA

SAMPLE RECEIPT & REVIEW FORM

Client: LANC	**SDG/AR/COC/Work Order:** 459193
Received By: AA / Michelle Sterner	**Date Received:** 9/11/18
Carrier and Tracking Number	Circle Applicable: FedEx Express / FedEx Ground / UPS / Field Services / Courier / Other 5035 4245 0649 5035 4245 0650

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): Ø CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: (Wet Ice) Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: 1°
4	Daily check performed and passed on IR temperature gun?	✓			**Temperature Device Serial #:** IR2-18 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	✓			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes No___ N/A Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KG Date 9/11/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

Laboratory Certifications

There are no "Data Exception Reports" associated with this analytical report.

List of current GEL Certifications as of 03 October 2018

State	Certification
Alaska	17−018
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−27
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Eurofins Lancaster Laboratories (LANC)
SDG #: 459193

Product: **GFPC, Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 2
Analytical Batch: 1802264

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
459193001	MW-4
459193002	MW-6
459193003	MW-2
459193004	MW-5
459193005	MW-1
459193006	MW-3
459193007	FB-09042018
1204113223	Method Blank (MB)
1204113224	459187008(MW-3) Sample Duplicate (DUP)
1204113225	459187008(MW-3) Matrix Spike (MS)
1204113226	459187008(MW-3) Matrix Spike Duplicate (MSD)
1204113227	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204113225 (MW-3MS) and 1204113226 (MW-3MSD), aliquots were reduced to conserve sample volume.

Product: **Lucas Cell, Ra226, liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 1802180

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
459193001	MW-4

459193002	MW-6
459193003	MW-2
459193004	MW-5
459193005	MW-1
459193006	MW-3
459193007	FB-09042018
1204113013	Method Blank (MB)
1204113014	459187001(MW-8) Sample Duplicate (DUP)
1204113015	459187001(MW-8) Matrix Spike (MS)
1204113016	459187001(MW-8) Matrix Spike Duplicate (MSD)
1204113017	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Duplication Criteria between QC Sample and Duplicate Sample
The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1204113014 (MW-8DUP)	Radium-226	RPD 139* (0.0%-100.0%) RER 2.06 (0-3)

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204113015 (MW-8MS) and 1204113016 (MW-8MSD), aliquots were reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report
for

LANC006 Eurofins Lancaster Laboratories

Client SDG: 459193 GEL Work Order: 459193

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria
** Analyte is a Tracer compound
U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Theresa L Austin **Name: Theresa Austin**

Date: 28 SEP 2018 **Title: Group Leader**

Sample Data Summary

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: September 28, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-4
Sample ID: 459193001
Matrix: Ground Water
Collect Date: 04-SEP-18
Receive Date: 11-SEP-18
Collector: Client
Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.224	+/-0.694	1.28	+/-0.697	3.00	pCi/L			JXC9	09/27/18	0913	1802264	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.120	+/-0.324	0.615	+/-0.325	1.00	pCi/L			PCW	09/27/18	0955	1802180	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1802264	92	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: September 28, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-6
Sample ID: 459193002
Matrix: Ground Water
Collect Date: 04-SEP-18
Receive Date: 11-SEP-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.476	+/-0.752	1.31	+/-0.763	3.00	pCi/L			JXC9	09/27/18	0913	1802264	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.403	+/-0.370	0.558	+/-0.376	1.00	pCi/L			PCW	09/27/18	0955	1802180	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1802264	88.9	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: September 28, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-2
Sample ID: 459193003
Matrix: Ground Water
Collect Date: 04-SEP-18
Receive Date: 11-SEP-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	1.12	+/-0.873	1.37	+/-0.924	3.00	pCi/L			JXC9	09/27/18	0913	1802264	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.187	+/-0.302	0.537	+/-0.303	1.00	pCi/L			PCW	09/27/18	0955	1802180	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1802264	87.7	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: September 28, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-5
Sample ID: 459193004
Matrix: Ground Water
Collect Date: 04-SEP-18
Receive Date: 11-SEP-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.786	+/-0.787	1.29	+/-0.815	3.00	pCi/L			JXC9	09/27/18	0913	1802264	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.077	+/-0.320	0.622	+/-0.320	1.00	pCi/L			PCW	09/27/18	0955	1802180	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1802264	84.6	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: September 28, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-1
Sample ID: 459193005
Matrix: Ground Water
Collect Date: 04-SEP-18
Receive Date: 11-SEP-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.532	+/-0.686	1.17	+/-0.701	3.00	pCi/L			JXC9	09/27/18	0913	1802264	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.193	+/-0.311	0.555	+/-0.313	1.00	pCi/L			PCW	09/27/18	0955	1802180	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1802264	87.7	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike

Lancaster, Pennsylvania 17601-5994

Report Date: September 28, 2018

Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-3
Sample ID: 459193006
Matrix: Ground Water
Collect Date: 04-SEP-18
Receive Date: 11-SEP-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.754	+/-1.23	2.11	+/-1.24	3.00	pCi/L			JXC9	09/27/18	0913	1802264	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.916	+/-0.400	0.319	+/-0.457	1.00	pCi/L			PCW	09/27/18	1030	1802180	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1802264	97.9	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike

Lancaster, Pennsylvania 17601-5994 Report Date: September 28, 2018

Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: FB-09042018 Project: LANC00115
Sample ID: 459193007 Client ID: LANC006
Matrix: Ground Water
Collect Date: 04-SEP-18
Receive Date: 11-SEP-18
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	-0.30	+/-0.814	1.63	+/-0.815	3.00	pCi/L			JXC9	09/27/18	0921	1802264	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	-0.0855	+/-0.265	0.615	+/-0.265	1.00	pCi/L			PCW	09/27/18	1030	1802180	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1802264	84.6	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

Quality Control Summary

QC Summary

Client : **Eurofins Lancaster Laboratories**
2425 New Holland Pike
Lancaster, Pennsylvania
Contact: **Ms. Hannah Cottman**
Workorder: **459193**

Report Date: September 28, 2018

Parmname		NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow											
Batch	1802264										
QC1204113224	459187008 DUP										
Radium-228		U	0.205	U	0.695	pCi/L	0		N/A	JXC9	09/27/1809:21
		Uncert:	+/-0.846		+/-1.04						
		TPU:	+/-0.848		+/-1.06						
QC1204113227	LCS										
Radium-228		17.3			20.7	pCi/L		120	(75%-125%)	JXC9	09/27/1809:20
		Uncert:			+/-2.44						
		TPU:			+/-6.12						
QC1204113223	MB										
Radium-228				U	-1.43	pCi/L				JXC9	09/27/1809:21
		Uncert:			+/-0.817						
		TPU:			+/-0.817						
QC1204113225	459187008 MS										
Radium-228		52.2 U	0.205		50.6	pCi/L		97	(75%-125%)	JXC9	09/27/1809:21
		Uncert:	+/-0.846		+/-6.59						
		TPU:	+/-0.848		+/-15.2						
QC1204113226	459187008 MSD										
Radium-228		52.2 U	0.205		48.7	pCi/L	3.96	93.2	(0%-20%)	JXC9	09/27/1809:21
		Uncert:	+/-0.846		+/-6.19						
		TPU:	+/-0.848		+/-14.7						
Rad Ra-226											
Batch	1802180										
QC1204113014	459187001 DUP										
Radium-226		U	0.112		0.628	pCi/L	139*		(0% - 100%)	PCW	09/27/1810:30
		Uncert:	+/-0.303		+/-0.361						
		TPU:	+/-0.304		+/-0.385						
QC1204113017	LCS										
Radium-226		26.0			22.5	pCi/L		86.8	(75%-125%)	PCW	09/27/1810:30
		Uncert:			+/-1.83						
		TPU:			+/-4.58						
QC1204113013	MB										
Radium-226				U	-0.0754	pCi/L				PCW	09/27/1810:30
		Uncert:			+/-0.276						
		TPU:			+/-0.277						
QC1204113015	459187001 MS										
Radium-226		130 U	0.112		138	pCi/L		106	(75%-125%)	PCW	09/27/1810:30
		Uncert:	+/-0.303		+/-10.4						
		TPU:	+/-0.304		+/-32.1						
QC1204113016	459187001 MSD										
Radium-226		130 U	0.112		132	pCi/L	4.1	102	(0%-20%)	PCW	09/27/1810:30
		Uncert:	+/-0.303		+/-10.2						

QC Summary

Workorder: **459193**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Ra-226										
Batch 1802180										
				TPU:	+/-0.304		+/-23.0			

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 1802264 Check-list

This check-list was completed on 27-SEP-18 by Nat Long

This batch was reviewed by Kenshalla Oston on 27-SEP-18 and Nat Long on 27-SEP-18.

Batch ID: 1802264

Product: GFC28RAL

Description: Gas Flow Radium 228 GL-RAD-A-009

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **1802264**
Analyst: Jasmine Conley (JXC9)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 2
Instrument: GFC−51204863

Due Dates for Lab: 05−OCT−2018 **Package: 07−OCT−2018** **SDG: 09−OCT−2018**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204113227	Radium−228 SPIKE	1810−A	.1	mL
MS	1204113225	Radium−228 SPIKE	1810−A	.1	mL
MSD	1204113226	Radium−228 SPIKE	1810−A	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Ac−228 Ingrow (date)	Ac−228 Separation (date)
1	459187001	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
2	459187002	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
3	459187003	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
4	459187004	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
5	459187005	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
6	459187006	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
7	459187007	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
8	459187008	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
9	459187009	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
10	459187010	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
11	459187011	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
12	459193001	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
13	459193002	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
14	459193003	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
15	459193004	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
16	459193005	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
17	459193006	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
18	459193007	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
19	1204113223 MB	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
20	1204113224 DUP (459187008)	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03
21	1204113225 MS (459187008)	21−SEP−2018	3	100	09/24/18 13:40	09/27/18 07:03
22	1204113226 MSD (459187008)	21−SEP−2018	3	100	09/24/18 13:40	09/27/18 07:03
23	1204113227 LCS	21−SEP−2018	3	300	09/24/18 13:40	09/27/18 07:03

Reagent/Solvent Lot ID	Description	Amount
REGNT 2571685.11	2mL Cartridges	2 mL
REGNT 2662331.3	cerium 500 mg/L in 2%HCI	.2 mL
REGNT 2672182	RGF−1.5 Ammonium Sulfate	10 mL
REGNT 2770329.5	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 2801523.7	Hydrofluoric Acid Poly Bottle	3 mL
REGNT 2822290	RGF−1M Citric Acid	5 mL
REGNT 2828165	RGF−16mg/mL Barium Chloride	1 mL
REGNT 2831338	RGF−50% Potassium Carbonate	2 mL
REGNT 2832275.4	HNO3	5 mL
REGNT 2832949	2M HCl	20 mL
REGNT 2833686	RGF−7M Nitric Acid	25 mL

Comments:

Pipet Id: RAD−GFC−1795419
Data Entry Date2: 21−SEP−2018 00:00

Prep Logbook

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Ac−228 Ingrow (date)	Ac−228 Separation (date)

Reagent/Solvent Lot ID	Description	Amount
WORK 0487−D	Barium−133 TRACER	.1 mL

Comments:

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 0487-D
Tracer Exp Date : 11/8/2018
Tracer Volume Added: 0.10

Batch : 1802264
Analyst : JAS02031
Prep Date : 9/21/2018
Ra-228 Method Uncertainty : 0.1268

Geometry: CeF on 25mm Filter

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 3 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	459187001.1	0.3000	1.8459E-05	9/5/2018 11:30	186.5	7.32%	165.4	7.78%	0.1	0.000200
2	459187002.1	0.3000	1.8459E-05	9/5/2018 11:40	186.5	7.32%	171.7	7.63%	0.1	0.000200
3	459187003.1	0.3000	1.8459E-05	9/5/2018 13:00	186.5	7.32%	148.1	8.22%	0.1	0.000200
4	459187004.1	0.3000	1.8459E-05	9/5/2018 13:30	186.5	7.32%	150.3	8.16%	0.1	0.000200
5	459187005.1	0.3000	1.8459E-05	9/5/2018 14:40	186.5	7.32%	156.6	7.99%	0.1	0.000200
6	459187006.1	0.3000	1.8459E-05	9/6/2018 9:55	186.5	7.32%	159.3	7.92%	0.1	0.000200
7	459187007.1	0.3000	1.8459E-05	9/6/2018 10:00	186.5	7.32%	172.1	7.62%	0.1	0.000200
8	459187008.1	0.3000	1.8459E-05	9/6/2018 11:55	186.5	7.32%	151.1	8.13%	0.1	0.000200
9	459187009.1	0.3000	1.8459E-05	9/6/2018 12:00	186.5	7.32%	139.8	8.46%	0.1	0.000200
10	459187010.1	0.3000	1.8459E-05	9/5/2018 14:00	186.5	7.32%	175.0	7.56%	0.1	0.000200
11	459187011.1	0.3000	1.8459E-05	9/6/2018 12:30	186.5	7.32%	166.4	7.75%	0.1	0.000200
12	459193001.1	0.3000	1.8459E-05	9/4/2018 11:25	186.5	7.32%	171.6	7.63%	0.1	0.000200
13	459193002.1	0.3000	1.8459E-05	9/4/2018 11:30	186.5	7.32%	165.8	7.77%	0.1	0.000200
14	459193003.1	0.3000	1.8459E-05	9/4/2018 13:30	186.5	7.32%	163.6	7.82%	0.1	0.000200
15	459193004.1	0.3000	1.8459E-05	9/4/2018 13:50	186.5	7.32%	157.8	7.96%	0.1	0.000200
16	459193005.1	0.3000	1.8459E-05	9/4/2018 15:45	186.5	7.32%	163.6	7.82%	0.1	0.000200
17	459193006.1	0.3000	1.8459E-05	9/4/2018 15:50	186.5	7.32%	182.6	7.40%	0.1	0.000200
18	459193007.1	0.3000	1.8459E-05	9/4/2018 13:15	186.5	7.32%	157.8	7.96%	0.1	0.000200
19	1204113223.1	0.3000	1.8459E-05	9/21/2018 0:00	186.5	7.32%	164.4	7.80%	0.1	0.000200
20	1204113224.1	0.3000	1.8459E-05	9/6/2018 11:55	186.5	7.32%	163.2	7.83%	0.1	0.000200
21	1204113225.1	0.1000	1.1370E-05	9/6/2018 11:55	186.5	7.32%	153.9	8.06%	0.1	0.000200
22	1204113226.1	0.1000	1.1370E-05	9/6/2018 11:55	186.5	7.32%	164.3	7.80%	0.1	0.000200
23	1204113227.1	0.3000	1.8459E-05	9/21/2018 0:00	186.5	7.32%	152.9	8.09%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-063
Instrument SOP: GL-RAD-I-006, GL-RAD-I-016

Count raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	A1	60	1	104	1.733	9/27/2018 9:25	9/24/2018 13:40	9/27/2018 7:03	0.993	0.765	0.999	1.057	88.7%	5.35%
2	A2	60	5	89	1.483	9/27/2018 9:25	9/24/2018 13:40	9/27/2018 7:03	0.993	0.765	0.999	1.057	92.1%	5.29%
3	A3	60	7	103	1.717	9/27/2018 9:25	9/24/2018 13:40	9/27/2018 7:03	0.993	0.765	0.999	1.057	79.4%	5.51%
4	1A	60	15	47	0.783	9/27/2018 9:11	9/24/2018 13:40	9/27/2018 7:03	0.993	0.785	0.999	1.057	80.6%	5.49%
5	1B	60	12	116	1.933	9/27/2018 9:11	9/24/2018 13:40	9/27/2018 7:03	0.993	0.785	0.999	1.057	84.0%	5.43%
6	1C	60	8	67	1.117	9/27/2018 9:11	9/24/2018 13:40	9/27/2018 7:03	0.993	0.785	0.999	1.057	85.4%	5.40%
7	2A	60	12	67	1.117	9/27/2018 9:11	9/24/2018 13:40	9/27/2018 7:03	0.993	0.785	0.999	1.057	92.3%	5.29%
8	2C	60	7	39	0.650	9/27/2018 9:11	9/24/2018 13:40	9/27/2018 7:03	0.993	0.785	0.999	1.057	81.0%	5.48%
9	3C	60	16	72	1.200	9/27/2018 9:12	9/24/2018 13:40	9/27/2018 7:03	0.993	0.785	0.999	1.057	75.0%	5.60%
10	3D	60	2	40	0.667	9/27/2018 9:12	9/24/2018 13:40	9/27/2018 7:03	0.993	0.785	0.999	1.057	93.8%	5.27%
11	4A	60	5	36	0.600	9/27/2018 9:13	9/24/2018 13:40	9/27/2018 7:03	0.993	0.783	0.999	1.057	89.2%	5.34%
12	4B	60	4	34	0.567	9/27/2018 9:13	9/24/2018 13:40	9/27/2018 7:03	0.992	0.783	0.999	1.057	92.0%	5.29%
13	4C	60	12	40	0.667	9/27/2018 9:13	9/24/2018 13:40	9/27/2018 7:03	0.992	0.783	0.999	1.057	88.9%	5.34%
14	4D	60	13	51	0.850	9/27/2018 9:13	9/24/2018 13:40	9/27/2018 7:03	0.992	0.783	0.999	1.057	87.7%	5.36%
15	5A	60	13	42	0.700	9/27/2018 9:13	9/24/2018 13:40	9/27/2018 7:03	0.992	0.783	0.999	1.057	84.6%	5.41%
16	5B	60	7	32	0.533	9/27/2018 9:13	9/24/2018 13:40	9/27/2018 7:03	0.993	0.783	0.999	1.057	87.7%	5.36%
17	5D	60	4	130	2.167	9/27/2018 9:13	9/24/2018 13:40	9/27/2018 7:03	0.993	0.783	0.999	1.057	97.9%	5.21%
18	6A	60	8	39	0.650	9/27/2018 9:21	9/24/2018 13:40	9/27/2018 7:03	0.992	0.771	0.999	1.057	84.6%	5.41%
19	6B	60	6	40	0.667	9/27/2018 9:21	9/24/2018 13:40	9/27/2018 7:03	0.998	0.771	0.999	1.057	88.1%	5.36%
20	6C	60	8	71	1.183	9/27/2018 9:21	9/24/2018 13:40	9/27/2018 7:03	0.993	0.771	0.999	1.057	87.5%	5.37%
21	9B	60	4	317	5.283	9/27/2018 9:21	9/24/2018 13:40	9/27/2018 7:03	0.993	0.770	0.999	1.057	82.5%	5.45%
22	9D	60	7	299	4.983	9/27/2018 9:21	9/24/2018 13:40	9/27/2018 7:03	0.993	0.770	0.999	1.057	88.1%	5.36%
23	11B	60	10	379	6.317	9/27/2018 9:20	9/24/2018 13:40	9/27/2018 7:03	0.998	0.772	0.999	1.057	82.0%	5.46%

Pos.	Calibration Data: Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	LB4100	6/1/2017	5/31/2019	0.6357	0.02044	1.060	9/21/2018 17:20	500
2	LB4100	6/1/2017	5/31/2019	0.5994	0.02268	1.022	9/21/2018 17:20	500
3	LB4100	6/1/2017	5/31/2019	0.5708	0.01784	1.156	9/21/2018 17:20	500
4	PIC	6/1/2017	5/31/2019	0.6430	0.00738	0.466	9/21/2018 16:49	500
5	PIC	6/1/2017	5/31/2019	0.6519	0.00711	0.736	9/21/2018 16:49	500
6	PIC	6/1/2017	5/31/2019	0.6443	0.00847	0.504	9/21/2018 16:49	500
7	PIC	6/1/2017	5/31/2019	0.6444	0.01914	0.396	9/21/2018 16:49	500
8	PIC	6/1/2017	5/31/2019	0.6389	0.01274	0.598	9/21/2018 16:49	500
9	PIC	6/1/2017	5/31/2019	0.6374	0.00988	0.786	9/21/2018 16:50	500
10	PIC	6/1/2017	5/31/2019	0.6255	0.02297	0.466	9/21/2018 16:50	500
11	PIC	6/1/2017	5/31/2019	0.6420	0.01123	0.706	9/21/2018 16:50	500
12	PIC	6/1/2017	5/31/2019	0.6410	0.01519	0.502	9/21/2018 16:50	500
13	PIC	6/1/2017	5/31/2019	0.6608	0.00889	0.530	9/21/2018 16:50	500
14	PIC	6/1/2017	5/31/2019	0.6462	0.00773	0.538	9/21/2018 16:50	500
15	PIC	6/1/2017	5/31/2019	0.6766	0.00851	0.480	9/21/2018 16:50	500
16	PIC	6/1/2017	5/31/2019	0.6547	0.00426	0.384	9/21/2018 16:50	500
17	PIC	6/1/2017	5/31/2019	0.6669	0.00925	1.926	9/22/2018 14:12	500
18	PIC	6/1/2017	5/31/2019	0.6547	0.02228	0.730	9/21/2018 16:54	500
19	PIC	6/1/2017	5/31/2019	0.6465	0.00851	1.060	9/21/2018 16:55	500
20	PIC	6/1/2017	5/31/2019	0.6594	0.01970	0.990	9/21/2018 16:55	500
21	PIC	6/1/2017	5/31/2019	0.6716	0.00754	0.778	9/21/2018 16:56	500
22	PIC	6/1/2017	5/31/2019	0.6494	0.02610	0.516	9/21/2018 16:56	500
23	PIC	6/1/2017	5/31/2019	0.6620	0.00697	0.864	9/21/2018 16:52	500

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

* - RPD changed to 0% due to sample & dup activity below MDA

Spike S/N : 1810-A
Spike Exp Date : 5/23/2019
Spike Activity (dpm/ml): 115.34
Spike Volume Added: 0.10

LCS S/N : 1810-A
LCS Exp Date : 5/23/2019
LCS Activity (dpm/ml): 115.34
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	1.2167	0.8590	3	1.9036	**2.4996**	26.77%	0.6733	0.1761	1.2812	1.4513		SAMPLE				
2	1.2201	0.8614	3	1.9124	**1.7491**	35.93%	0.4613	0.1636	1.2158	1.3061		SAMPLE				
3	1.5803	1.1157	3	2.4622	**2.5886**	31.89%	0.5607	0.1758	1.5913	1.7414		SAMPLE				
4	0.8547	0.6034	3	1.4036	**1.2481**	37.68%	0.3173	0.1183	0.9117	0.9725		SAMPLE				
5	1.0168	0.7178	3	1.6218	**4.4577**	16.28%	1.1973	0.1836	1.3395	1.8028		SAMPLE				
6	0.8369	0.5909	3	1.3669	**2.2688**	23.51%	0.6127	0.1401	1.0167	1.1877		SAMPLE				
7	0.6865	0.4847	3	1.1406	**2.4696**	20.13%	0.7207	0.1393	0.9356	1.1516		SAMPLE				
8	0.9691	0.6842	3	1.5652	**0.2047**	210.99%	0.0520	0.1097	0.8463	0.8481		SAMPLE				
9	1.2036	0.8498	3	1.9128	**1.7656**	35.93%	0.4140	0.1469	1.2277	1.3185		SAMPLE				
10	0.7552	0.5332	3	1.2402	**0.6974**	54.99%	0.2007	0.1097	0.7475	0.7714		SAMPLE				
11	0.9536	0.6733	3	1.5248	**-0.3779**	100.93%	-0.1060	0.1068	0.7465	0.7466		SAMPLE				
12	0.7817	0.5519	3	1.2770	**0.2241**	158.16%	0.0647	0.1022	0.6943	0.6970		SAMPLE				
13	0.8065	0.5694	3	1.3128	**0.4756**	80.91%	0.1367	0.1103	0.7525	0.7634		SAMPLE				
14	0.8419	0.5944	3	1.3691	**1.1250**	39.94%	0.3120	0.1235	0.8725	0.9240		SAMPLE				
15	0.7878	0.5562	3	1.2910	**0.7858**	51.37%	0.2200	0.1124	0.7867	0.8150		SAMPLE				
16	0.7024	0.4959	3	1.1698	**0.5317**	66.03%	0.1493	0.0983	0.6858	0.7007		SAMPLE				
17	1.3833	0.9766	3	2.1099	**0.7536**	83.23%	0.2407	0.1999	1.2269	1.2435		SAMPLE				
18	1.0193	0.7197	3	1.6267	**-0.2998**	138.72%	-0.0800	0.1109	0.8144	0.8146		SAMPLE				
19	1.1881	0.8388	3	1.8589	**-1.4259**	29.74%	-0.3933	0.1150	0.8173	0.8174		MB				
20	1.1392	0.8043	3	1.7884	**0.6953**	76.41%	0.1933	0.1473	1.0385	1.0556	459187008.1	DUP	* 0.0%			
21	3.1552	2.2276	3	5.0170	**50.6262**	8.63%	4.5053	0.2994	6.5930	15.2182	459187008.1	MS			52.2049	97.0%
22	2.4909	1.7586	3	4.0618	**48.6622**	8.81%	4.4673	0.2900	6.1911	14.7269	459187008.1	MSD	4.0%		52.2049	93.2%
23	1.1238	0.7934	3	1.7767	**20.7090**	8.14%	5.4527	0.3271	2.4351	6.1167		LCS			17.3185	119.6%

1802264.xls

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
459187001	A1	60	1	104	9/27/2018 9:25	9/27/2018 10:25	LB4100	1802264
459187002	A2	60	5	89	9/27/2018 9:25	9/27/2018 10:25	LB4100	1802264
459187003	A3	60	7	103	9/27/2018 9:25	9/27/2018 10:25	LB4100	1802264
459187004	1A	60	15	47	9/27/2018 9:11	9/27/2018 10:11	PIC	1802264
459187005	1B	60	12	116	9/27/2018 9:11	9/27/2018 10:11	PIC	1802264
459187006	1C	60	8	67	9/27/2018 9:11	9/27/2018 10:11	PIC	1802264
459187007	2A	60	12	67	9/27/2018 9:11	9/27/2018 10:11	PIC	1802264
459187008	2C	60	7	39	9/27/2018 9:11	9/27/2018 10:11	PIC	1802264
459187009	3C	60	16	72	9/27/2018 9:12	9/27/2018 10:12	PIC	1802264
459187010	3D	60	2	40	9/27/2018 9:12	9/27/2018 10:12	PIC	1802264
459187011	4A	60	5	36	9/27/2018 9:13	9/27/2018 10:13	PIC	1802264
459193001	4B	60	4	34	9/27/2018 9:13	9/27/2018 10:13	PIC	1802264
459193002	4C	60	12	40	9/27/2018 9:13	9/27/2018 10:13	PIC	1802264
459193003	4D	60	13	51	9/27/2018 9:13	9/27/2018 10:13	PIC	1802264
459193004	5A	60	13	42	9/27/2018 9:13	9/27/2018 10:13	PIC	1802264
459193005	5B	60	7	32	9/27/2018 9:13	9/27/2018 10:13	PIC	1802264
459193006	5D	60	4	130	9/27/2018 9:13	9/27/2018 10:13	PIC	1802264
459193007	6A	60	8	39	9/27/2018 9:21	9/27/2018 10:21	PIC	1802264
1204113223	6B	60	6	40	9/27/2018 9:21	9/27/2018 10:21	PIC	1802264
1204113224	6C	60	8	71	9/27/2018 9:21	9/27/2018 10:21	PIC	1802264
1204113225	9B	60	4	317	9/27/2018 9:21	9/27/2018 10:21	PIC	1802264
1204113226	9D	60	7	299	9/27/2018 9:21	9/27/2018 10:21	PIC	1802264
1204113227	11B	60	10	379	9/27/2018 9:20	9/27/2018 10:20	PIC	1802264

ASSAY 24-Sep-18 14:31:14

Protocol	id	8	Ba-133
Time	limit		
Count	limit		
Isotope	Ba-133		
Protocol	date	9/24/2018	
Run	id.	1718	

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
1	97	1	180.03	644.85	186.49	7.32		02:31:14
2	97	2	180.04	581.48	165.36	7.78	88.67	02:34:27
3	97	3	180.05	600.6	171.72	7.63	92.08	02:37:41
4	97	4	180.04	529.6	148.07	8.22	79.40	02:40:55
5	97	5	180.03	536.14	150.26	8.16	80.57	02:44:09
1	76	1	180.04	555.17	156.59	7.99	83.97	02:48:08
2	76	2	180.06	563.31	159.28	7.92	85.41	02:51:22
3	76	3	180.03	601.73	172.13	7.62	92.30	02:54:36
4	76	4	180.04	538.77	151.12	8.13	81.03	02:57:50
5	76	5	180.04	504.9	139.84	8.46	74.99	03:01:04
1	86	1	180.03	610.34	174.99	7.56	93.83	03:04:40
2	86	2	180.04	584.62	166.4	7.75	89.23	03:07:53
3	86	3	180.06	600.17	171.57	7.63	92.00	03:11:07
4	86	4	180.04	582.71	165.77	7.77	88.89	03:14:21
5	86	5	180.04	576.22	163.61	7.82	87.73	03:17:35
1	53	1	180.04	558.68	157.76	7.96	84.59	03:21:18
2	53	2	180.04	576.17	163.59	7.82	87.72	03:24:32
3	53	3	180.04	633.31	182.63	7.4	97.93	03:27:46
4	53	4	180.04	558.82	157.81	7.96	84.62	03:31:00
5	53	5	180.03	578.48	164.37	7.8	88.14	03:34:14
1	70	1	180.06	575.19	163.24	7.83	87.53	03:38:10
2	70	2	180.04	547.22	153.94	8.06	82.55	03:41:24
3	70	3	180.05	578.19	164.25	7.8	88.07	03:44:38
4	70	4	180.04	544.11	152.9	8.09	81.99	03:47:52

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 27-Sep-2018

Detectors LB4100 A1 through J4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100B1	Below	Alpha eff	27-Sep 08:04	5	9796	10030	12040	-3.70
LB4100B1	Below	Beta eff	27-Sep 08:20	5	48674	50540	59850	-4.20
LB4100B2	Below	Alpha eff	27-Sep 08:04	5	7816	8083	10940	-3.56
LB4100B2	Below	Beta eff	27-Sep 08:20	5	19832	21280	24110	-6.07
LB4100B3	Missing	Alpha eff	27-Sep 08:04	5	0.00E+0	8427	16450	-9.30
LB4100B3	Missing	Alpha XTalk	27-Sep 08:04	5	24702	0.270	0.653	+386,364.00
LB4100B4	Above	Beta bkg	27-Sep 06:07	60	84.350	0.607	2.163	+319.81
LB4100B4	Below	Beta eff	27-Sep 08:20	5	34510	36820	41450	-5.99
LB4100C1	Above	Beta bkg	27-Sep 06:27	60	1.983	1.035	1.925	+3.39
LB4100C2	Below	Beta eff	27-Sep 06:17	5	13735	15090	19370	-4.90
LB4100C2	need 2nd	Beta XTalk	27-Sep 06:17	5	4.37E-4	1.13E-4	4.85E-4	+2.22
LB4100C3	Above	Beta bkg	27-Sep 06:27	60	2.300	0.776	2.251	+3.20
LB4100C4	Above	Beta bkg	27-Sep 06:27	60	5.033	0.686	2.113	+15.27
LB4100C4	Below	Beta eff	27-Sep 06:17	5	16528	17060	23010	-3.54
LB4100E2	Above	Beta bkg	27-Sep 06:12	60	3.333	0.261	3.241	+3.19
LB4100E3	Above	Beta bkg	27-Sep 06:12	60	2.117	0.473	2.078	+3.14
LB4100E4	Above	Beta bkg	27-Sep 06:12	60	2.133	0.641	2.336	+2.28
LB4100G2	need 2nd	Alpha XTalk	27-Sep 05:48	5	0.410	0.256	0.413	+2.90
LB4100G2	Above	Beta bkg	27-Sep 06:17	60	2528	0.414	2.180	+8,587.40
LB4100H2	Above	Beta bkg	27-Sep 06:12	60	2.983	-1.72E+0	4.379	+1.63
LB4100I2	Above	Beta bkg	27-Sep 05:52	60	3.600	-1.65E+1	28.950	-0.35
LB4100I3	Above	Beta bkg	27-Sep 05:52	60	2.583	-5.60E-1	3.474	+1.68
LB4100J1	Above	Alpha bkg	27-Sep 08:30	60	0.367	0.053	0.379	+2.78
PIC7D	Below	Alpha eff	27-Sep 06:10	5	10260	10390	11090	-4.11
PIC7D	Above	Alpha XTalk	27-Sep 06:10	5	0.281	0.252	0.273	+5.21
PIC8A	Above	Beta XTalk	27-Sep 06:11	5	3.58E-4	5.74E-5	2.92E-4	+4.67
PIC12D	Above	Beta bkg	27-Sep 05:19	60	2.367	0.504	1.615	+7.06

PIC13D	Above	Beta bkg	27-Sep 06:28	60	1.850	-2.54E-1	1.788	+3.18

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

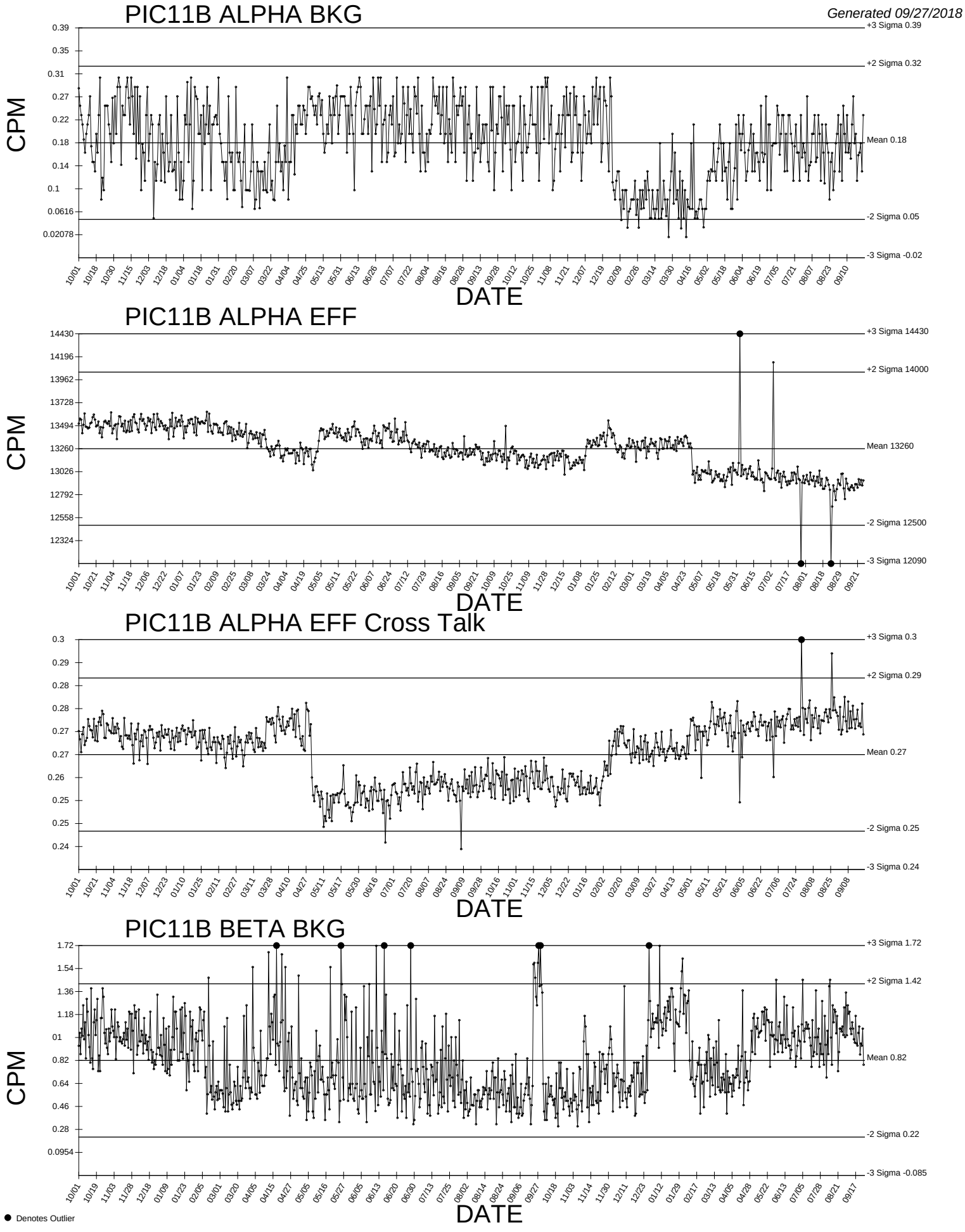
LB4100B3	Alpha bkg, Beta bkg, Beta eff, Beta XTalk
LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC3A	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

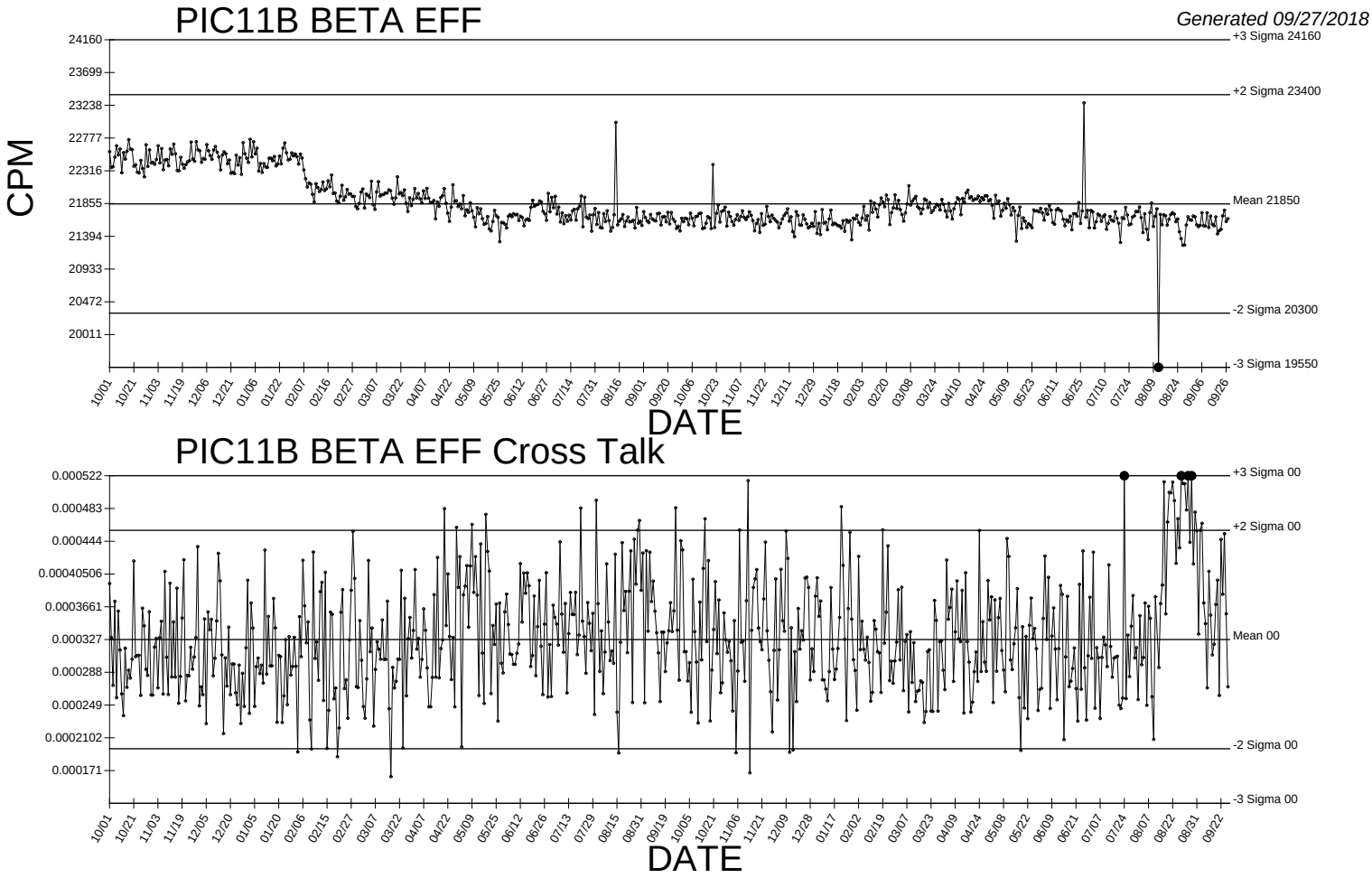
Reviewed by R. Gould - Harmon

Date 9-27-18

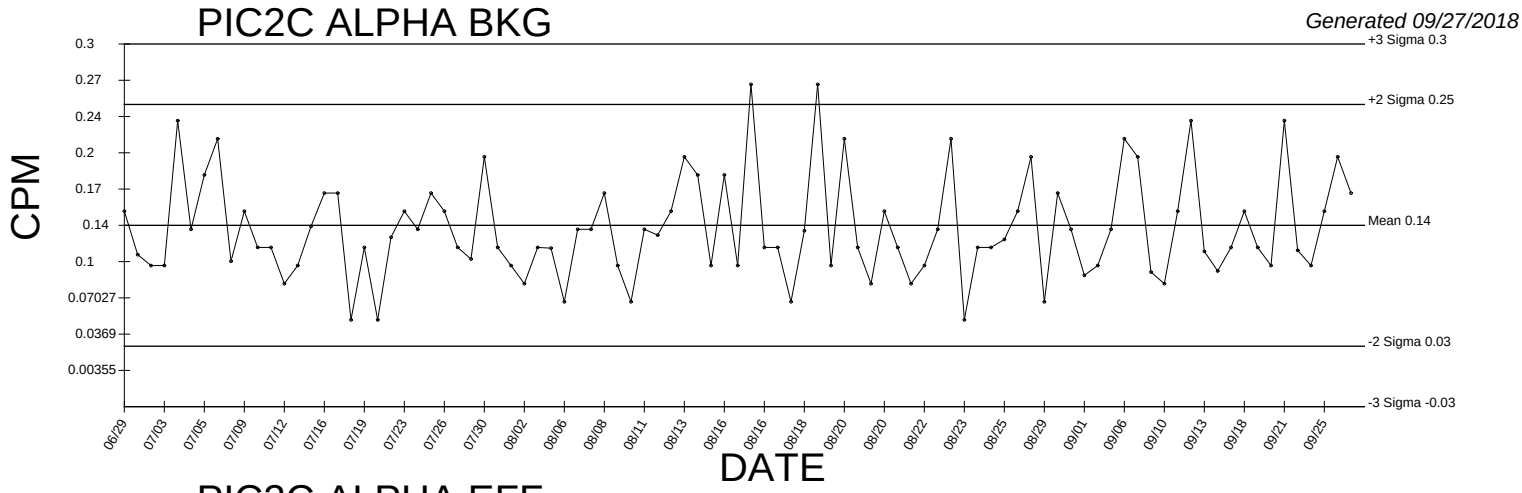
GEL Laboratories LLC

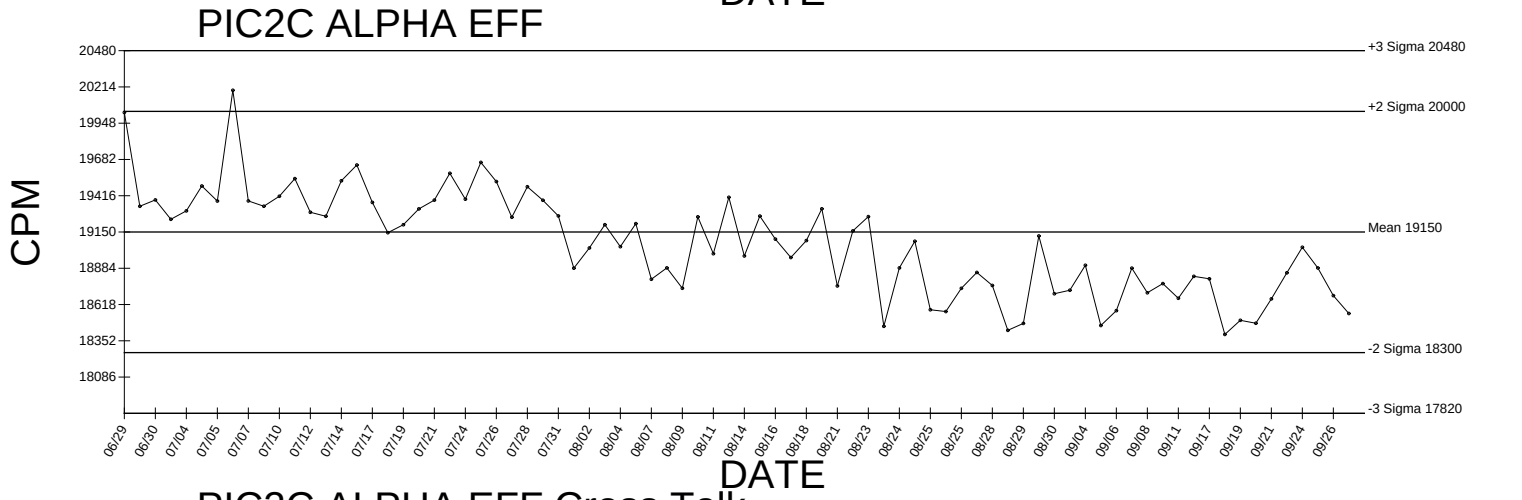
Background and Efficiency Data

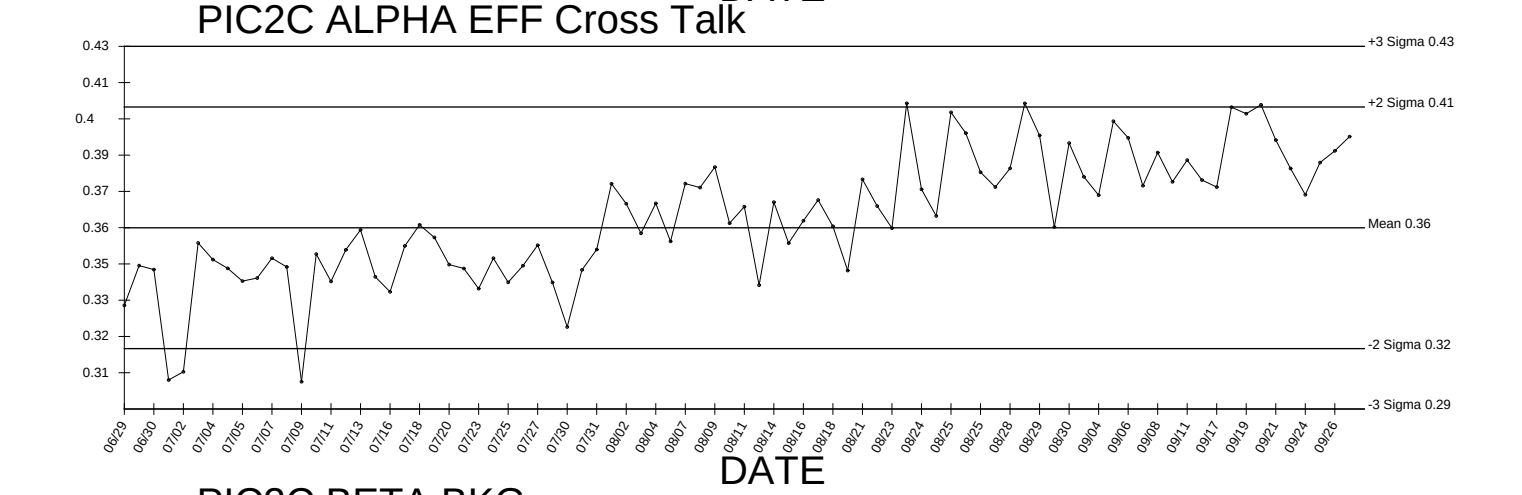

PIC11B ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.39
+2 Sigma 0.32
Mean 0.18
-2 Sigma 0.05
-3 Sigma -0.02
PIC11B ALPHA EFF
+3 Sigma 14430
+2 Sigma 14000
Mean 13260
-2 Sigma 12500
-3 Sigma 12090
PIC11B ALPHA EFF Cross Talk
+3 Sigma 0.3
+2 Sigma 0.29
Mean 0.27
-2 Sigma 0.25
-3 Sigma 0.24
PIC11B BETA BKG
+3 Sigma 1.72
+2 Sigma 1.42
Mean 0.82
-2 Sigma 0.22
-3 Sigma -0.085
● Denotes Outlier

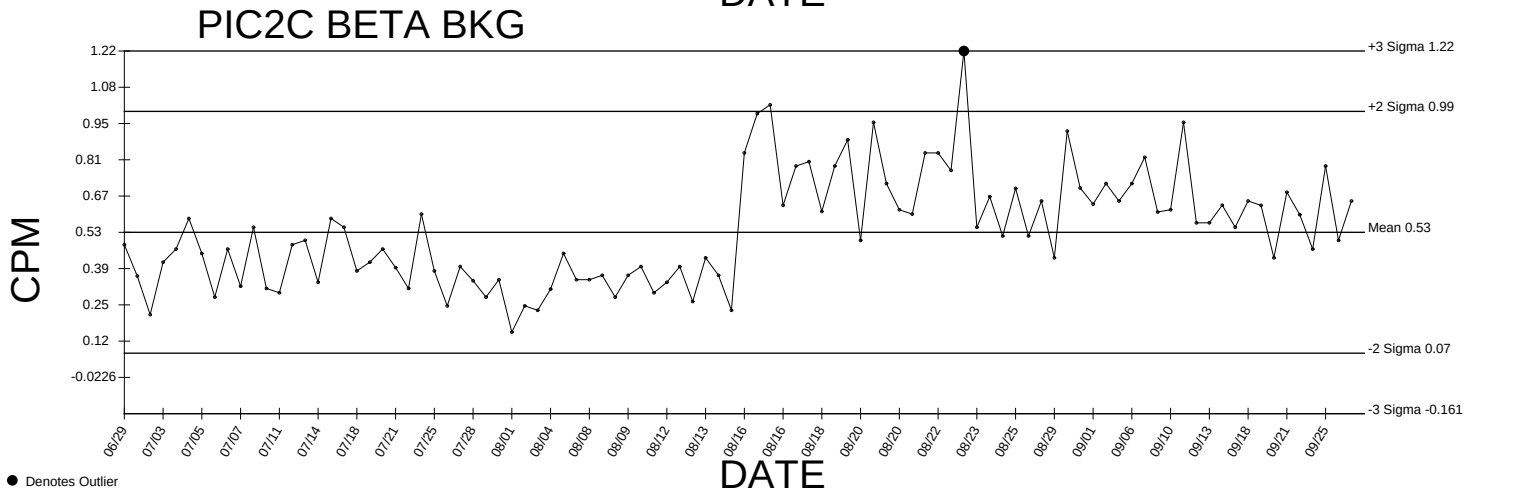


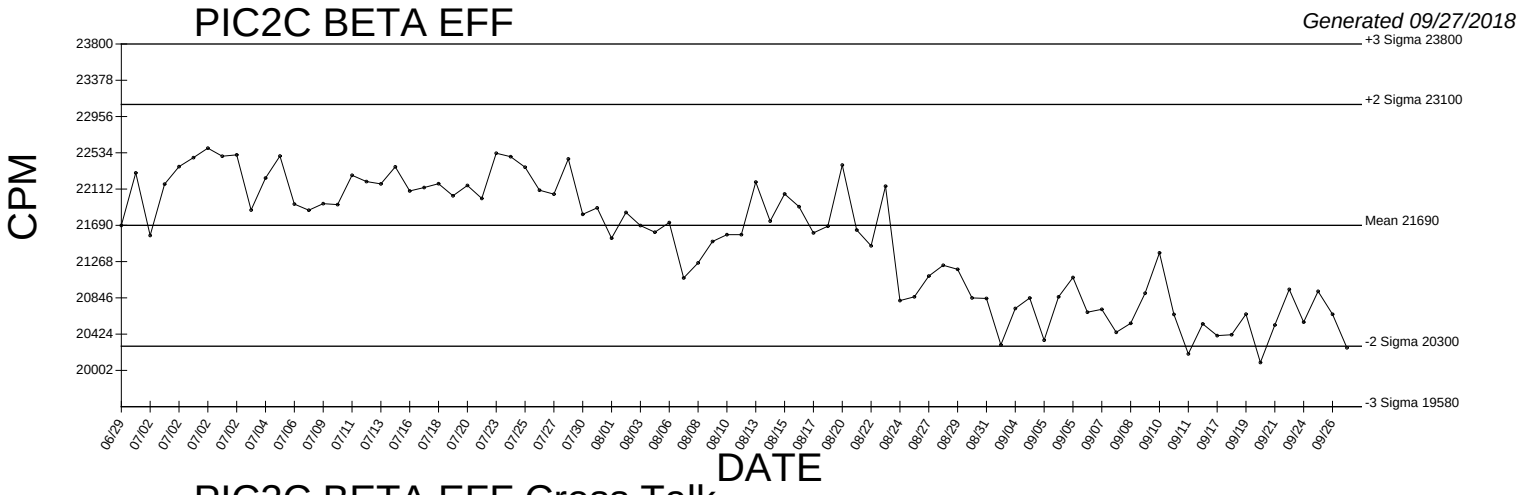
● Denotes Outlier

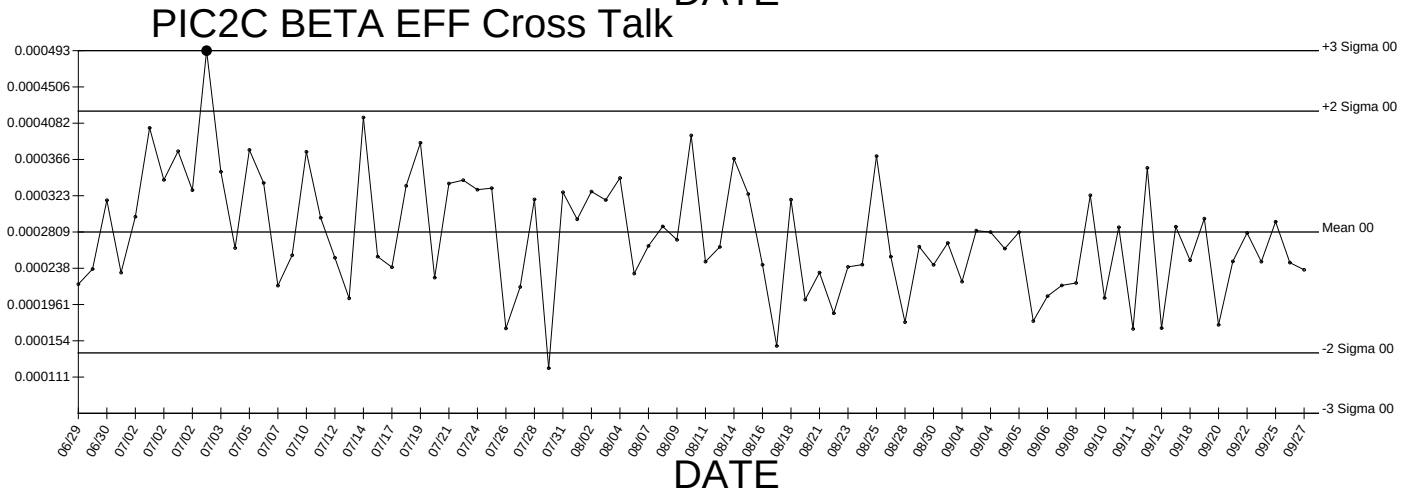

PIC2C ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.3
+2 Sigma 0.25
Mean 0.14
-2 Sigma 0.03
-3 Sigma -0.03


PIC2C ALPHA EFF
CPM
DATE
+3 Sigma 20480
+2 Sigma 20000
Mean 19150
-2 Sigma 18300
-3 Sigma 17820

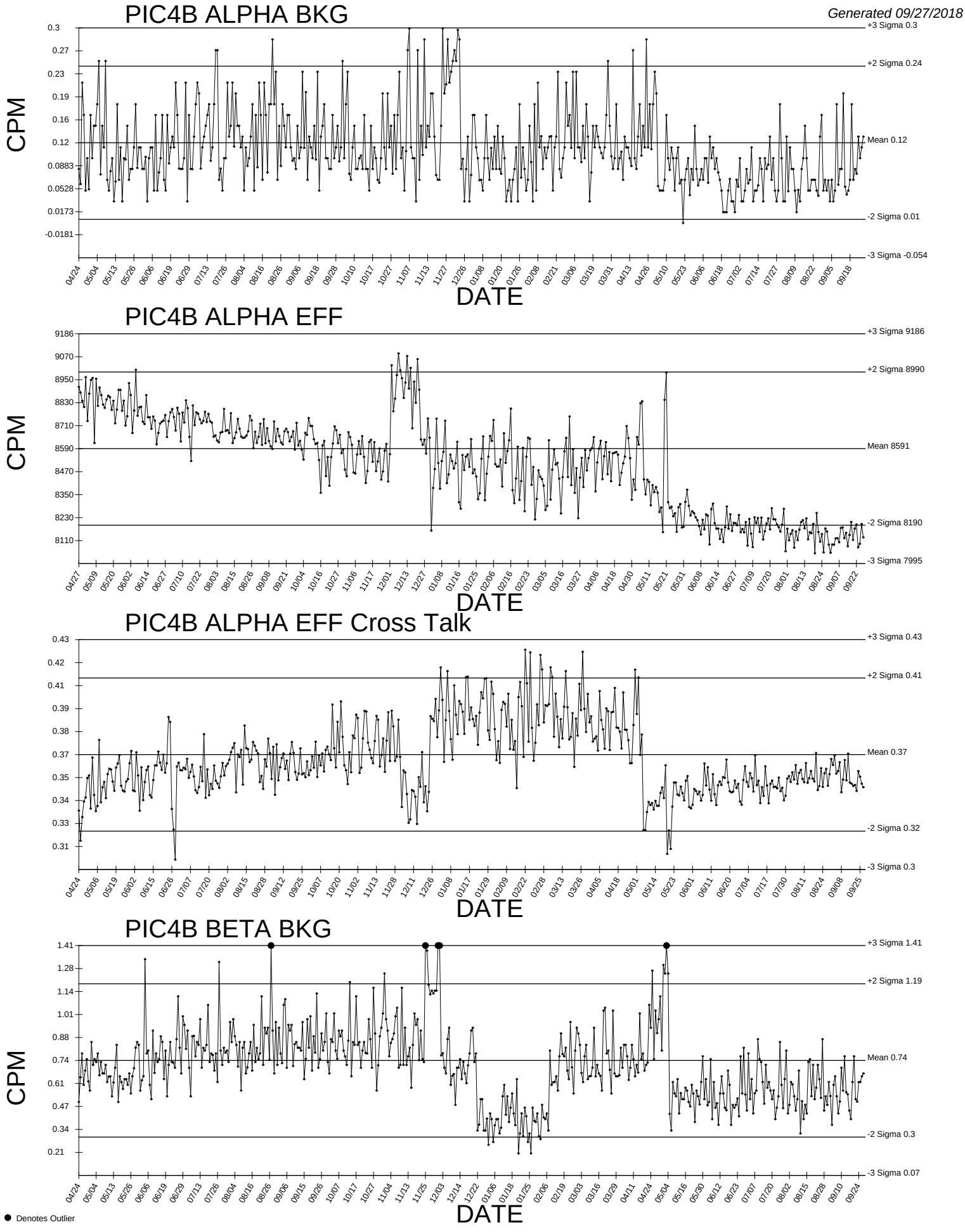

PIC2C ALPHA EFF Cross Talk
DATE
+3 Sigma 0.43
+2 Sigma 0.41
Mean 0.36
-2 Sigma 0.32
-3 Sigma 0.29

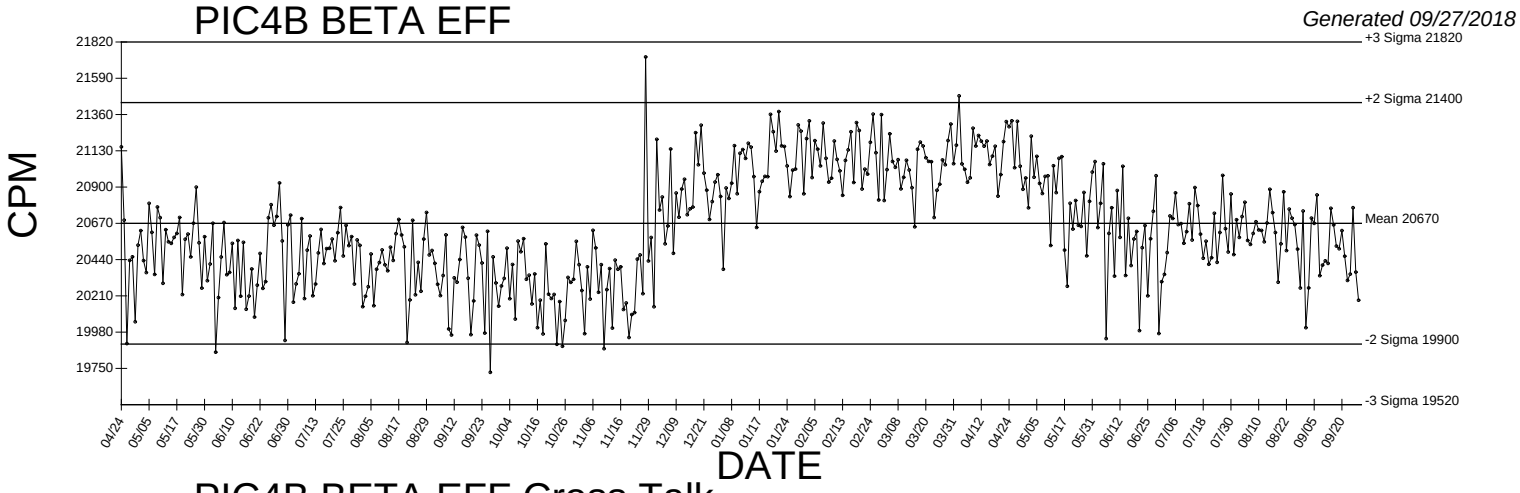

PIC2C BETA BKG
CPM
DATE
+3 Sigma 1.22
+2 Sigma 0.99
Mean 0.53
-2 Sigma 0.07
-3 Sigma -0.161
● Denotes Outlier

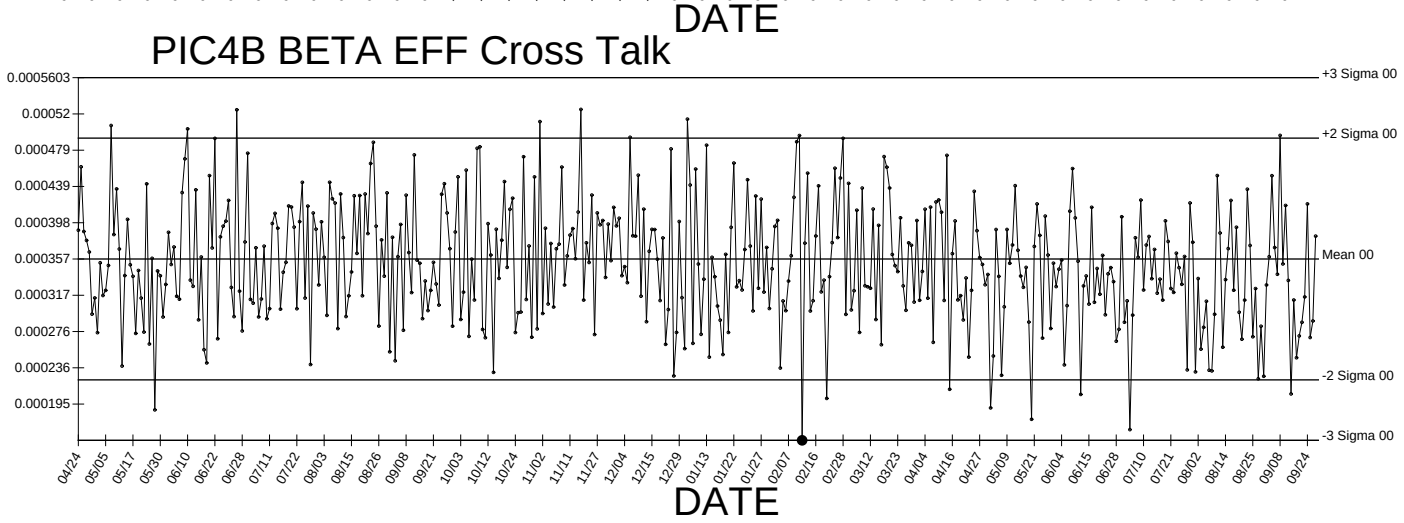




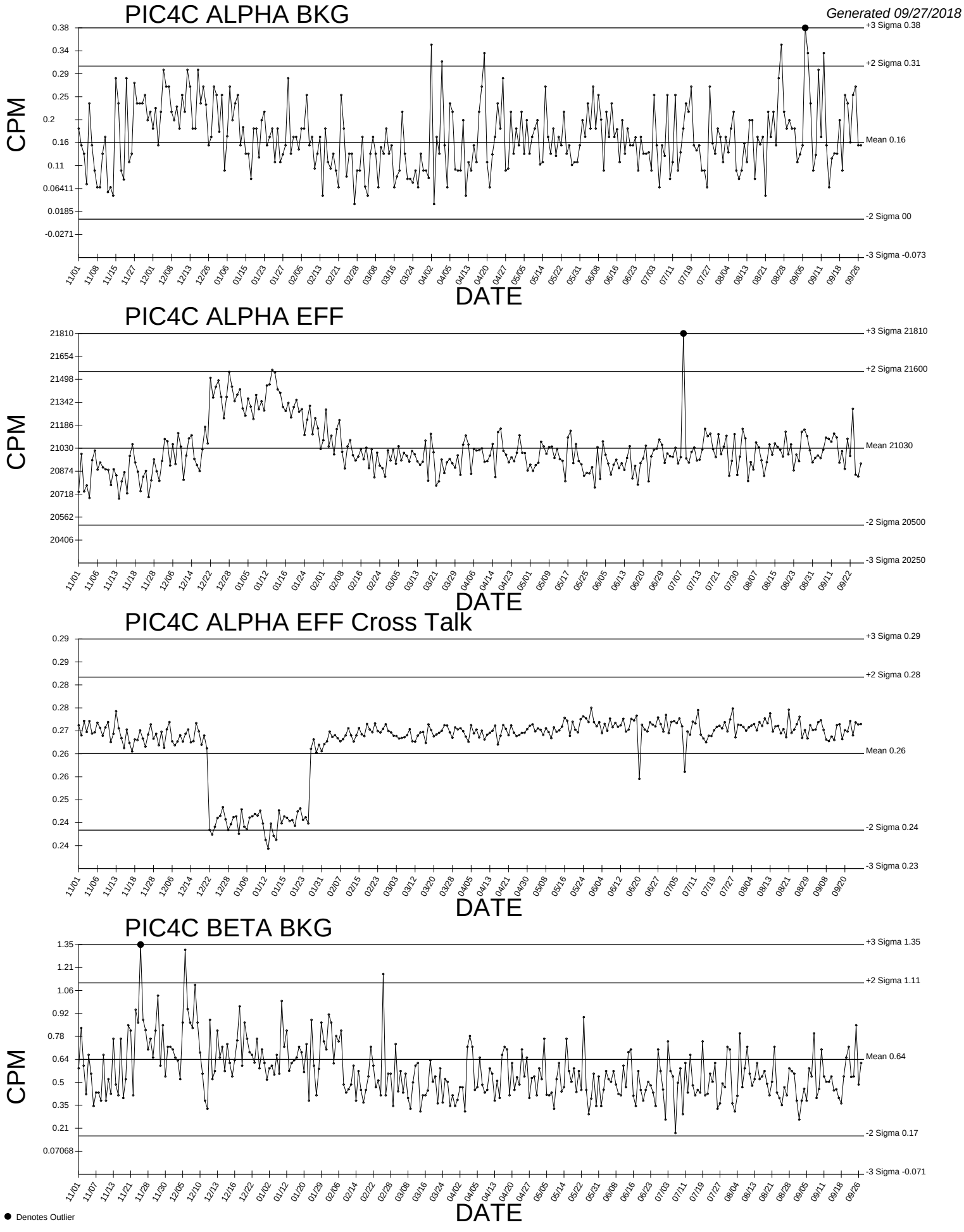
● Denotes Outlier

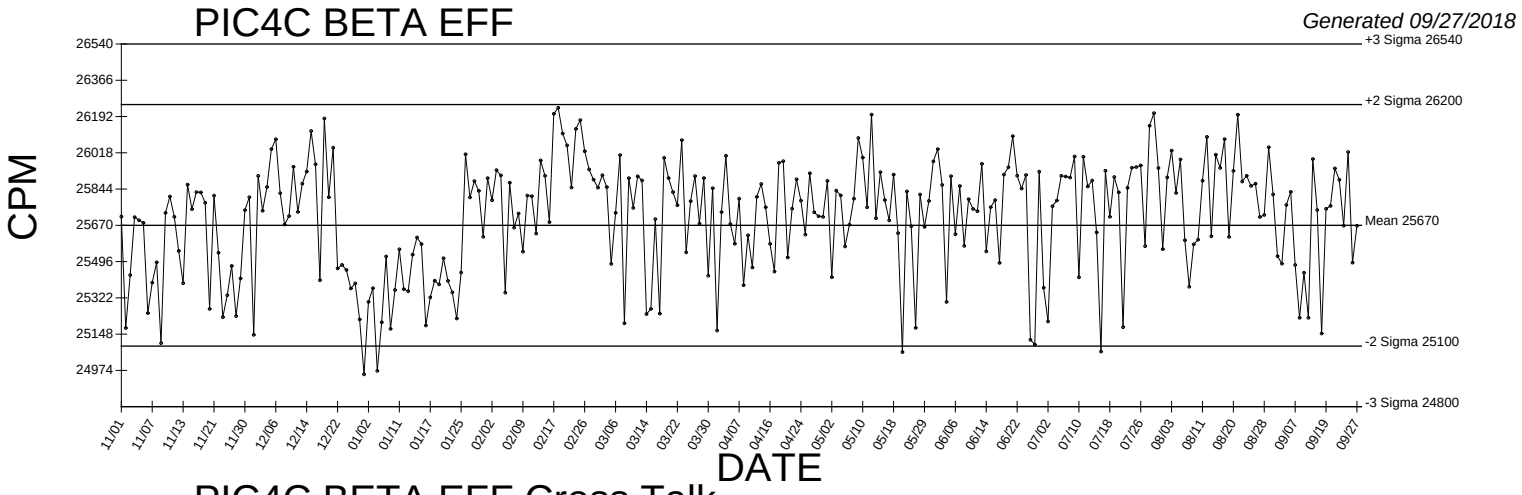

PIC4B ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.3
+2 Sigma 0.24
Mean 0.12
-2 Sigma 0.01
-3 Sigma -0.054
PIC4B ALPHA EFF
+3 Sigma 9186
+2 Sigma 8990
Mean 8591
-2 Sigma 8190
-3 Sigma 7995
PIC4B ALPHA EFF Cross Talk
+3 Sigma 0.43
+2 Sigma 0.41
Mean 0.37
-2 Sigma 0.32
-3 Sigma 0.3
PIC4B BETA BKG
+3 Sigma 1.41
+2 Sigma 1.19
Mean 0.74
-2 Sigma 0.3
-3 Sigma 0.07
Denotes Outlier

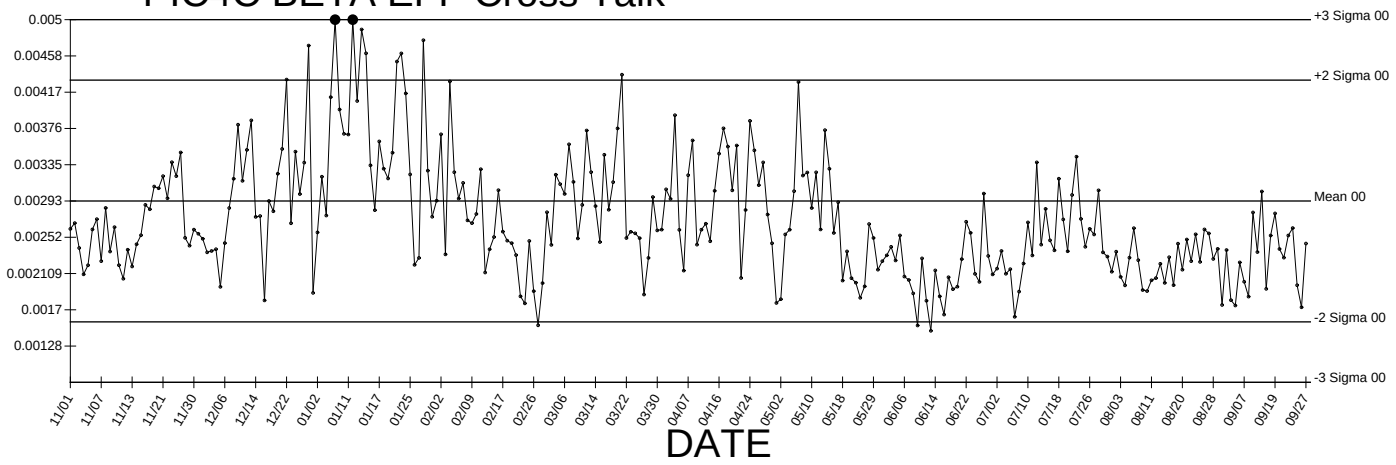




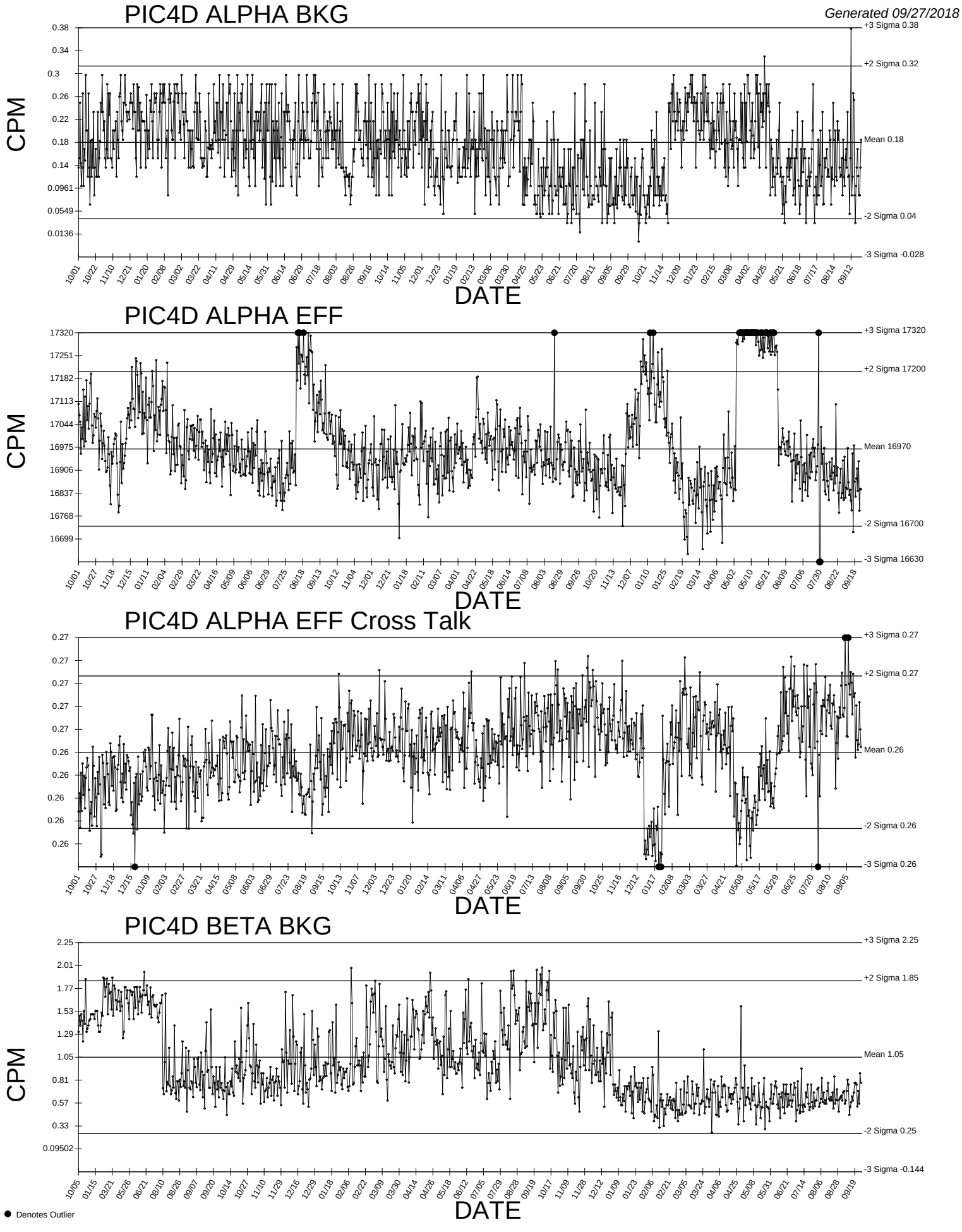
● Denotes Outlier

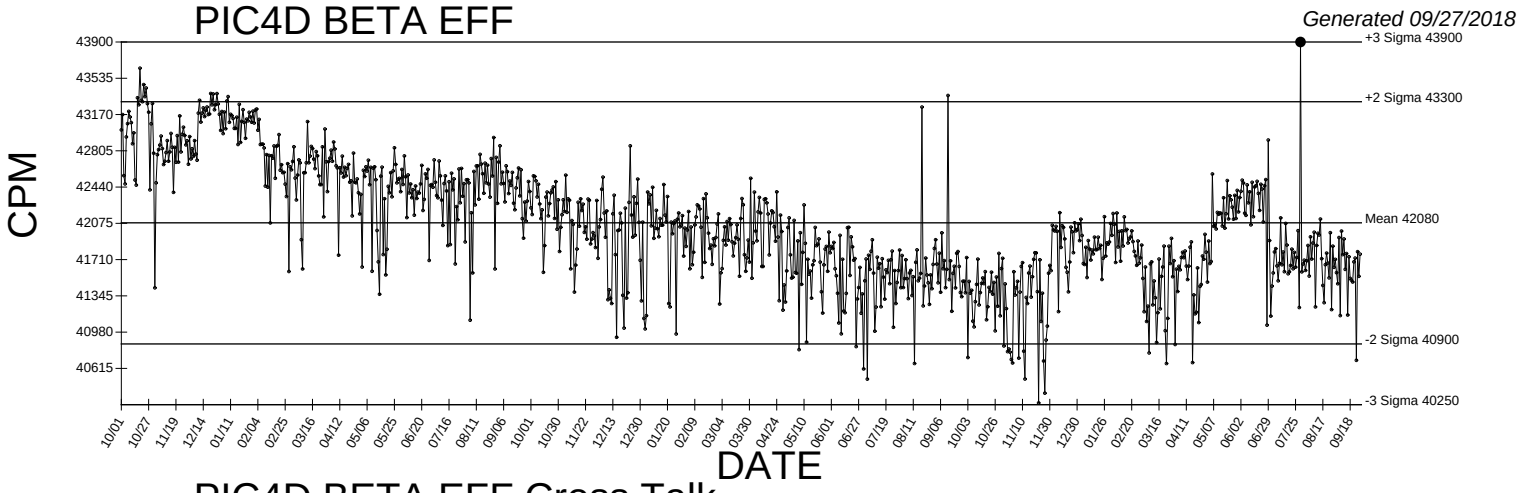

PIC4C ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.31
Mean 0.16
-2 Sigma 00
-3 Sigma -0.073
PIC4C ALPHA EFF
+3 Sigma 21810
+2 Sigma 21600
Mean 21030
-2 Sigma 20500
-3 Sigma 20250
PIC4C ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.26
-2 Sigma 0.24
-3 Sigma 0.23
PIC4C BETA BKG
+3 Sigma 1.35
+2 Sigma 1.11
Mean 0.64
-2 Sigma 0.17
-3 Sigma -0.071
Denotes Outlier

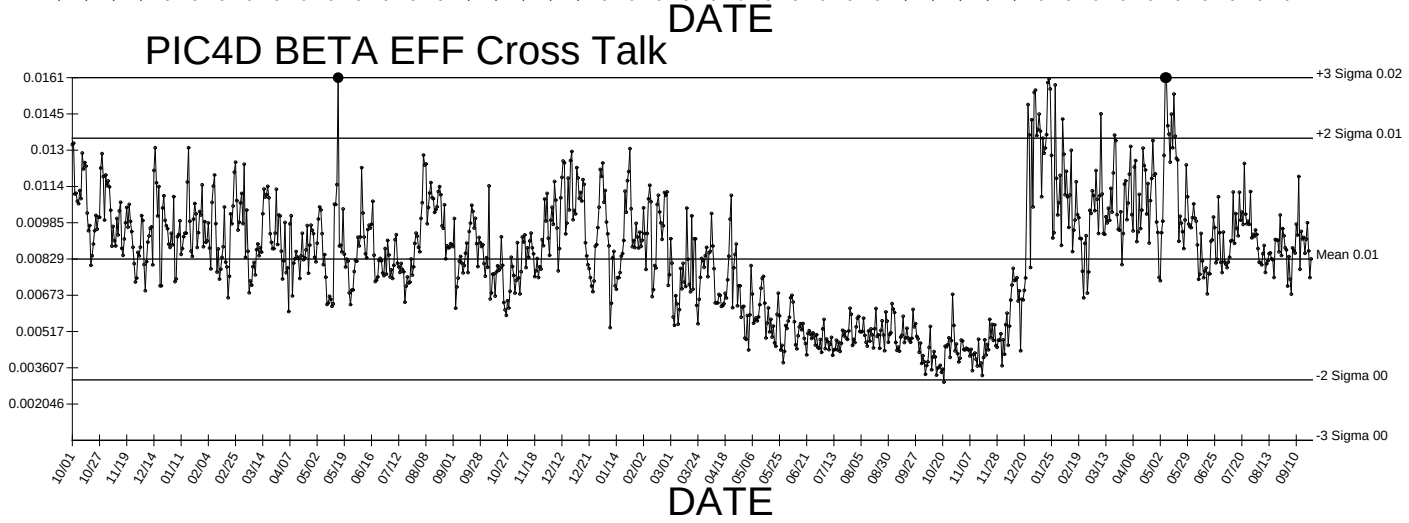




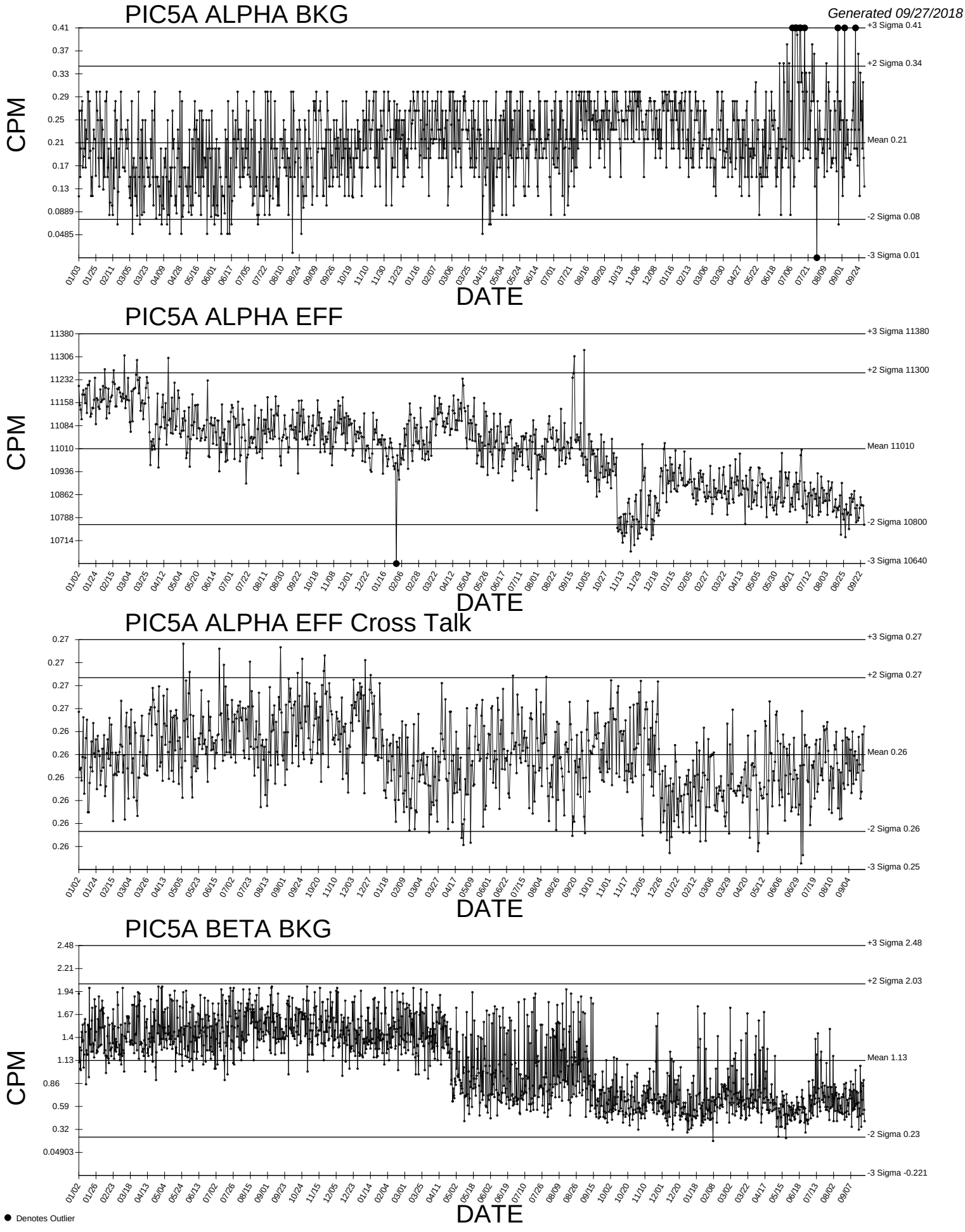
● Denotes Outlier

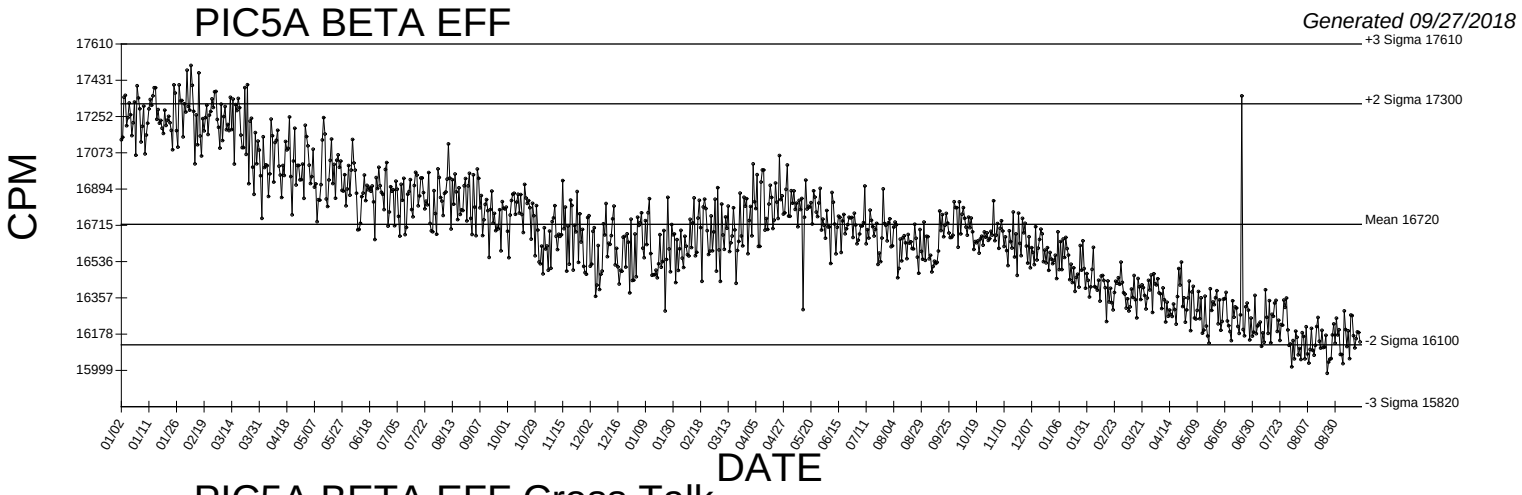

PIC4D ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.32
Mean 0.18
-2 Sigma 0.04
-3 Sigma -0.028
PIC4D ALPHA EFF
+3 Sigma 17320
+2 Sigma 17200
Mean 16970
-2 Sigma 16700
-3 Sigma 16630
PIC4D ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.26
PIC4D BETA BKG
+3 Sigma 2.25
+2 Sigma 1.85
Mean 1.05
-2 Sigma 0.25
-3 Sigma -0.144
Denotes Outlier

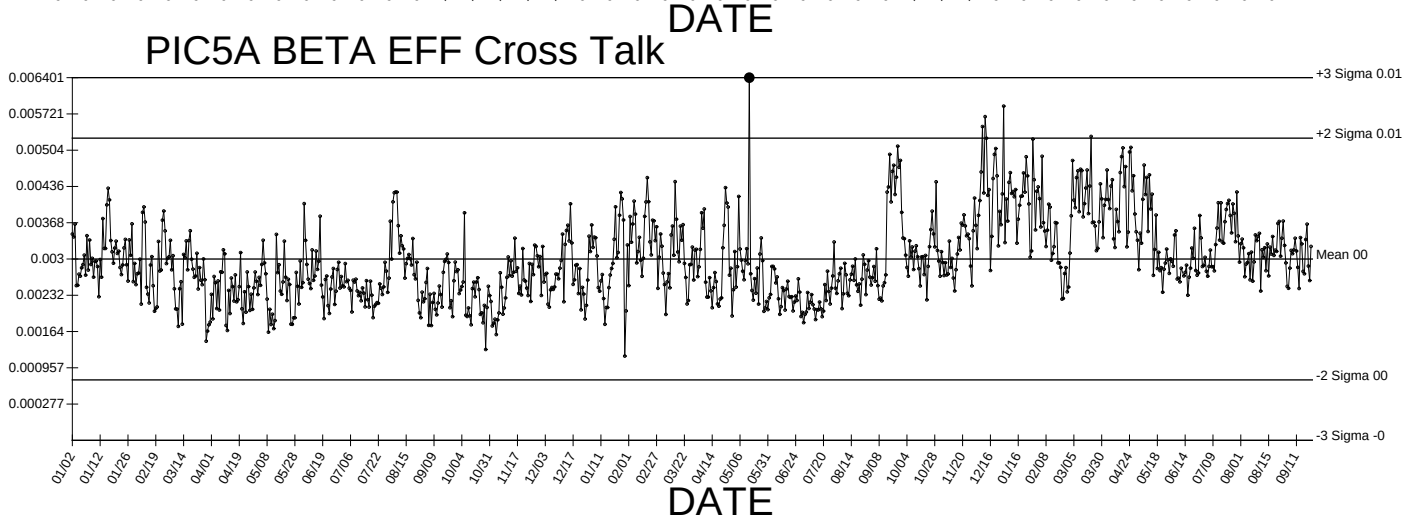




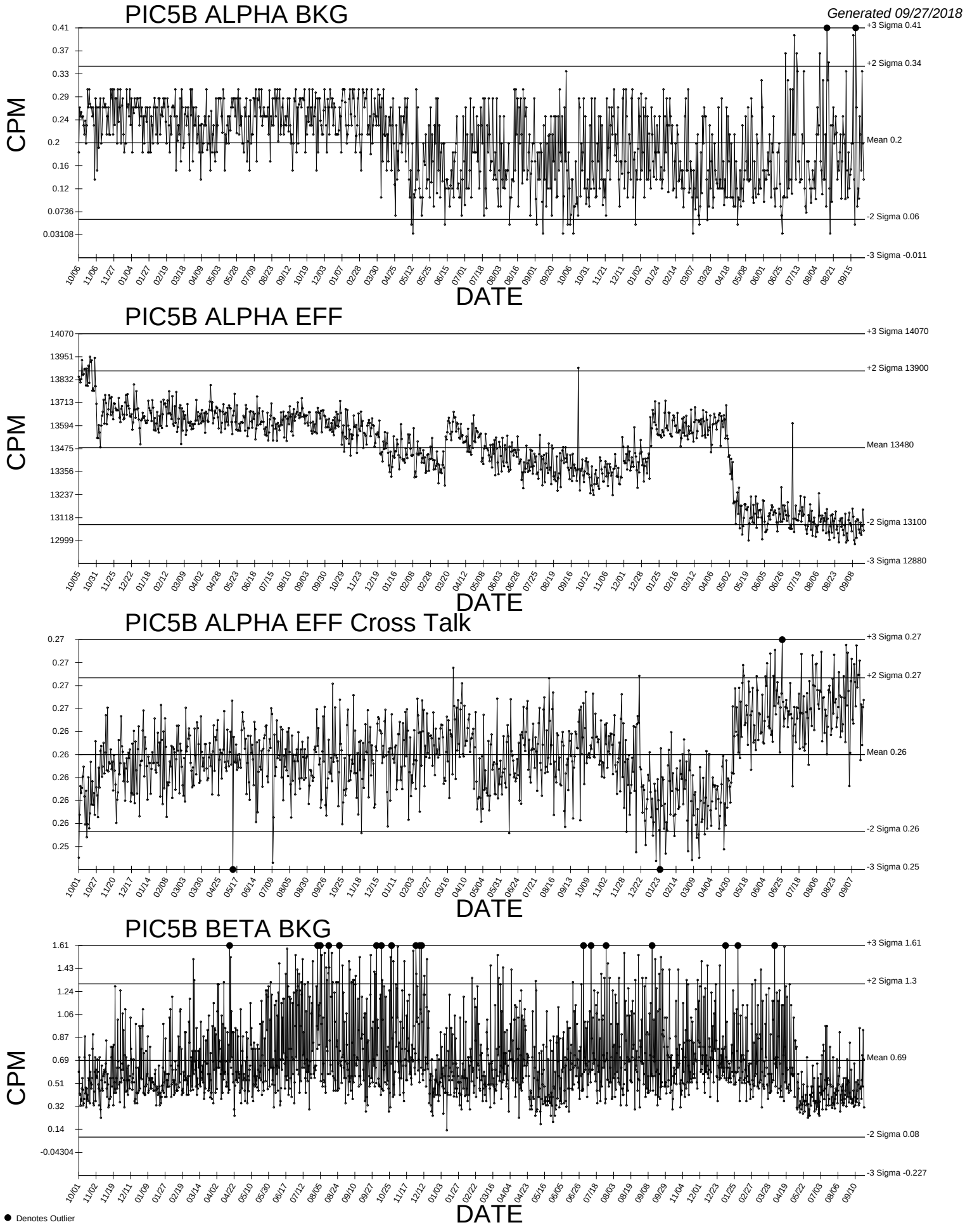
● Denotes Outlier

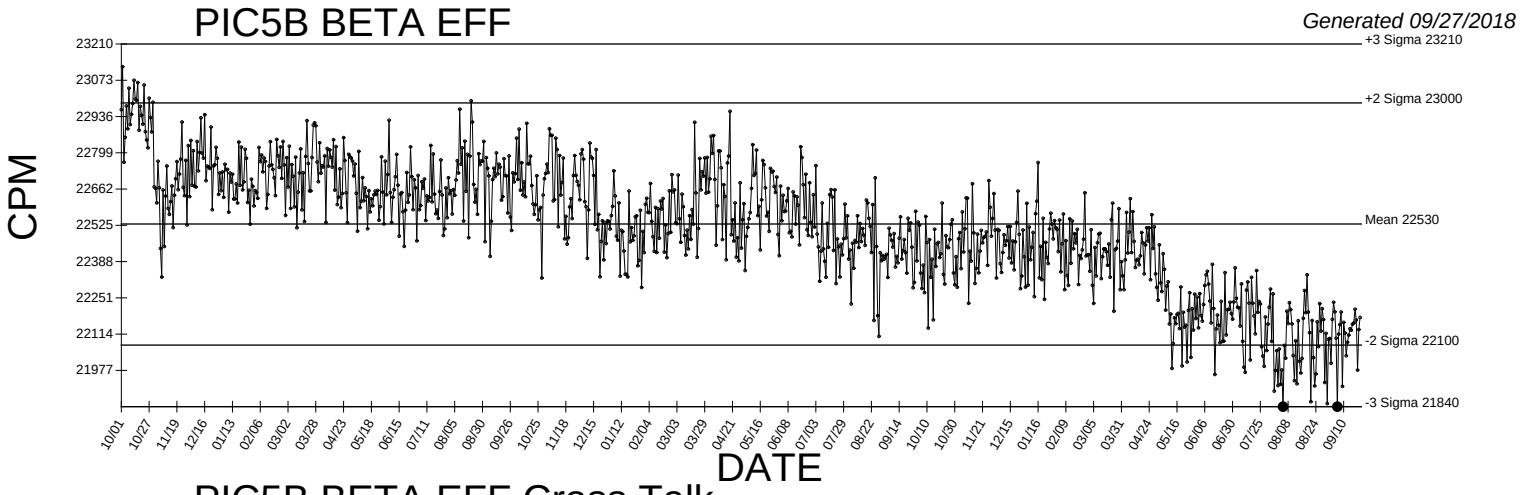

PIC5A ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.41
+2 Sigma 0.34
Mean 0.21
-2 Sigma 0.08
-3 Sigma 0.01
PIC5A ALPHA EFF
+3 Sigma 11380
+2 Sigma 11300
Mean 11010
-2 Sigma 10800
-3 Sigma 10640
PIC5A ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
PIC5A BETA BKG
+3 Sigma 2.48
+2 Sigma 2.03
Mean 1.13
-2 Sigma 0.23
-3 Sigma -0.221
Denotes Outlier

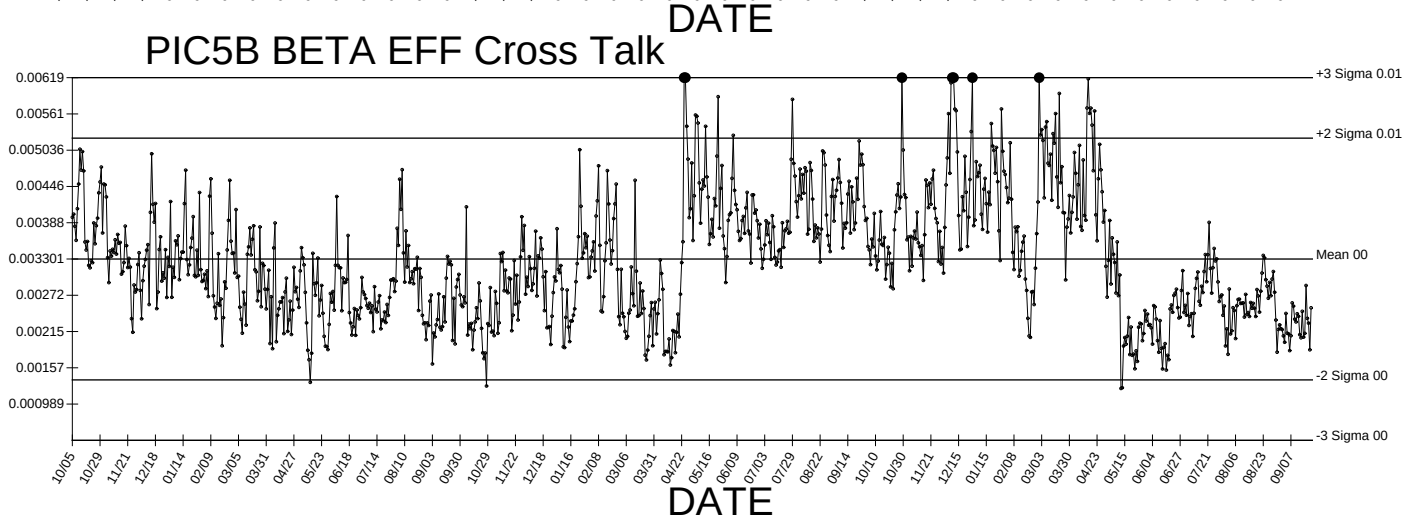




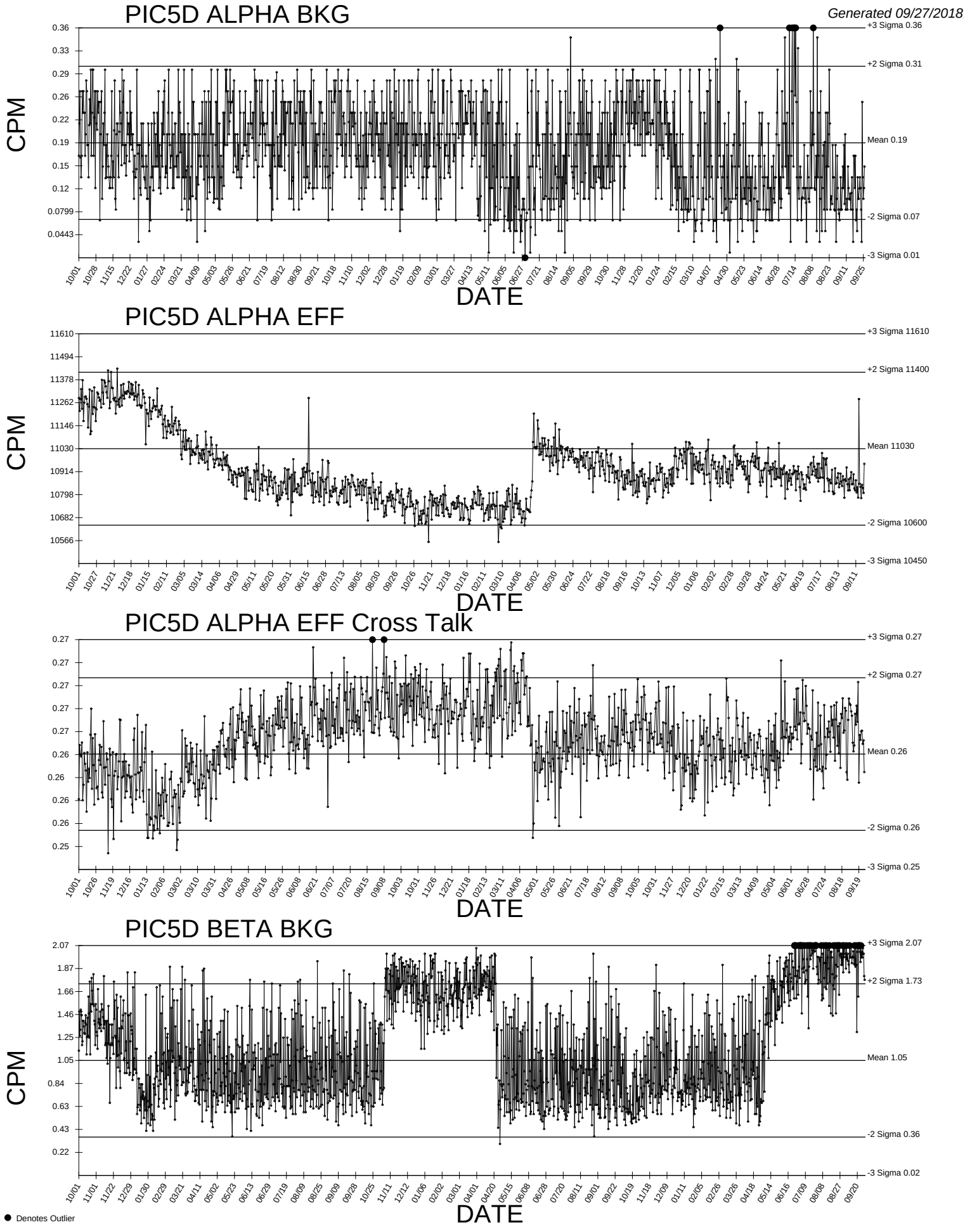
● Denotes Outlier

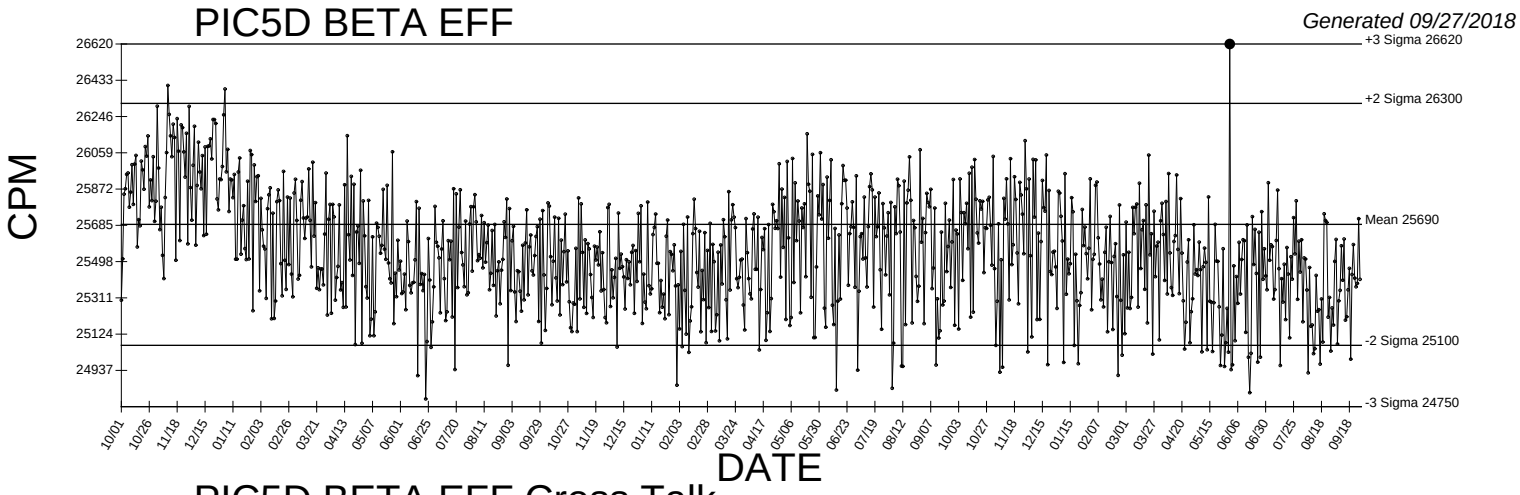

PIC5B ALPHA BKG
Generated 09/27/2018
CPM
0.41
0.37
0.33
0.29
0.24
0.2
0.16
0.12
0.0736
0.03108
+3 Sigma 0.41
+2 Sigma 0.34
Mean 0.2
-2 Sigma 0.06
-3 Sigma -0.011
10/06 11/06 11/27 01/04 01/27 02/19 03/18 04/09 05/03 05/28 07/09 08/23 09/12 10/19 12/03 01/07 02/28 03/30 04/25 05/12 05/25 06/15 07/01 07/18 08/03 08/16 09/01 09/20 10/06 10/31 11/21 12/11 01/02 01/24 02/14 03/07 03/28 04/18 05/08 06/01 06/25 07/13 08/04 08/21 09/15
DATE
PIC5B ALPHA EFF
CPM
14070
13951
13832
13713
13594
13475
13356
13237
13118
12999
+3 Sigma 14070
+2 Sigma 13900
Mean 13480
-2 Sigma 13100
-3 Sigma 12880
10/05 10/31 11/25 12/22 01/18 02/12 03/09 04/02 04/28 05/23 06/18 07/15 08/10 09/03 09/30 10/29 11/23 12/19 01/16 02/08 02/28 03/20 04/12 05/08 06/03 06/28 07/25 08/19 09/16 10/12 11/06 12/01 12/28 01/25 02/16 03/12 04/06 05/02 05/19 06/05 06/26 07/19 08/06 08/23 09/08
DATE
PIC5B ALPHA EFF Cross Talk
0.27
0.27
0.27
0.27
0.26
0.26
0.26
0.26
0.26
0.25
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
10/01 10/27 11/20 12/17 01/14 02/08 03/03 03/30 04/25 05/17 06/14 07/09 08/05 08/30 09/26 10/25 11/18 12/15 01/11 02/03 02/27 03/16 04/10 05/04 05/31 06/24 07/21 08/16 09/13 10/09 11/02 11/28 12/22 01/23 02/14 03/09 04/04 04/30 05/18 06/04 06/25 07/18 08/06 08/23 09/07
DATE
PIC5B BETA BKG
CPM
1.61
1.43
1.24
1.06
0.87
0.69
0.51
0.32
0.14
-0.04304
+3 Sigma 1.61
+2 Sigma 1.3
Mean 0.69
-2 Sigma 0.08
-3 Sigma -0.227
10/01 11/02 11/19 12/11 01/09 01/27 02/19 03/14 04/02 04/22 05/10 05/30 06/17 07/12 08/05 08/24 09/10 09/27 10/25 11/17 12/12 01/03 01/27 02/22 03/16 04/04 04/23 05/16 06/05 06/26 07/18 08/03 08/19 09/08 09/29 11/04 12/01 12/23 01/25 02/27 03/28 04/19 05/22 07/03 08/06 09/10
DATE
Denotes Outlier

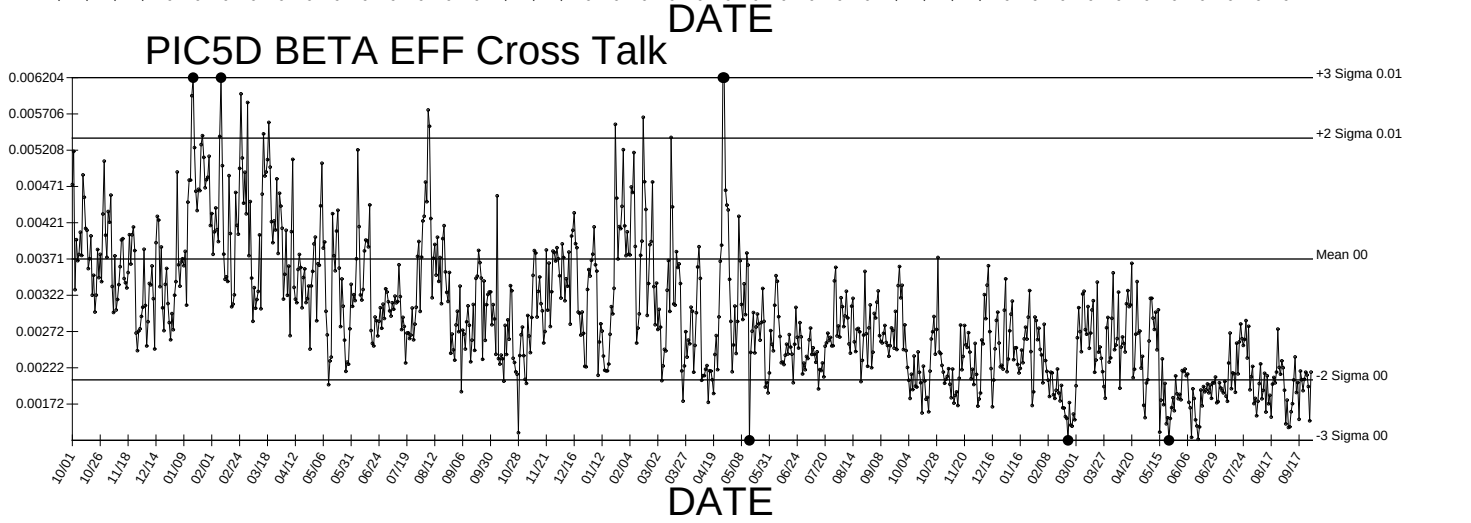




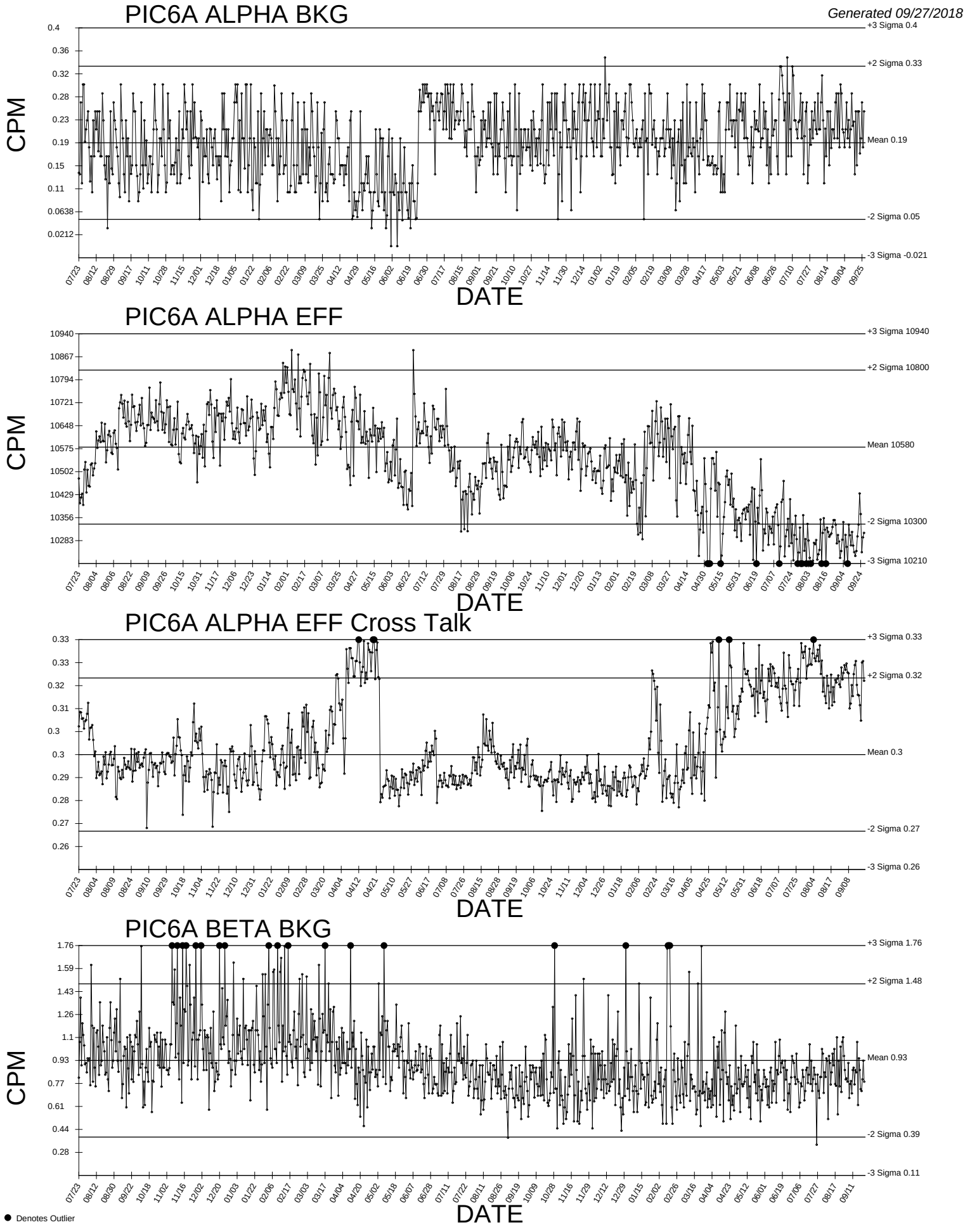
● Denotes Outlier

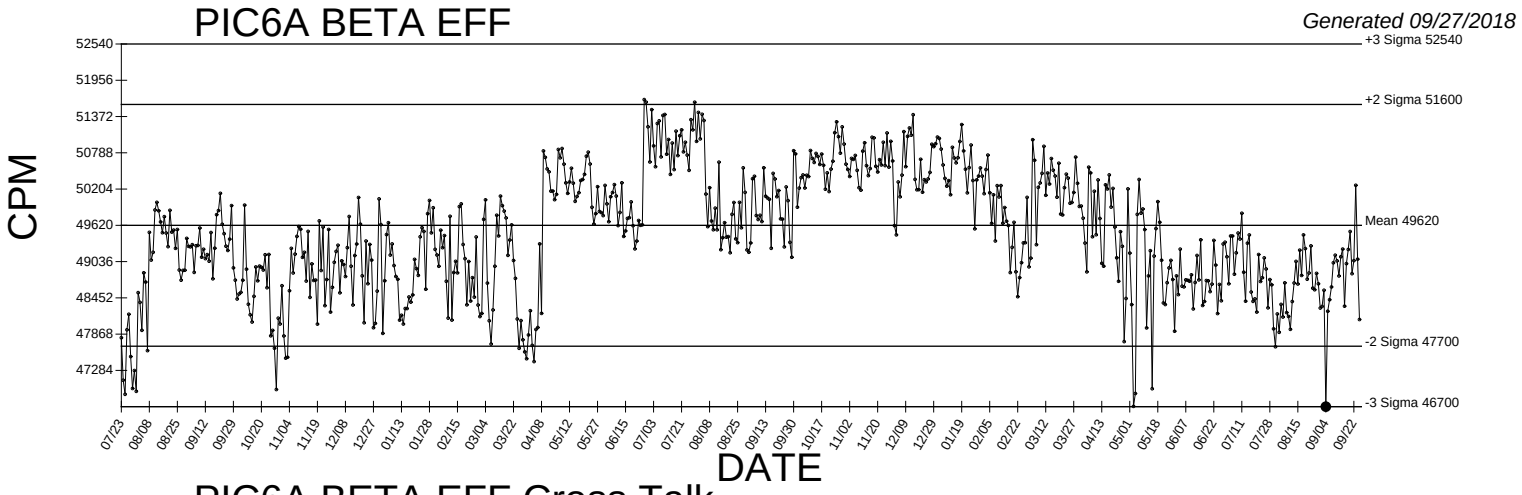

PIC5D ALPHA BKG
Generated 09/27/2018
CPM
0.36
0.33
0.29
0.26
0.22
0.19
0.15
0.12
0.0799
0.0443
+3 Sigma 0.36
+2 Sigma 0.31
Mean 0.19
-2 Sigma 0.07
-3 Sigma 0.01
10/01 10/28 11/15 12/22 01/27 02/24 03/21 04/09 05/03 05/26 06/21 07/19 08/12 08/30 09/21 10/18 11/10 12/02 12/28 01/19 02/09 03/01 03/27 04/13 05/11 06/05 06/27 07/21 08/14 09/05 09/29 10/30 11/28 12/20 01/24 02/15 03/10 04/07 04/30 05/23 06/14 06/28 07/14 08/08 08/23 09/11 09/25
DATE
PIC5D ALPHA EFF
CPM
11610
11494
11378
11262
11146
11030
10914
10798
10682
10566
+3 Sigma 11610
+2 Sigma 11400
Mean 11030
-2 Sigma 10600
-3 Sigma 10450
10/01 10/27 11/21 12/18 01/15 02/11 03/05 03/14 04/06 04/29 05/11 05/20 05/31 06/15 06/28 07/13 08/05 08/30 09/26 10/26 11/21 12/18 01/16 02/11 03/10 04/06 05/02 05/30 06/24 07/22 08/18 09/16 10/13 11/07 12/05 01/06 02/02 02/28 03/28 04/24 05/21 06/19 07/17 08/13 09/11
DATE
PIC5D ALPHA EFF Cross Talk
0.27
0.27
0.27
0.27
0.27
0.26
0.26
0.26
0.26
0.25
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
10/01 10/26 11/19 12/16 01/13 02/06 03/02 03/10 03/31 04/26 05/08 05/16 05/26 06/08 06/21 07/07 07/20 08/15 09/08 10/03 10/31 11/26 12/21 01/18 02/13 03/11 04/06 05/01 05/26 06/21 07/18 08/12 09/08 10/05 10/31 11/27 12/20 01/22 02/15 03/13 04/09 05/04 06/01 06/28 07/24 08/18 09/19
DATE
PIC5D BETA BKG
CPM
2.07
1.87
1.66
1.46
1.25
1.05
0.84
0.63
0.43
0.22
+3 Sigma 2.07
+2 Sigma 1.73
Mean 1.05
-2 Sigma 0.36
-3 Sigma 0.02
10/01 11/01 11/22 12/29 01/30 02/29 03/21 04/11 05/02 05/23 06/13 06/29 07/19 08/09 08/25 09/09 09/28 10/25 11/11 12/12 01/06 02/02 03/01 04/01 04/20 05/15 06/08 06/28 07/20 08/11 09/01 09/22 10/19 11/18 12/09 01/11 02/05 02/26 03/26 04/18 05/14 06/16 07/09 08/08 08/27 09/20
DATE
● Denotes Outlier

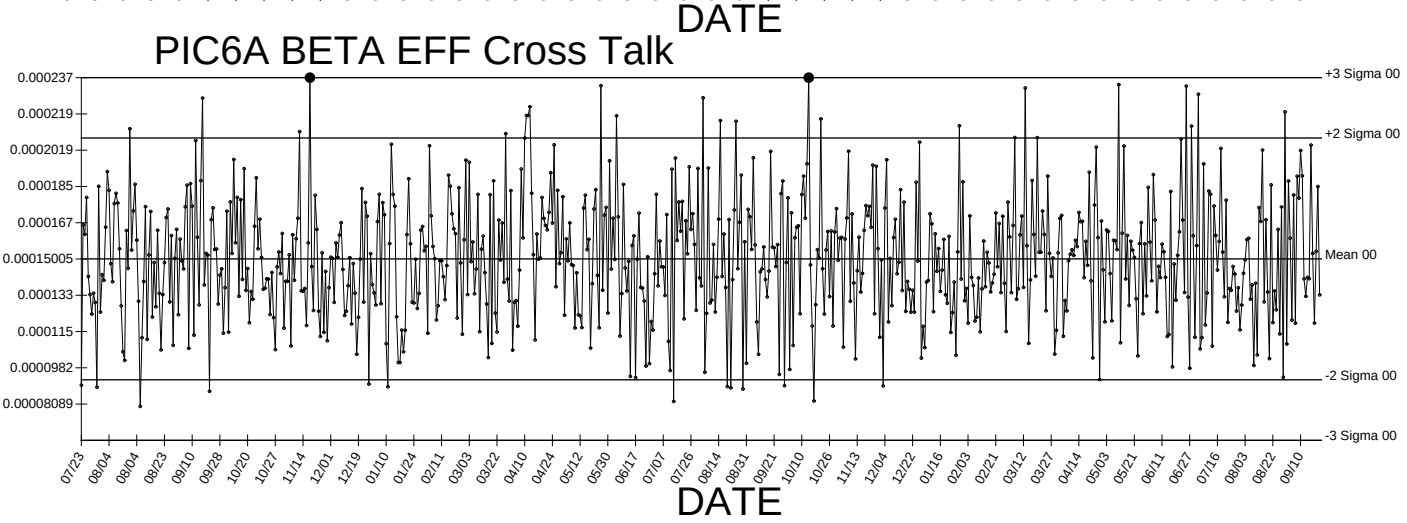




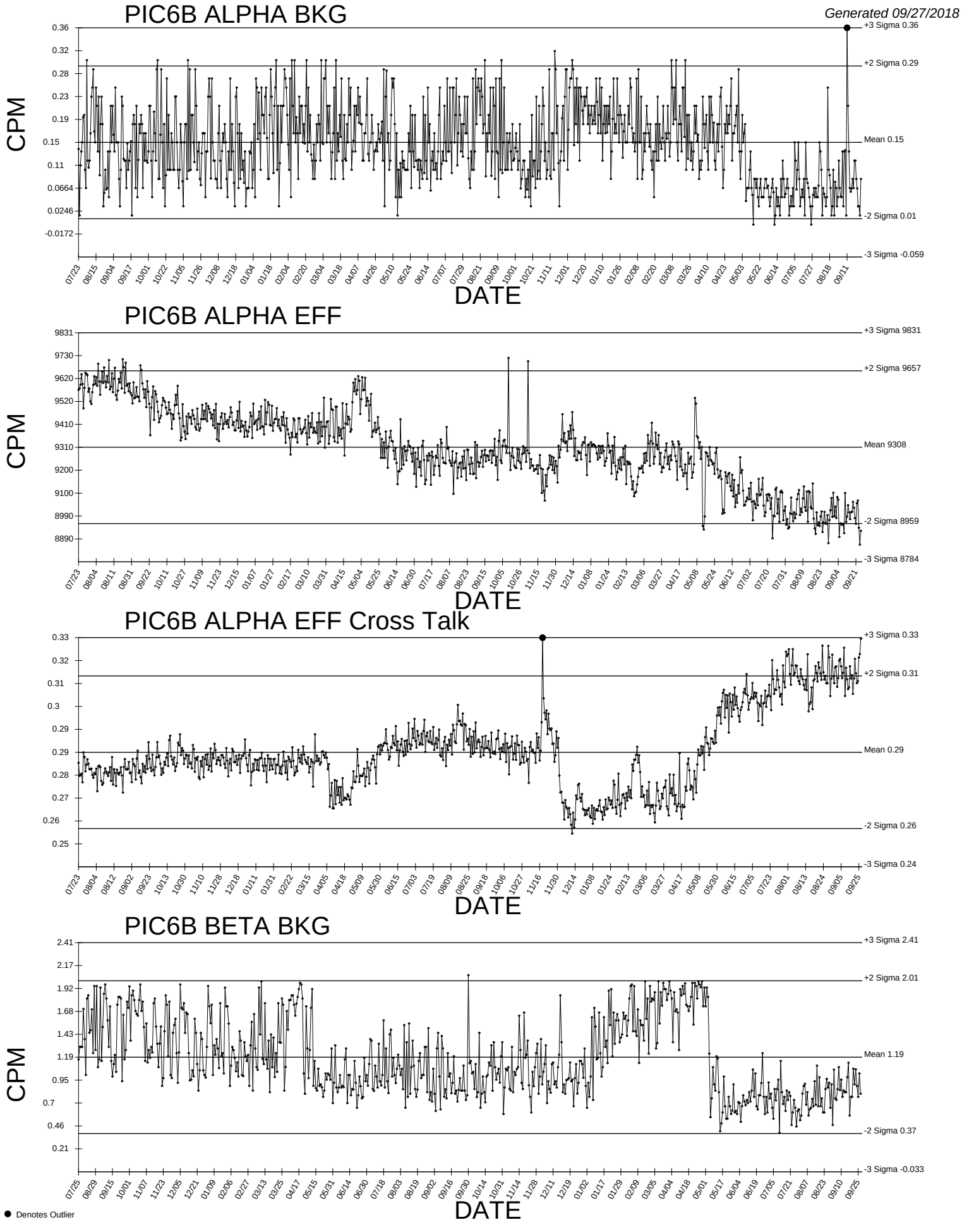
● Denotes Outlier

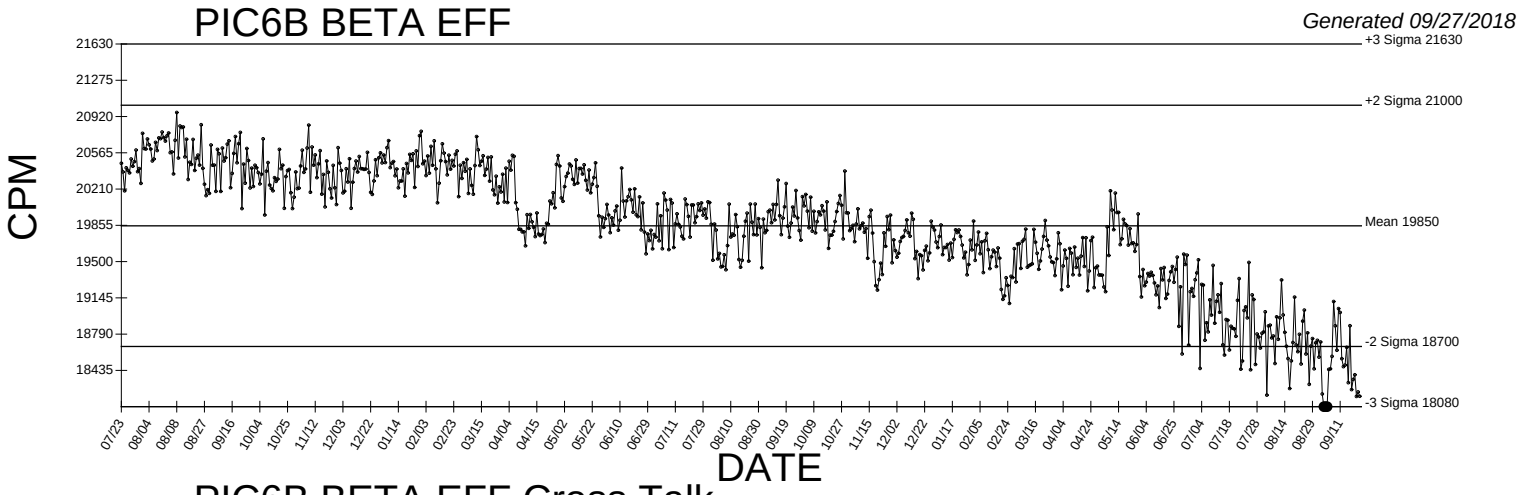

PIC6A ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.4
+2 Sigma 0.33
Mean 0.19
-2 Sigma 0.05
-3 Sigma -0.021
PIC6A ALPHA EFF
+3 Sigma 10940
+2 Sigma 10800
Mean 10580
-2 Sigma 10300
-3 Sigma 10210
PIC6A ALPHA EFF Cross Talk
+3 Sigma 0.33
+2 Sigma 0.32
Mean 0.3
-2 Sigma 0.27
-3 Sigma 0.26
PIC6A BETA BKG
+3 Sigma 1.76
+2 Sigma 1.48
Mean 0.93
-2 Sigma 0.39
-3 Sigma 0.11
● Denotes Outlier

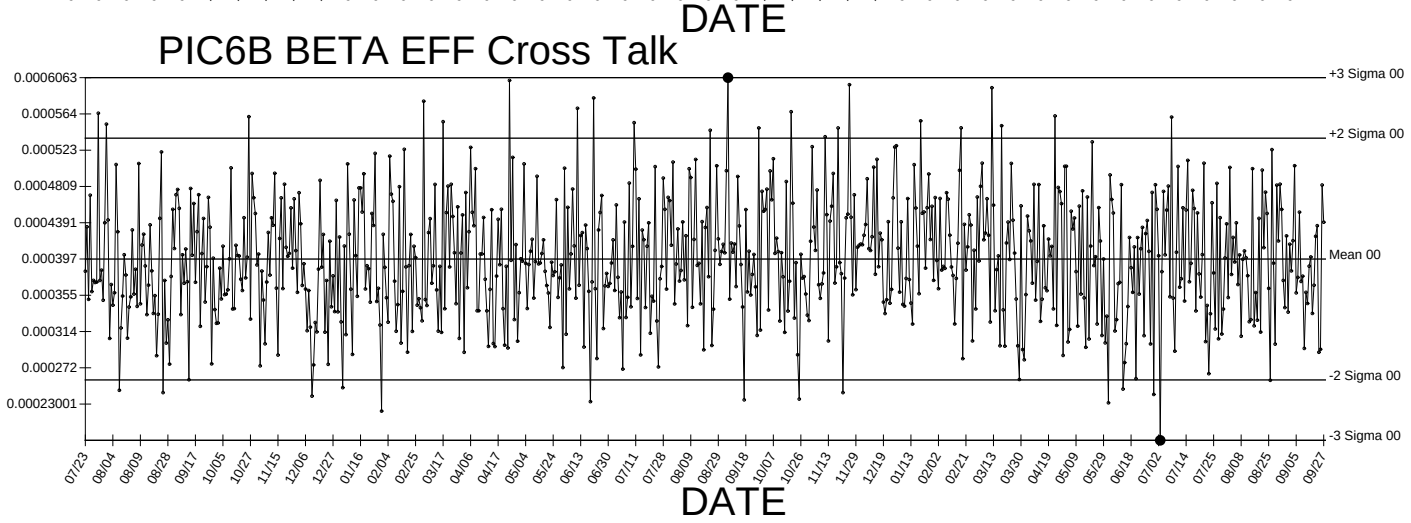




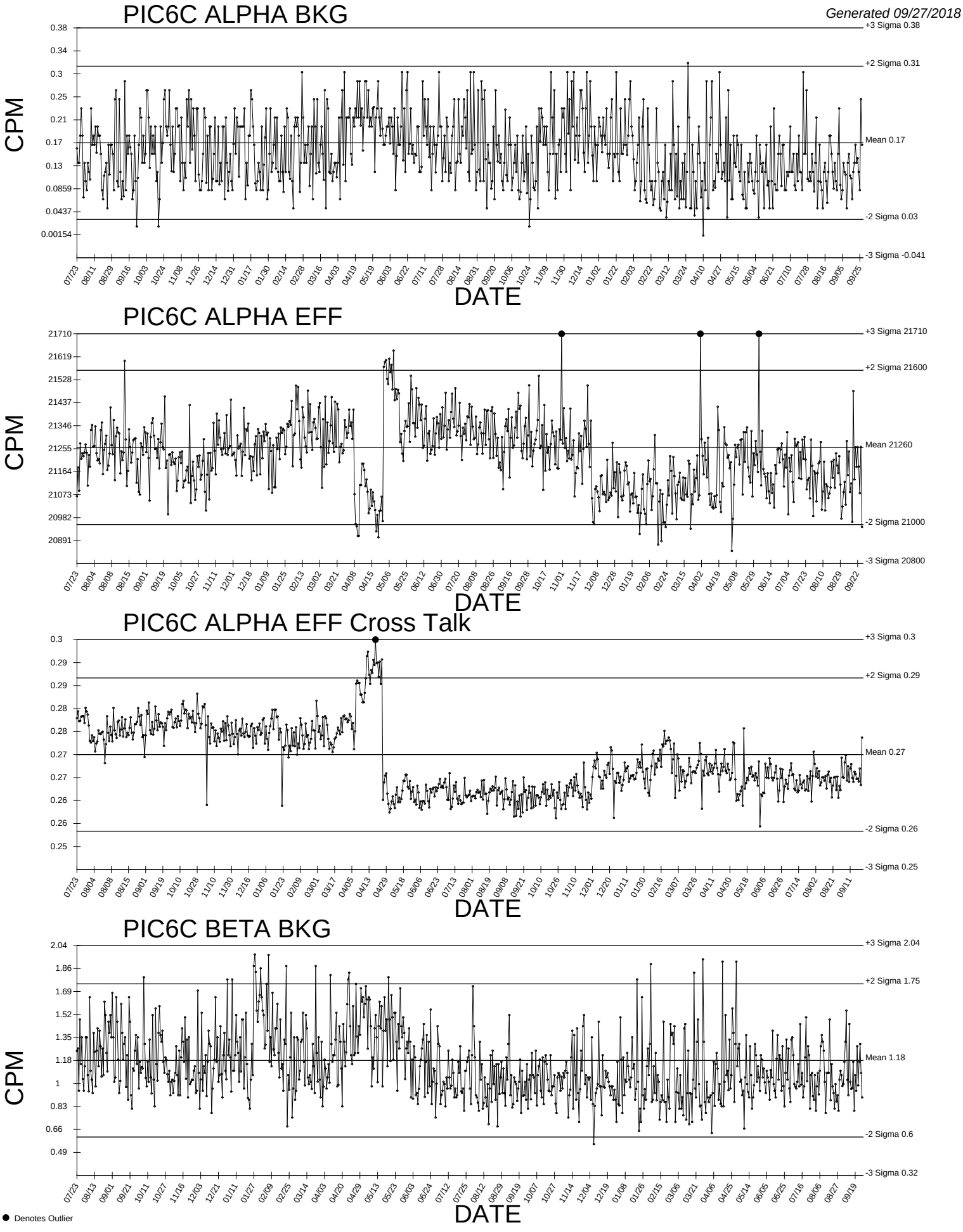
● Denotes Outlier

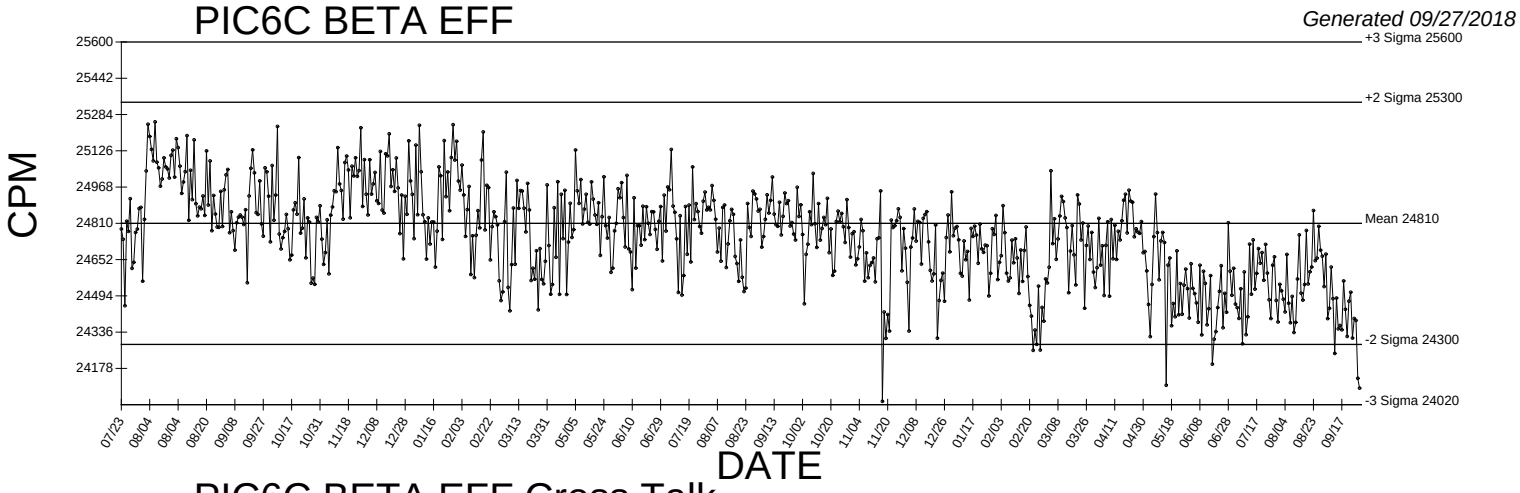

PIC6B ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.36
+2 Sigma 0.29
Mean 0.15
-2 Sigma 0.01
-3 Sigma -0.059
PIC6B ALPHA EFF
+3 Sigma 9831
+2 Sigma 9657
Mean 9308
-2 Sigma 8959
-3 Sigma 8784
PIC6B ALPHA EFF Cross Talk
+3 Sigma 0.33
+2 Sigma 0.31
Mean 0.29
-2 Sigma 0.26
-3 Sigma 0.24
PIC6B BETA BKG
+3 Sigma 2.41
+2 Sigma 2.01
Mean 1.19
-2 Sigma 0.37
-3 Sigma -0.033
Denotes Outlier

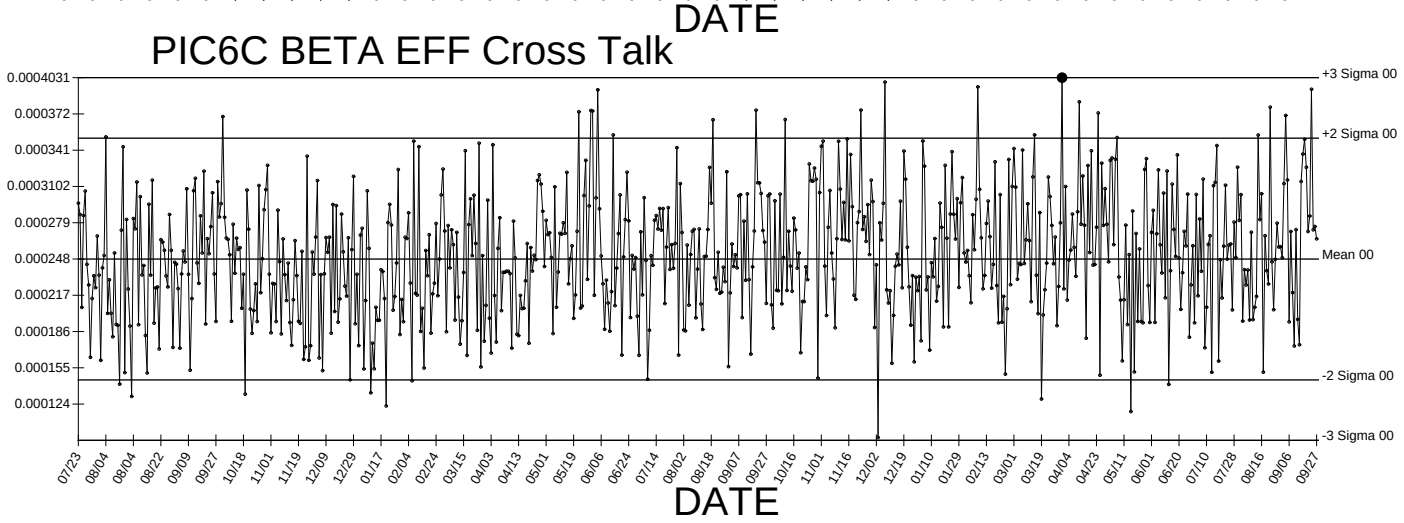




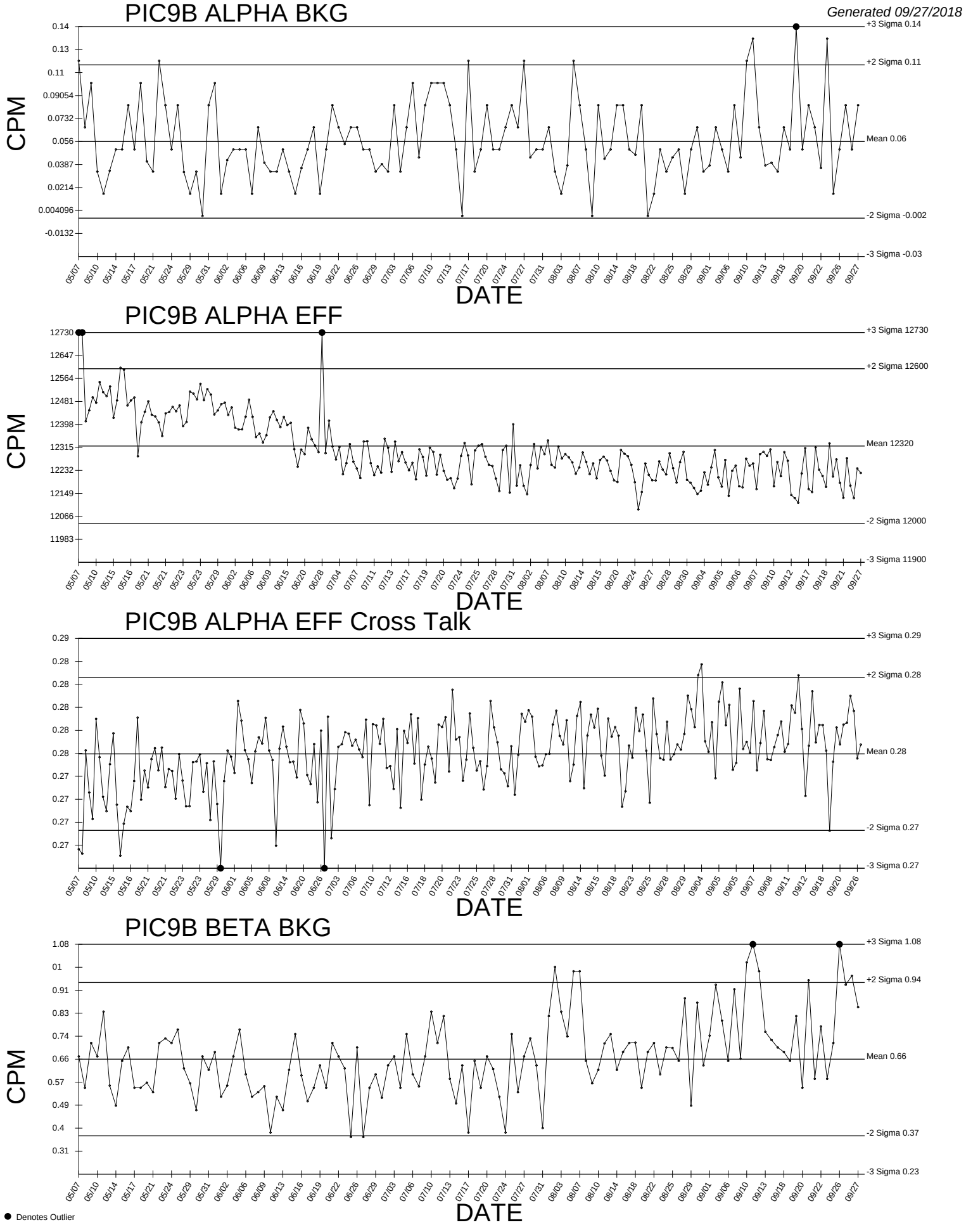
● Denotes Outlier

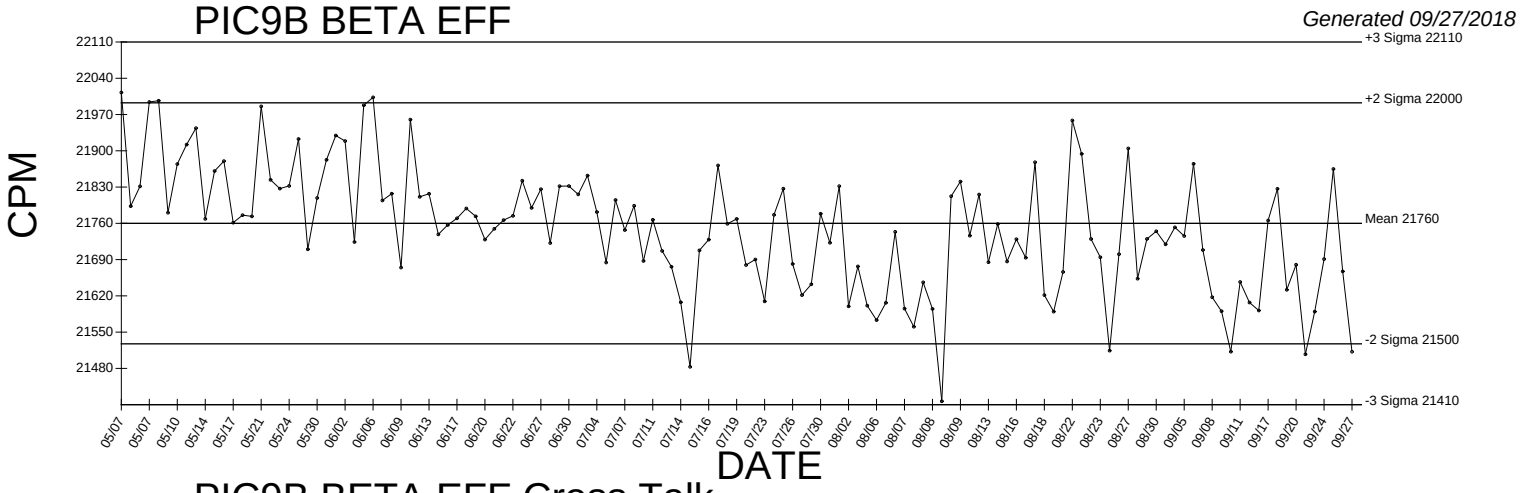

PIC6C ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.31
Mean 0.17
-2 Sigma 0.03
-3 Sigma -0.041
PIC6C ALPHA EFF
+3 Sigma 21710
+2 Sigma 21600
Mean 21260
-2 Sigma 21000
-3 Sigma 20800
PIC6C ALPHA EFF Cross Talk
+3 Sigma 0.3
+2 Sigma 0.29
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.25
PIC6C BETA BKG
+3 Sigma 2.04
+2 Sigma 1.75
Mean 1.18
-2 Sigma 0.6
-3 Sigma 0.32
Denotes Outlier

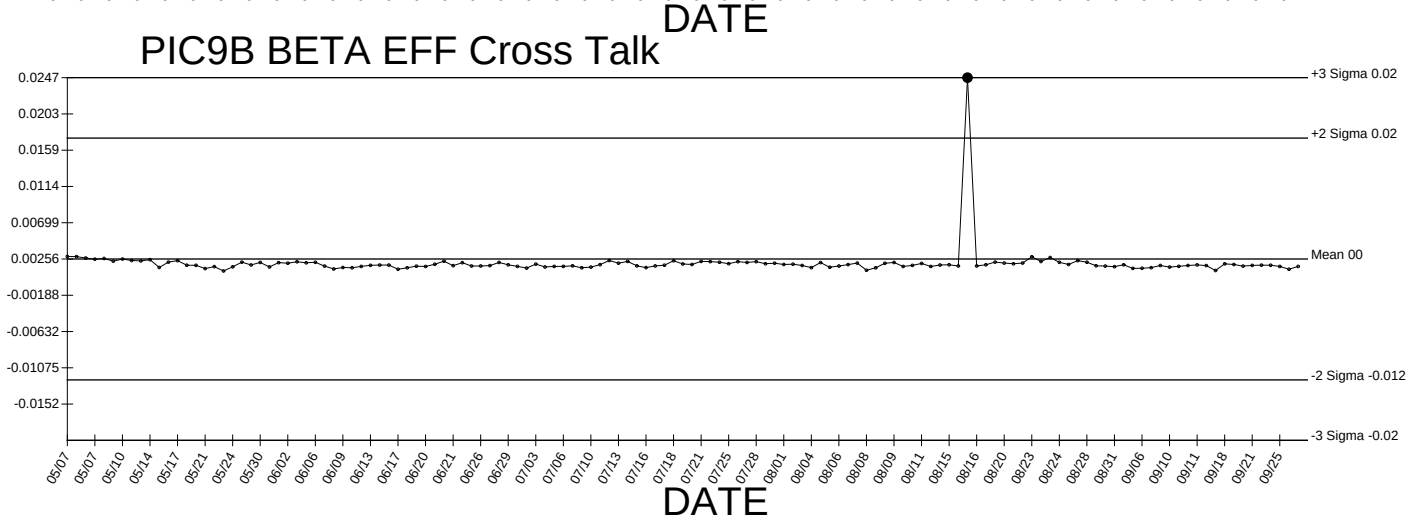




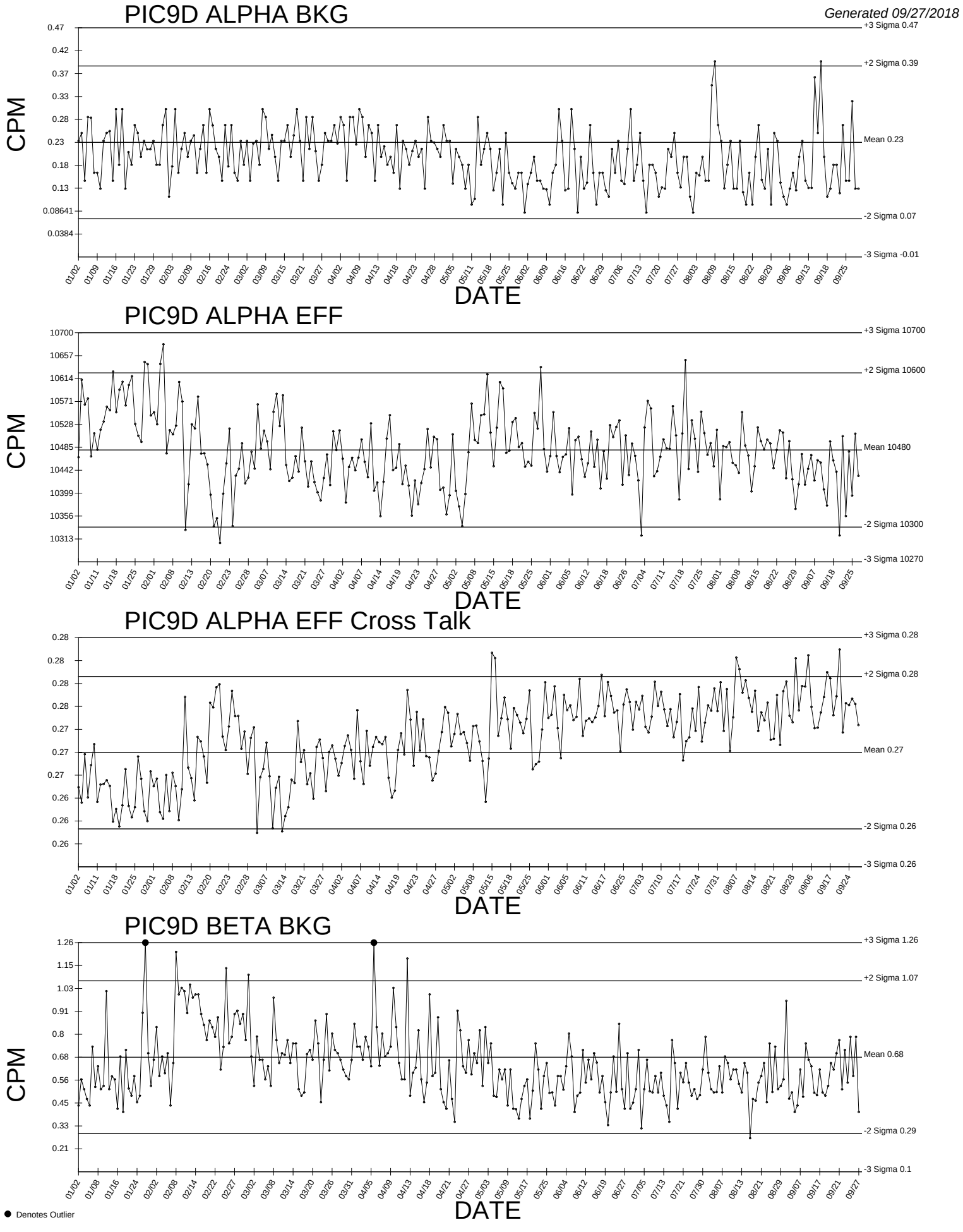
● Denotes Outlier

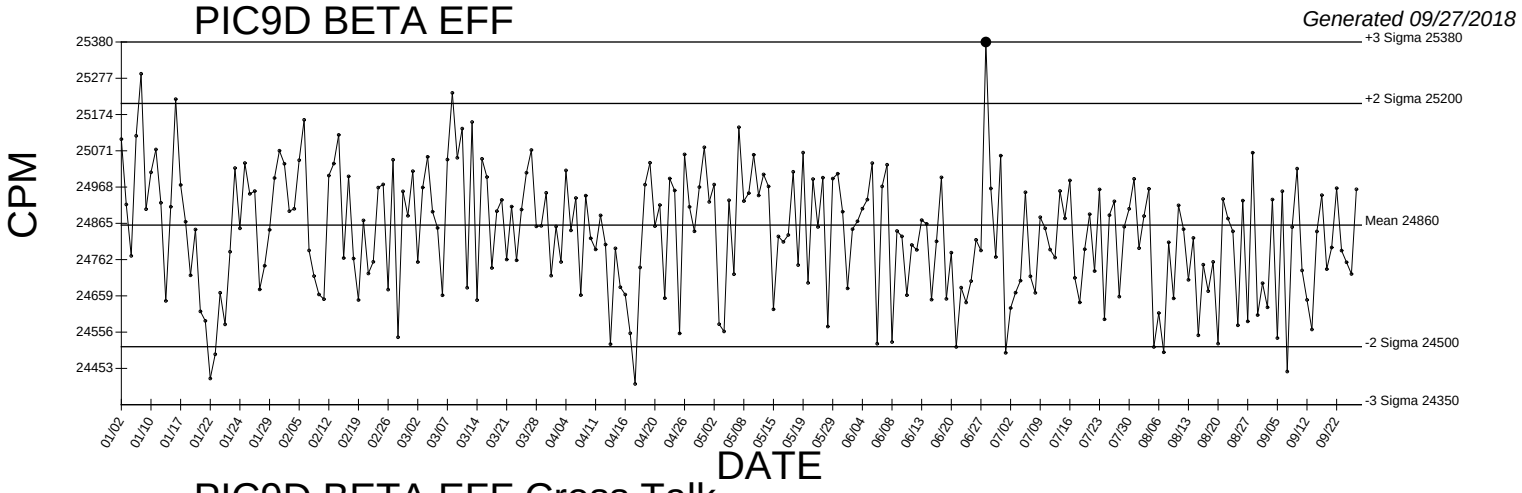

PIC9B ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.14
+2 Sigma 0.11
Mean 0.06
-2 Sigma -0.002
-3 Sigma -0.03
PIC9B ALPHA EFF
+3 Sigma 12730
+2 Sigma 12600
Mean 12320
-2 Sigma 12000
-3 Sigma 11900
PIC9B ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.28
-2 Sigma 0.27
-3 Sigma 0.27
PIC9B BETA BKG
+3 Sigma 1.08
+2 Sigma 0.94
Mean 0.66
-2 Sigma 0.37
-3 Sigma 0.23
Denotes Outlier

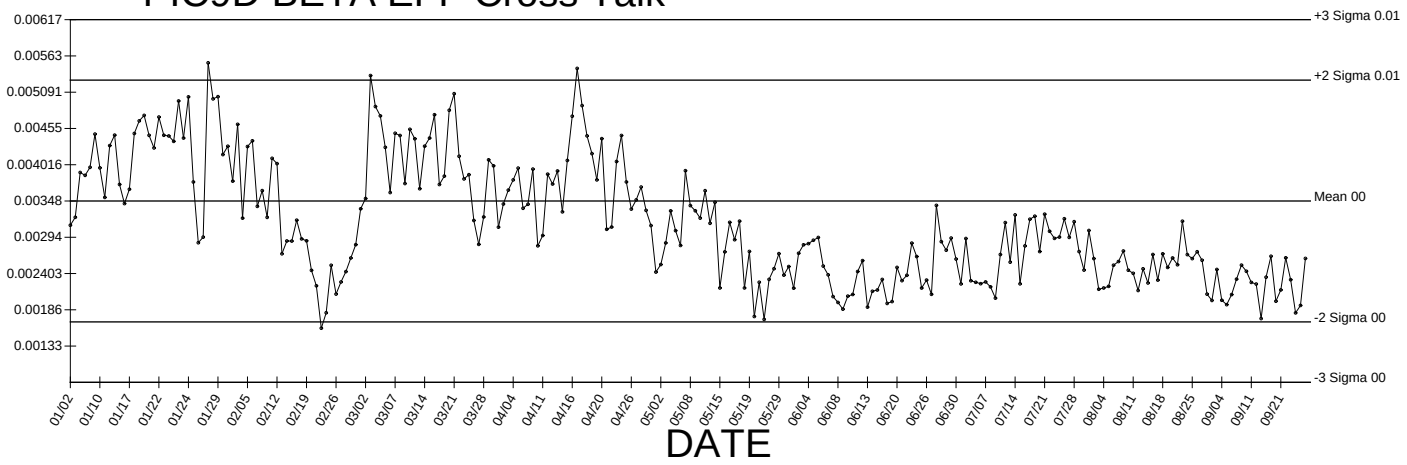




● Denotes Outlier


PIC9D ALPHA BKG
Generated 09/27/2018
CPM
DATE
+3 Sigma 0.47
+2 Sigma 0.39
Mean 0.23
-2 Sigma 0.07
-3 Sigma -0.01
PIC9D ALPHA EFF
+3 Sigma 10700
+2 Sigma 10600
Mean 10480
-2 Sigma 10300
-3 Sigma 10270
PIC9D ALPHA EFF Cross Talk
+3 Sigma 0.28
+2 Sigma 0.28
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.26
PIC9D BETA BKG
+3 Sigma 1.26
+2 Sigma 1.07
Mean 0.68
-2 Sigma 0.29
-3 Sigma 0.1
● Denotes Outlier





● Denotes Outlier

RAD Standards Traceability

0487

National Institute of Standards & Technology

0487

Certificate

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

RC-S-035-002a

Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have an acid concentration and a carrier concentration comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

*Notes and references are on pages 5 and 6.

RC-5-035-002b

PROPERTIES OF SRM 4251C
(Certified values are shown in bold type)

Source identification number	NIST SRM 4251C		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution density	**(1.015 ± 0.002) g•mL^{-1} at 22.1 °C** [b]*		
Solution mass	**(5.054 ± 0.001) g** [b]		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol•L^{-1})	Mass Fraction (g•g^{-1})
	H_2O HCl $BaCl_2$ $^{133}BaCl_2$	54 1.0 6×10^{-4} 4×10^{-7}	0.96 0.04 1.2×10^{-4} 8×10^{-8}
Radiological Properties:			
Radionuclide	**Barium-133**		
Reference time	**1200 EST, 1 September 1993**		
Massic activity of the solution [c] (Activity per unit mass of solution)	**4.876×10^5 Bq•g^{-1}**		
Relative expanded uncertainty (k=2)	**0.52%** [d]		
Photon-emitting impurities	None detected [e]		
Half lives used	Barium-133: (10.52 ± 0.13) a [f] Radium-226: (1600 ± 7) a [f]		
Measuring instrument	Pressurized "4π"γ ionization chamber A calibrated using a barium-133 solution whose activity was determined by 4π(e+X)-γ-anticoincidence counting		

*Notes and references are on pages 5 and 6.

RC-S-035-002

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i, the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [g]	Relative Sensitivity Factor, $\lvert\partial y/\partial x_i\rvert \cdot (x_i/y)$ [h]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [i]
PIC A net response per gram of SRM 4251C, measured relative to RRS20 [j]	Standard deviation of the mean for 1000 repeated measurements (A)	0.008	1.0	0.01
PIC A background response, measured relative to RRS20	Standard deviation of the mean for >150 repeated measurements (A)	0.25	0.001 [k]	0.00
PIC A net response for RRS200, measured relative to RRS20	Standard deviation of the mean for >100 repeated measurements (A)	0.06	1.0	0.06
PIC A net response per Bq of barium-133 in solution, measured relative to RRS200.	Standard deviation of the mean for 240 repeated measurements (A)	0.02	1.0	0.02
Gravimetric measurements	Estimated (B)	0.01	1.0	0.01
Half life of barium-133 Half life of radium-226	Standard uncertainty of the half life (A)	1.24 [m] 0.44 [m]	0.004 [n] 0.004 [n]	0.00 0.00
Activity used to calibrate PIC A net response per Bq of barium-133 in solution	Standard uncertainty of the activity determined by $4\pi(e+X)$-γ-anticoincidence counting. (B)	0.22	1.0	0.22
Live-time [p]	Estimated (B)	0.10	1.0	0.10
PIC A charge collection	Estimated (B)	0.05	1.0	0.05
Source Positioning	Estimated (B)	0.05	1.0	0.05
Photon-emitting impurities	Limit of detection for Cs-134 (B) [q]	100.	0.00002	0.00
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.26
Coverage Factor, k				x 2
Relative Expanded Uncertainty of the Output Quantity, U/y, (%)				0.52

*Notes and references are on pages 5 and 6.

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NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	100	1.5	0.2

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] Estimated limits of detection for photon-emitting impurities are:
600 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 12 and 75 keV,
150 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 84 and 379 keV, and
3 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 387 and 2700 keV, provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of barium-133.

[f] The stated uncertainty is the standard uncertainty. See reference [5].

[g] Relative standard uncertainty of the input quantity x_i.

[h] The relative change in the output quantity y divided by the relative change in the input quantity x_i. If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y. If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y.

[i] Relative component of combined standard uncertainty of output quantity y, rounded to two decimal places. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

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[j] The response of pressurized ionization chamber A (PIC A) is determined from measurement of the time required to collect a given amount of charge on a stable fixed capacitor. All of the response measurements in the NIST pressurized ionization chambers are made relative to the response of one or more artifact standards. These artifact standards consist of microgram quantities of aged radium-226 in small welded stainless-steel capsules. These capsules are encapsulated in plastic rods whose dimensions are similar to those of the standard NIST ampoule. The artifact standards are called **Radium Reference Sources** and are designated as RRSx, where x is the nominal mass (in micrograms) of radium-226 in the capsule.

[k] $|\partial y/\partial x_i| \cdot (x_i/y)$ = (average background response)/(average net sample response)

[m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$

[p] The live time is determined by counting the pulses from a gated oscillator.

[q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i$ = 100%. $|\partial y/\partial x_i| \cdot (x_i/y)$ = {(response per Bq of impurity)/(response per Bq of Ba-133)}·{(Bq of impurity)/(Bq of Ba-133)}. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] Evaluated Nuclear Structure Data File (ENSDF), April 1994.

RC-S-035-002f

Standard Traceability Log Rad

Source Material Info	
Parent Code:	0487
Prepared By:	Angela Johnson
Carrier Conc:	0.1 M HCL
Reference Date:	09/01/1993
Ampoule Mass (g):	5.054 g
Uncertainty:	+/- .26 %
LogBook No:	RC S 035 002

A Solution Material Info			
Isotope:	Barium-133		
Prepared By:	Angela Johnson		
Prep Date:	10/31/2002		
Verification Date:	11/08/2017		
Expiration Date:	11/08/2018		
Primary Code:	0487-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.7696 g		
Density(g/mL):	0.9984	Balance ID:	

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (100 mL) = 1395394.1760 dpm/mL
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (0.9984 g/mL) / (100 mL) = 1397609.3930 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
12/18/2015	Gregory Ramsay	15.0062	1000	0487-B	20972.806 dpm/mL	11/18/2016	11/18/2017
01/17/2017	Bethany Fiem	15.1795	1000	0487-C	21215.0117 dpm/mL	01/17/2017	01/17/2018
11/08/2017	Bethany Fiem	15.5573	1000	0487-D	21708.5658 dpm/mL	11/08/2017	11/08/2018

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ba-133 Standard 0487-D

v1.0.2

Instrument	BLUE
Analyst	BXF1
Verification Prep Date	11/8/2017

Standard Information	
Isotope	Ba-133
Serial Number	0487-D
Isotope Halflife	3.8410E+03 D
Reference Date	9/1/1993
Ref. Act. (DPM/mL)	21708.56581
Amount of Std. (mL)	1.0
Standard Prep Date	11/8/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	11/9/2017	90.10	3690.91	42.20
2	11/9/2017	91.20	3665.09	42.30
3	11/9/2017	91.10	3667.64	42.20

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	3648.71	0.818070	4460.15	4460.15
2	3622.89	0.818070	4428.58	4428.58
3	3625.44	0.818070	4431.70	4431.70

	dpm/mL
Mean Value =	4440.14
Stdev =	17.39253395
Certificate Value* =	**4407.7**
Two sigma =	34.785
10 % of Mean =	444.014
Rule A (Pass/Fail)	**Pass**
% Recovery	100.74%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**11/8/2018**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ba-133 source 0487-D by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBLUE for Ba-133 source standard verification. The Ba-133 efficiency calibration which was used for verification calculations was performed on 11/8/2017 using Ba-133 source 1601-A.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,

B = BKG cpm,

C = System efficiency (cpm/dpm), and

D = volume used for standard verification.

RAD-M-001

11-13-17

11/14/17

National Institute of Standards & Technology

Certificate

Received 3-9-17

Standard Reference Material® 4339b

1810

Radium-228 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-228 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4339b consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-228** massic activity value, at a **Reference Time of 1200 EST, 07 October 2010**, is:

$$\mathbf{(195 \pm 14)\ Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, Becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4339b** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and Chemical Hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the Physical Measurement Laboratory, Radiation and Biomolecular Physics Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification and photon-emitting impurity analyses were provided by L. Pibida of the NIST Radioactivity Group, with production assistance by J. LaRosa, R. Collé, and L. Laureano-Pérez. Alpha-emitting impurity analyses were provided by J. LaRosa.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation and Biomolecular Physics Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 14 November 2012

Robert L. Watters, Jr., Director
Office of Reference Materials

CLCFD-707-103

Table 1. Certified Massic Activity of SRM 4339b

Radionuclide	**Radium-228[a]**
Reference time	**1200 EST, 07 October 2010**
Massic activity of the solution	**195 Bq g^{-1}**
Relative expanded uncertainty ($k = 2$)	**7.2 %[b]**

[a] The final ^{228}Ra purification from the ^{232}Th mother solution was performed on 02 September 2010 0920 EST.
[b] The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4,5]. The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain what is assumed to be an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4339b

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.3 mol L^{-1} HNO_3 with 19.8 µg g^{-1} Ba^{+2}
Solution density	(1.034 ± 0.002) g mL^{-1} at 20.8 °C[a]
Solution mass	(5.180 ± 0.003) g[a]
Photon-emitting impurities	^{226}Ra: < 0.5 Bq g^{-1}[b]
Alpha-emitting impurities	^{232}Th: < 0.08 Bq g^{-1}[c]
Half-lives used	^{228}Ra: (5.75 ± 0.04) a[d] [6] ^{228}Ac: (6.15 ± 0.02) h [7] ^{226}Ra: (1600 ± 7) a [8] ^{232}Th: (14.02 ± 0.06) x 10^9 a [9]
Calibration methods (and instruments)	The certified massic activity for ^{228}Ra was obtained by high-resolution gamma-ray spectrometry of three master solution ampoules (eleven separate determinations), as measured on three to five different spectrometers and geometries on each ampoule, and used assumed nuclear data for probabilities per decay for 16 gamma-ray transitions. Confirmatory measurements were performed by 2πα spectrometry of ingrown ^{228}Th with a planar, ion-implanted Si detector.

[a] The stated uncertainty is two times the standard uncertainty. See reference 5.
[b] Based on gamma-ray spectrometry of forced-fitted peak at 186.2 keV and assuming a probability per decay of 0.0355 [6].
[c] The maximum ^{232}Th activity concentration in ^{228}Ra.
[d] The stated uncertainty is the standard uncertainty. See reference 5.

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4339b

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{228}Ra (%)
1	Gamma-ray spectrometry precision; relative standard deviation of the grand mean on the average massic gamma-ray emission rates for 16 measured ^{228}Ac gamma-ray transitions. Each mean in the grand mean is based on 11 determinations with three sources in three to five different detectors. The uncertainty in the determination of the massic gamma-ray emission rate for any one transition in a given determination ranged from typically 0.5 % to 1.5 %. The relative standard deviation of the mean for the average of the 16 lines, for any one determination, was typically 1 %; whereas the relative standard deviation of the grand mean for the average of the 16 lines across all 11 determinations is 0.34 %[b]. Data passes normality test.	A	0.84
2	Uncertainty due to assumed gamma-ray probabilities per decay for the measured ^{228}Ac transitions [7]. The uncertainty on each transition has a shared (correlated) component of 2.5 % (see comments in [7]).	B	3.5
3	Detection efficiencies not embodied within component 1	B	0.4
4	Mass determinations for dilution factors and counting source preparations	B	0.1
5	Decay corrections for ^{228}Ra half-life uncertainty of 0.7 % [6]	B	0.003
6	Effect of ^{228}Ra and ^{228}Ac half-life uncertainties on secular equilibrium ratio	B	0.02
Relative combined standard uncertainty			**3.6**
Relative expanded uncertainty (k = 2)			**7.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.
[b] Average massic gamma-ray emission rates of 11 geometries (R_γ) for 16 measured ^{228}Ac gamma-ray transitions with their respective energy (E_γ); assumed gamma-ray probabilities per decay (I_γ) and standard deviation of the mean (S_m).

E_γ (keV)	Assumed I_γ (%) [1]	Mean R_γ (s^{-1} g^{-1})(i)	S_m (%)(ii)
129.065	2.50	1347	0.38
153.967	0.754	421.6	0.40
209.249	3.97	2264	0.55
270.245	3.55	2014	0.33
328.004	3.04	1822	0.43
338.32	11.4	6712	0.43
409.46	2.02	1185	0.29
463.002	4.45	2645	0.33
755.313	1.03	593.3	0.46
772.291	1.52	899.2	0.53
794.942	4.31	2588	0.35
835.704	1.7	995.3	0.42
911.196	26.2	15609	0.29
964.786	4.99	3007	0.35
968.96	15.9	9582	0.30
1588.2	3.06	1889	0.28

(i) Grand mean for n = 11 determinations with three sources in three to five different detectors.
(ii) Relative standard deviation of the grand mean on R_γ for n = 11.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to SDS for further information.

Storage: SRM 4339b should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Nov 2012). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (ISO GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/ (accessed Nov 2012).

[6] Luca, A.; June 2009, ^{228}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-228_tables.pdf (accessed Nov 2012).

[7] Pearce, A.; January 2010, ^{228}Ac. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ac-228_tables.pdf (accessed Nov 2012).

[8] Christé, V. and M.M. Bé; December 2006, ^{226}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Nov 2012).

[9] Arinc, A.; September 2008, ^{232}Th. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Th-232_tables.pdf (accessed Nov 2012).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1810
Prepared By:	Tim Chandler
Carrier Conc:	1.3M HNO3
Reference Date:	10/07/2010
Ampoule Mass (g):	5.18 g
Uncertainty:	+/- 3.6 %
LogBook No:	GL-CED-297-103

A Solution Material Info			
Isotope:	Radium-228 SPIKE		
Prepared By:	Bethany Fiem		
Prep Date:	05/23/2018		
Verification Date:	05/23/2018		
Expiration Date:	05/23/2019		
Primary Code:	1810-A		
Dilution(mL):	200 mL		
Mass of Parent(g):	5.1447 g		
Density(g/mL):	1.0178	Balance ID:	B733529066

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (200 mL) = 300.9650 dpm/mL
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (1.0178 g/mL) / (200 mL) = 295.7015 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-228 Standard 1810-A Jar

v1.1.2
BMF
5/23/2018

Isotope	Result
Ra-228	pCi/L
Ra-228 N1	29340
Ra-228 N2	28510
Ra-228 N3	29320

Mean Value (Counting) =	29056.67	pCi/L	**107.165**	**Fail**	*Exception taken due to the high uncertainty of the certified value
Stdev =	473.533	pCi/L		**Rule B (Pass/Fail)**	
Certificate Value =	27114.0	pCi/L			
Two sigma =	947.0656436				
10 % of Mean =	2905.666667				
Rule A (Pass/Fail)	**Pass**				

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
Rule B = The determined mean value shall be within 5% of the certificate value.

5-23-18

5/25/18

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 1802264**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
459187004	SAMPLE	JXC9	PIC1A	SEP-27-18 09:11:42	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187005	SAMPLE	JXC9	PIC1B	SEP-27-18 09:11:45	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187006	SAMPLE	JXC9	PIC1C	SEP-27-18 09:11:49	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187007	SAMPLE	JXC9	PIC2A	SEP-27-18 09:11:54	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187008	SAMPLE	JXC9	PIC2C	SEP-27-18 09:11:58	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187009	SAMPLE	JXC9	PIC3C	SEP-27-18 09:12:02	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187010	SAMPLE	JXC9	PIC3D	SEP-27-18 09:12:10	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187011	SAMPLE	JXC9	PIC4A	SEP-27-18 09:13:03	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459193001	SAMPLE	JXC9	PIC4B	SEP-27-18 09:13:05	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459193002	SAMPLE	JXC9	PIC4C	SEP-27-18 09:13:07	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459193003	SAMPLE	JXC9	PIC4D	SEP-27-18 09:13:10	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459193004	SAMPLE	JXC9	PIC5A	SEP-27-18 09:13:16	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459193005	SAMPLE	JXC9	PIC5B	SEP-27-18 09:13:21	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459193006	SAMPLE	JXC9	PIC5D	SEP-27-18 09:13:22	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204113227	LCS	JXC9	PIC11B	SEP-27-18 09:20:33	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459193007	SAMPLE	JXC9	PIC6A	SEP-27-18 09:21:27	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204113223	MB	JXC9	PIC6B	SEP-27-18 09:21:37	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204113224	DUP	JXC9	PIC6C	SEP-27-18 09:21:44	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204113225	MS	JXC9	PIC9B	SEP-27-18 09:21:52	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204113226	MSD	JXC9	PIC9D	SEP-27-18 09:21:56	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187001	SAMPLE	JXC9	LB4100A1	SEP-27-18 09:25:47	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187002	SAMPLE	JXC9	LB4100A2	SEP-27-18 09:25:48	DONE	CeF on 25mm Filter	01-JUN-17 00:00
459187003	SAMPLE	JXC9	LB4100A3	SEP-27-18 09:25:48	DONE	CeF on 25mm Filter	01-JUN-17 00:00

Lucas Cell Raw Data

Batch 1802180 Check-list

This check-list was completed on 27-SEP-18 by Elizabeth Krouse

This batch was reviewed by Elizabeth Krouse on 27-SEP-18 and Lyndsey Pace on 27-SEP-18.

Batch ID: 1802180

Product: LUC26RAL

Description: Lucas Cell Radium 226 GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?		No	
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Radium-226 Queue Sheet

17-SEP-18

GEL Laboratories, Radiochemistry Division

Batch #: 1802180 Analyst: PCW First Client Due Date: 10/09/2018 Internal Due Date: 10/05/2018

Spike Isotope: Radium-226 Spike Code: 17151 Expiration Date: 12/19/18 Vol: 0.1 End Initial/Degas Date/Time: 9/24/18 0900

LCS Isotope: Radium-226 LCS Code: 17151 Expiration Date: 12/19/18 Vol: 0.1 End LN De-em Date: 9/27/18

Bkg Count Time: 30 (Min) Sample Count Time: 30 (Min) Start Count Date: 9/27/18

Prep Date: 9/24/18 Pipet ID: 2766953 Balance ID: 18150253 Initials: PW Witness: N/A

Sample I	Client Description	Type	Hazard Code	Matrix	Min CRDL	Client	Position (Label)	Aliquot (ml or g)	End LN De-em Time	Start Count Time	Cell #	Det #	Bkg counts	Total Counts
459187001-1	MW-8	SAMPLE		GROUND WATER	pCi/L	LANC006	1	500	0536	0920	105	1	7	10
459187002-1	MW-9	SAMPLE		GROUND WATER	pCi/L	LANC006	2	500	0536	0920	204	2	6	11
459187003-1	MW-5	SAMPLE		GROUND WATER	pCi/L	LANC006	3	500	0536	0920	307	3	2	13
459187004-1	MW-7	SAMPLE		GROUND WATER	pCi/L	LANC006	4	500	0536	0920	408	4	2	9
459187005-1	MW-6	SAMPLE		GROUND WATER	pCi/L	LANC006	5	500	0534	0920	507	5	5	28
459187006-1	MW-1	SAMPLE		GROUND WATER	pCi/L	LANC006	6	500	0536	0920	607	6	2	33
459187007-1	MW-2	SAMPLE		GROUND WATER	pCi/L	LANC006	7	500	0536	0920	701	7	2	44
459187008-1	MW-3	SAMPLE		GROUND WATER	pCi/L	LANC006	8	500	0534	0920	801	8	4	9
459187009-1	MW-4	SAMPLE		GROUND WATER	pCi/L	LANC006	9	500	0558	0955	106	1	8	5
459187010-1	FB-09052018	SAMPLE		GROUND WATER	pCi/L	LANC006	10	500	0558	0955	202	2	5	6
459187011-1	FB-09062018	SAMPLE		GROUND WATER	pCi/L	LANC006	11	500	0558	0955	301	3	3	5
459193001-1	MW-4	SAMPLE		GROUND WATER	pCi/L	LANC006	12	500	0556	0955	401	4	7	10
459193002-1	MW-6	SAMPLE		GROUND WATER	pCi/L	LANC006	13	500	0556	0955	504	5	3	11
459193003-1	MW-2	SAMPLE		GROUND WATER	pCi/L	LANC006	14	500	0558	0955	604	6	6	11
459193004-1	MW-5	SAMPLE		GROUND WATER	pCi/L	LANC006	15	500	0558	0955	705	7	8	16
459193005-1	MW-1	SAMPLE		GROUND WATER	pCi/L	LANC006	16	500	0558	0955	805	8	6	11
459193006-1	MW-3	SAMPLE		GROUND WATER	pCi/L	LANC006	17	500	0620	1030	203	2	1	23
459193007-1	FB-09042018	SAMPLE		GROUND WATER	pCi/L	LANC006	18	500	0620	1030	306	3	6	4
1204113013-1	MB for batch 1802180	MB		GROUND WATER	pCi/L	QC ACCOUNT	19	500	0620	1030	402	4	8	6
1204113014-1	MW-8(459187001DUP)	DUP		GROUND WATER	pCi/L	QC ACCOUNT	20	500	0620	1030	503	5	3	19
1204113015-1	MW-8(459187001MS)	MS		GROUND WATER	pCi/L	QC ACCOUNT	21	100	0620	1030	601	6	8	699
1204113016-1	MW-8(459187001MSD)	MSD		GROUND WATER	pCi/L	QC ACCOUNT	22	100	0620	1030	706	7	8	673
1204113017-1	LCS for batch 1802180	LCS		GROUND WATER	pCi/L	QC ACCOUNT	23	500	0620	1050	806	8	2	586

Comments:

Data Reviewed By: 9/27/18

Radium-226 Liquid

Filename : RA226.XLS
File type : Excel
Version # : 1.3.2

Batch : 1802180
Analyst : PCW
Prep Date : 9/24/2018
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	459187001.1	0.5000	2.0256E-05	9/5/2018 11:30	105	30	10	0.333	7	0.233	30	2.0440
2	459187002.1	0.5000	2.0256E-05	9/5/2018 11:40	204	30	11	0.367	6	0.200	30	2.0820
3	459187003.1	0.5000	2.0256E-05	9/5/2018 13:00	307	30	13	0.433	2	0.067	30	1.8050
4	459187004.1	0.5000	2.0256E-05	9/5/2018 13:30	408	30	9	0.300	2	0.067	30	1.8510
5	459187005.1	0.5000	2.0256E-05	9/5/2018 14:40	507	30	28	0.933	5	0.167	30	1.9970
6	459187006.1	0.5000	2.0256E-05	9/6/2018 9:55	607	30	33	1.100	2	0.067	30	2.1300
7	459187007.1	0.5000	2.0256E-05	9/6/2018 10:00	701	30	44	1.467	2	0.067	30	1.9520
8	459187008.1	0.5000	2.0256E-05	9/6/2018 11:55	801	30	9	0.300	4	0.133	30	1.7120
9	459187009.1	0.5000	2.0256E-05	9/6/2018 12:00	106	30	5	0.167	8	0.267	30	2.1070
10	459187010.1	0.5000	2.0256E-05	9/5/2018 14:00	202	30	6	0.200	5	0.167	30	1.8580
11	459187011.1	0.5000	2.0256E-05	9/6/2018 12:30	301	30	5	0.167	3	0.100	30	1.8290
12	459193001.1	0.5000	2.0256E-05	9/4/2018 11:25	401	30	10	0.333	7	0.233	30	1.9020
13	459193002.1	0.5000	2.0256E-05	9/4/2018 11:30	505	30	11	0.367	3	0.100	30	1.5140
14	459193003.1	0.5000	2.0256E-05	9/4/2018 13:30	604	30	11	0.367	6	0.200	30	2.0460
15	459193004.1	0.5000	2.0256E-05	9/4/2018 13:50	705	30	10	0.333	8	0.267	30	1.9830
16	459193005.1	0.5000	2.0256E-05	9/4/2018 15:45	805	30	11	0.367	6	0.200	30	1.9810
17	459193006.1	0.5000	2.0256E-05	9/4/2018 15:50	203	30	23	0.767	1	0.033	30	1.8290
18	459193007.1	0.5000	2.0256E-05	9/4/2018 13:15	306	30	4	0.133	6	0.200	30	1.7820
19	1204113013.1	0.5000	2.0256E-05	9/24/2018 0:00	402	30	6	0.200	8	0.267	30	2.0200
20	1204113014.1	0.5000	2.0256E-05	9/5/2018 11:30	503	30	19	0.633	3	0.100	30	1.9410
21	1204113015.1	0.1000	1.1370E-05	9/5/2018 11:30	601	30	699	23.300	8	0.267	30	1.9080
22	1204113016.1	0.1000	1.1370E-05	9/5/2018 11:30	706	30	673	22.433	8	0.267	30	1.9130
23	1204113017.1	0.5000	2.0256E-05	9/24/2018 0:00	806	30	586	19.533	2	0.067	30	1.9730

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-008
Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
9.300%	5/1/2018	4/30/2019	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
1.700%	8/1/2018	7/31/2019	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
6.300%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
7.000%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
5.300%	6/1/2018	5/31/2019	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
2.900%	7/1/2018	6/30/2019	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
1.900%	11/1/2017	10/31/2018	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
3.700%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 5:36	9/27/2018 9:20	0.404	0.972	1.002	1.000
4.700%	5/1/2018	4/30/2019	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
9.300%	8/1/2018	7/31/2019	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
8.200%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
0.500%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
4.000%	6/1/2018	5/31/2019	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
1.700%	7/1/2018	6/30/2019	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
2.700%	11/1/2017	10/31/2018	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
3.100%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 5:58	9/27/2018 9:55	0.406	0.971	1.002	1.000
9.900%	8/1/2018	7/31/2019	9/24/2018 9:00	9/27/2018 6:20	9/27/2018 10:30	0.408	0.969	1.002	1.000
3.900%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 6:20	9/27/2018 10:30	0.408	0.969	1.002	1.000
1.600%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 6:20	9/27/2018 10:30	0.408	0.969	1.002	1.000
8.100%	6/1/2018	5/31/2019	9/24/2018 9:00	9/27/2018 6:20	9/27/2018 10:30	0.408	0.969	1.002	1.000
8.500%	7/1/2018	6/30/2019	9/24/2018 9:00	9/27/2018 6:20	9/27/2018 10:30	0.408	0.969	1.002	1.000
3.000%	11/1/2017	10/31/2018	9/24/2018 9:00	9/27/2018 6:20	9/27/2018 10:30	0.408	0.969	1.002	1.000
6.000%	3/1/2018	2/28/2019	9/24/2018 9:00	9/27/2018 6:20	9/27/2018 10:30	0.408	0.969	1.002	1.000

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-D
Spike Exp Date : 12/19/2018
Spike Activity (dpm/ml): 288.43
Spike Volume Added: 0.10

LCS S/N : 1715-D
LCS Exp Date : 12/19/2018
LCS Activity (dpm/ml): 288.43
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3264	0.2305	1	0.5732	**0.1123**	137.75%	0.1000	0.1374	0.3026	0.3037		SAMPLE				
2	0.2967	0.2095	1	0.5292	**0.1838**	82.48%	0.1667	0.1374	0.2970	0.2983		SAMPLE				
3	0.1976	0.1395	1	0.4062	**0.4664**	35.77%	0.3667	0.1291	0.3218	0.3338		SAMPLE				
4	0.1927	0.1360	1	0.3961	**0.2894**	47.89%	0.2333	0.1106	0.2688	0.2749		SAMPLE				
5	0.2824	0.1993	1	0.5137	**0.8814**	25.53%	0.7667	0.1915	0.4315	0.4591		SAMPLE				
6	0.1674	0.1182	1	0.3442	**1.1138**	19.30%	1.0333	0.1972	0.4166	0.4510		SAMPLE				
7	0.1827	0.1290	1	0.3756	**1.6466**	16.26%	1.4000	0.2261	0.5212	0.5761		SAMPLE				
8	0.2946	0.2080	1	0.5501	**0.2235**	72.21%	0.1667	0.1202	0.3159	0.3180		SAMPLE				
9	0.3377	0.2384	1	0.5855	**-0.1087**	120.28%	-0.1000	0.1202	0.2561	0.2561		SAMPLE				
10	0.3027	0.2137	1	0.5508	**0.0411**	331.79%	0.0333	0.1106	0.2671	0.2673		SAMPLE				
11	0.2382	0.1682	1	0.4616	**0.0835**	141.66%	0.0667	0.0943	0.2314	0.2321		SAMPLE				
12	0.3499	0.2471	1	0.6145	**0.1204**	137.44%	0.1000	0.1374	0.3244	0.3248		SAMPLE				
13	0.2878	0.2032	1	0.5576	**0.4034**	46.94%	0.2667	0.1247	0.3698	0.3757		SAMPLE				
14	0.3012	0.2126	1	0.5372	**0.1866**	82.48%	0.1667	0.1374	0.3015	0.3028		SAMPLE				
15	0.3588	0.2533	1	0.6221	**0.0770**	212.15%	0.0667	0.1414	0.3201	0.3204		SAMPLE				
16	0.3111	0.2196	1	0.5548	**0.1927**	82.52%	0.1667	0.1374	0.3114	0.3129		SAMPLE				
17	0.1372	0.0969	1	0.3187	**0.9161**	24.37%	0.7333	0.1633	0.3998	0.4571		SAMPLE				
18	0.3450	0.2435	1	0.6153	**-0.0855**	158.16%	-0.0667	0.1054	0.2649	0.2650		SAMPLE				
19	0.3514	0.2481	1	0.6093	**-0.0754**	187.09%	-0.0667	0.1247	0.2765	0.2766		MB				
20	0.2239	0.1581	1	0.4339	**0.6278**	30.41%	0.5333	0.1563	0.3607	0.3851	459187001.1	DUP	139.3%	2.0602		
21	1.8601	1.3133	1	3.2252	**137.9113**	9.33%	23.0333	0.8863	10.4013	32.1309	459187001.1	MS			129.9275	106.1%
22	1.8552	1.3098	1	3.2168	**132.3753**	4.94%	22.1667	0.8699	10.1816	23.0083	459187001.1	MSD	4.1%	0.2746	129.9275	101.9%
23	0.1799	0.1270	1	0.3698	**22.5427**	7.30%	19.4667	0.8083	1.8346	4.5807		LCS			25.9849	86.8%

Continuing Calibration Data

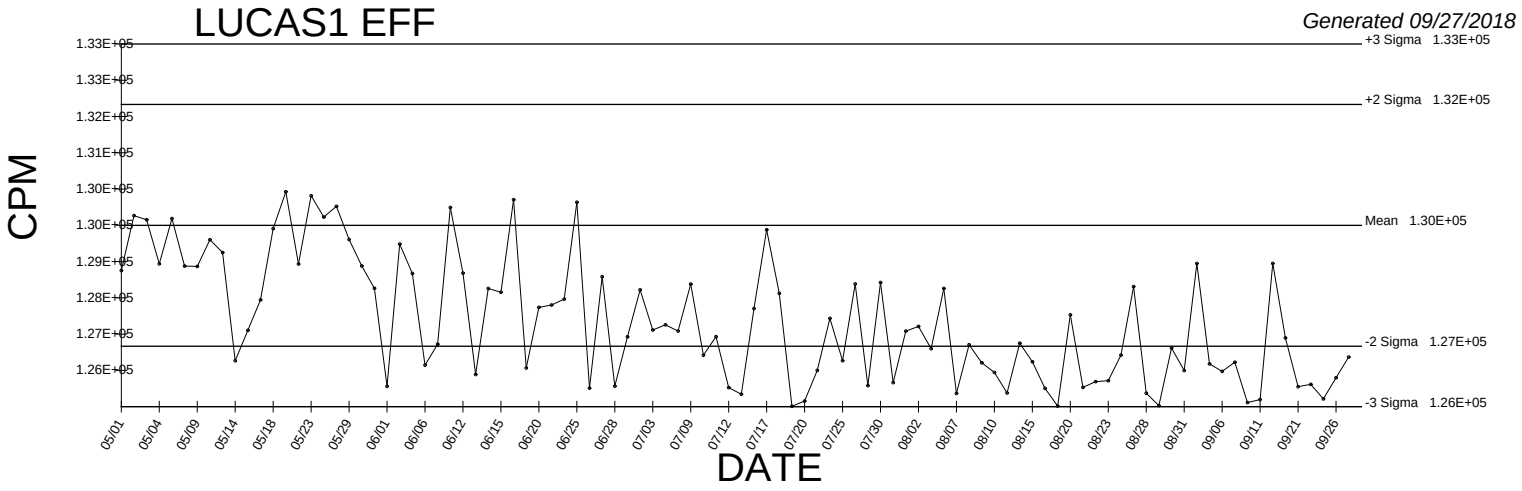
Ludlum Alpha Scintillation Counter Checks for 27-SEP-2018

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:20	1	1.27E+05	126753	-2.18		
LUCAS2	EFF	07:20	1	1.33E+05	133112	2.01		
LUCAS3	EFF	07:20	1	1.38E+05	138045	-1.4		
LUCAS4	EFF	07:20	1	1.32E+05	131528	-0.13		
LUCAS5	EFF	07:20	1	1.35E+05	134865	0.77		
LUCAS6	EFF	07:20	1	1.34E+05	133948	-0.78		
LUCAS7	EFF	07:20	1	1.42E+05	142440	1.63		
LUCAS8	EFF	07:20	1	1.37E+05	137481	-0.55		

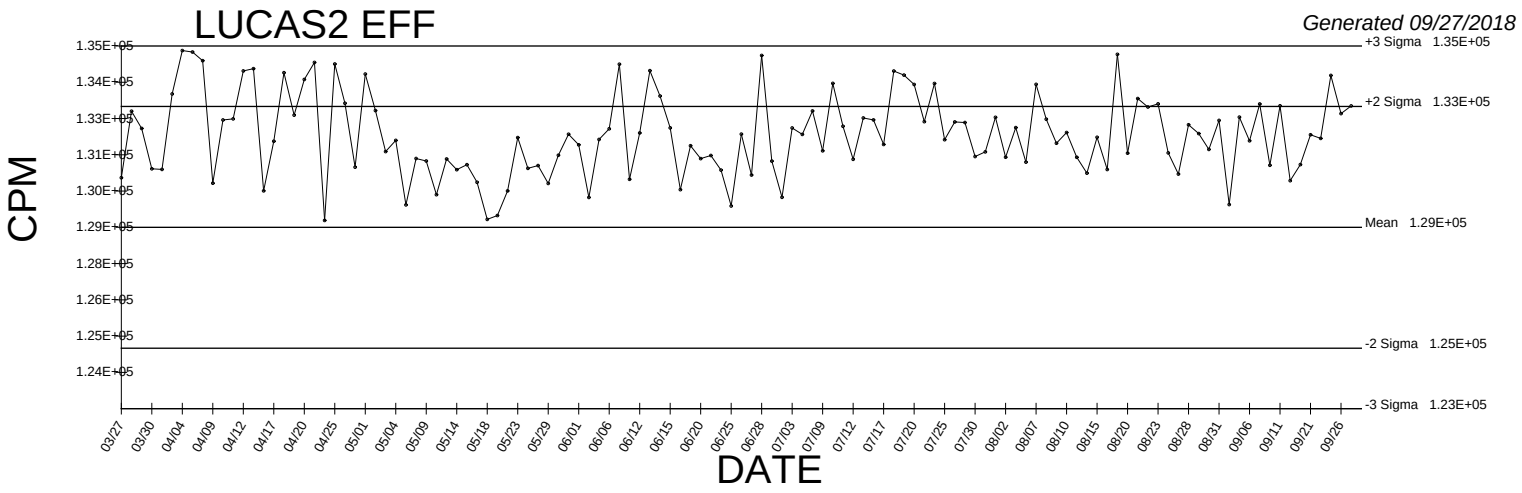
Reviewed by: Lyndsey Pace **Date:** 27-SEP-18

GEL Laboratories LLC

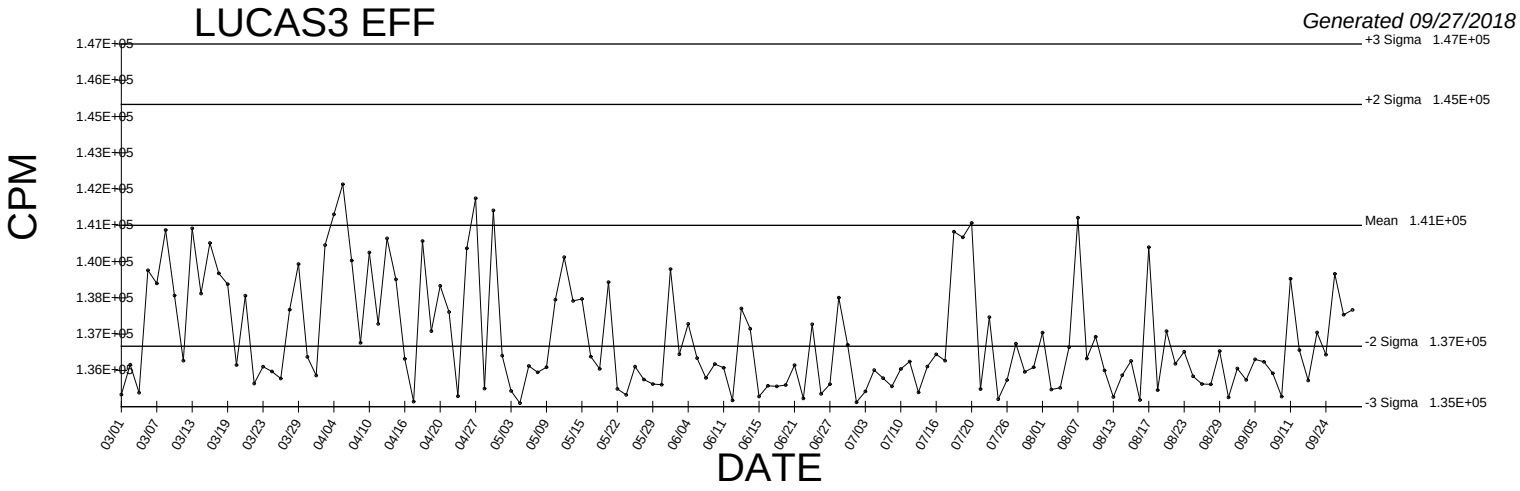
Efficiency Data



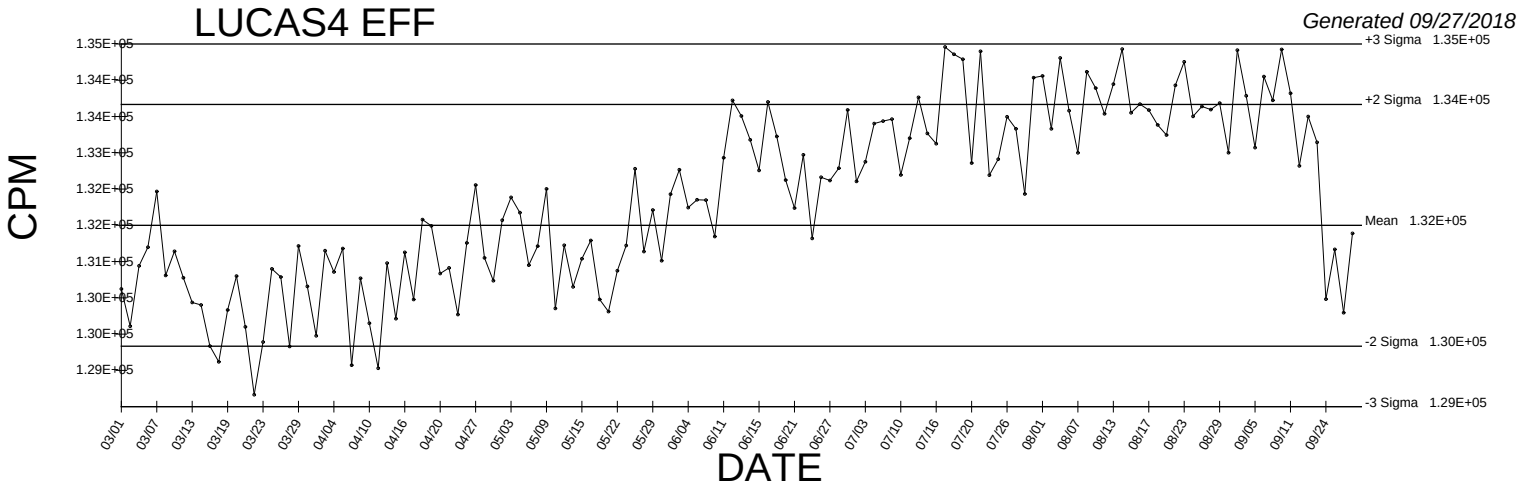
● Denotes Outlier



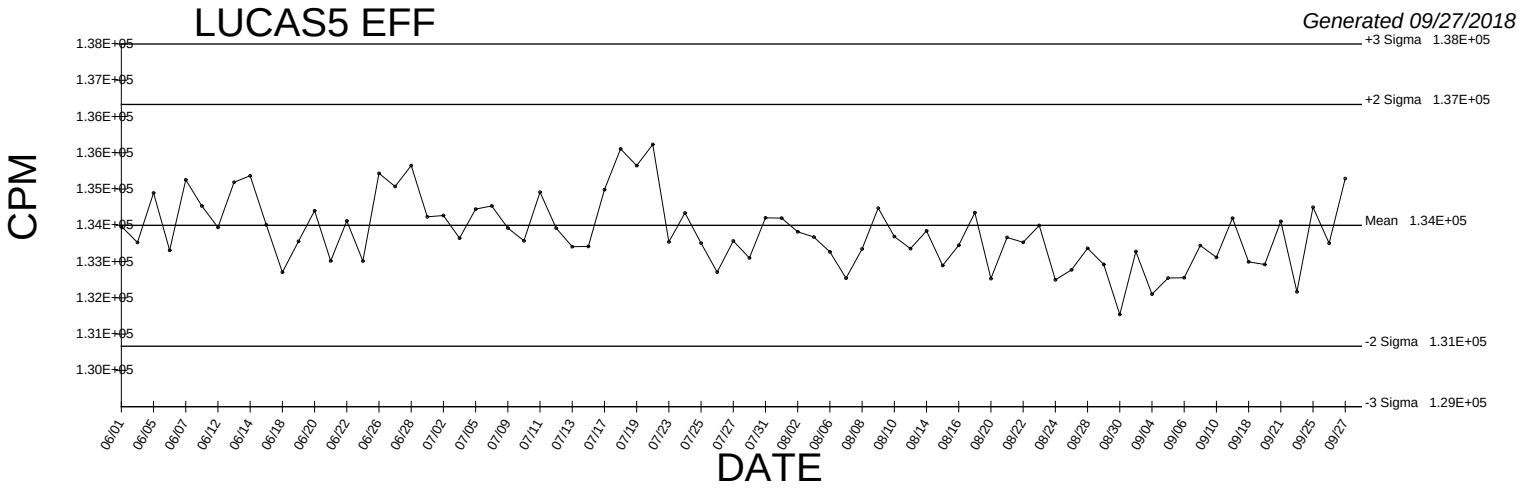
● Denotes Outlier



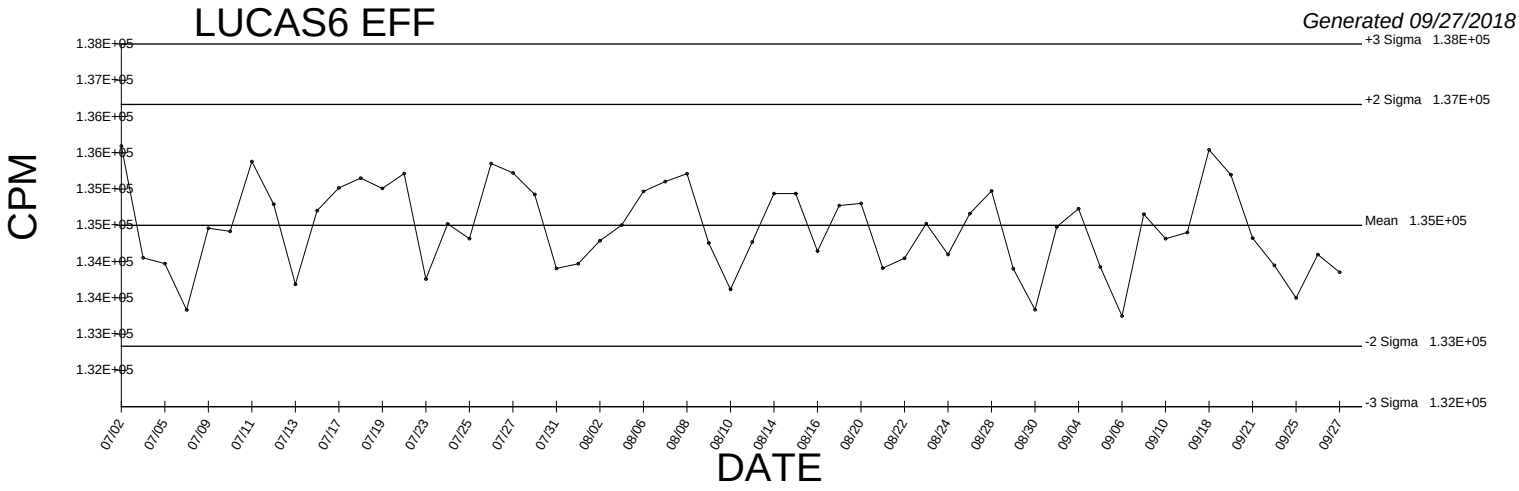
● Denotes Outlier



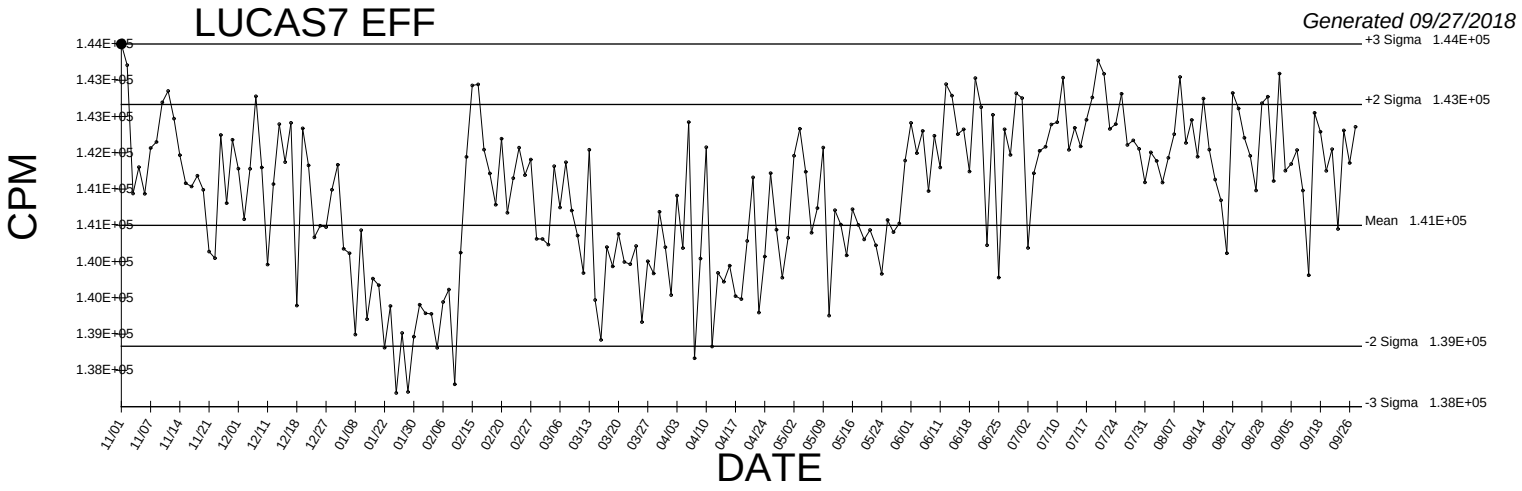
● Denotes Outlier



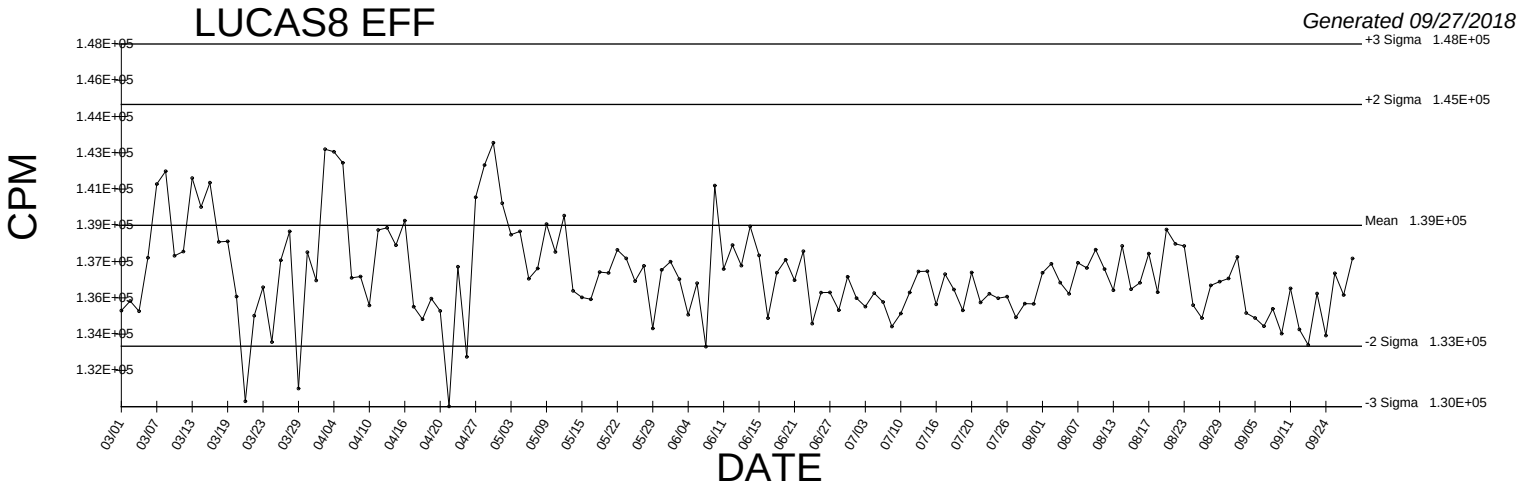
● Denotes Outlier



● Denotes Outlier



● Denotes Outlier



● Denotes Outlier

RAD Standards Traceability

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

1715

98367

Ra-226 5 mL Liquid in Flame Sealed Vial

Customer: GEL Laboratories, LLC
P.O. No.: GEL 1408580, Item 7 Product Code: 8226

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics, using a germanium gamma spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Ra-226	5.844E+05	3.676E+04	1.0	2.1	4.7	09/09/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities (other than decay products)<0.1%.
5.02193 g 0.1M HCl solution with approximately 30 µg/g Ba carrier.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QC Approved: L. Tk
L. Tkavadze, Nuclear Metrologist

Date: 9 Sep 14

RECEIVED 9/10/14

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1715
Prepared By:	Gregory Ramsay
Carrier Conc:	0.1M HCl
Reference Date:	09/09/2014
Ampoule Mass (g):	5.02193 g
Uncertainty:	+/- 2.35 %
LogBook No:	GL-CED-297-008

A Solution Material Info			
Isotope:	Radium-226		
Prepared By:	Gregory Ramsay		
Prep Date:	07/06/2016		
Verification Date:	02/08/2017		
Expiration Date:	02/08/2018		
Primary Code:	1715-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9865 g		
Density(g/mL):	0.9967	Balance ID:	C31514

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / (Ampoule Mass(g) *(Dilution Vol)) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / Density / (Ampoule Mass (g) * (Dilution Vol)) = Parent Activity (dpm/g)
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (5.02193 g * 100 mL) = 21900.3937 dpm/mL
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (0.9967 g/mL)/ (5.02193 g * 100 mL) = 21972.4854 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
07/06/2016	Gregory Ramsay	2.6261	200	1715-B	288.51 dpm/ml	01/25/2017	11/10/2018
02/08/2017	Gregory Ramsay	21.96	250	1715-C	1930.063 dpm/ml	02/08/2017	02/08/2018
12/19/2017	Gregory Ramsay	2.63	200	1715-D	288.938 dpm/ml	12/19/2017	12/19/2018

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-226 Standard 1715-D

v1.0.2

Instrument	Yellow
Analyst	GXR1
Verification Prep Date	12/19/2017

Standard Information	
Isotope	Ra-226
Serial Number	1715-D
Isotope Halflife	1.6000E+03 Y
Reference Date	9/9/2014
Ref. Act. (DPM/mL)	288.938
Amount of Std. (mL)	0.5
Standard Prep Date	12/19/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	12/20/2017	773.48	70.40	11.00
2	12/20/2017	774.10	70.70	11.00
3	12/20/2017	772.98	73.30	11.00

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	59.40	0.422157	281.41	140.71
2	59.70	0.422157	282.83	141.42
3	62.30	0.422157	295.15	147.58

	dpm/mL
Mean Value =	286.47
Stdev =	7.555402963
Certificate Value* =	**288.5**
Two sigma =	15.111
10 % of Mean =	28.647
Rule A (Pass/Fail)	**Pass**
% Recovery	99.29%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**12/19/2018**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-226 source 1715-D by transferring 0.5 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYellow for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 12/20/2017 using Ra-226 source 0299-H.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,
B = BKG cpm,
C = System efficiency (cpm/dpm), and
D = volume used for standard verification.

RAD-M-001

12/21/17

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 1802180**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
459187001	SAMPLE	PCW	LUCAS1	SEP-27-18 09:20:00	DONE	Lucas Cell	01-MAY-18 00:00
459187002	SAMPLE	PCW	LUCAS2	SEP-27-18 09:20:00	DONE	Lucas Cell	01-AUG-18 00:00
459187003	SAMPLE	PCW	LUCAS3	SEP-27-18 09:20:00	DONE	Lucas Cell	01-MAR-18 00:00
459187004	SAMPLE	PCW	LUCAS4	SEP-27-18 09:20:00	DONE	Lucas Cell	01-MAR-18 00:00
459187005	SAMPLE	PCW	LUCAS5	SEP-27-18 09:20:00	DONE	Lucas Cell	01-JUN-18 00:00
459187006	SAMPLE	PCW	LUCAS6	SEP-27-18 09:20:00	DONE	Lucas Cell	01-JUL-18 00:00
459187007	SAMPLE	PCW	LUCAS7	SEP-27-18 09:20:00	DONE	Lucas Cell	01-NOV-17 00:00
459187008	SAMPLE	PCW	LUCAS8	SEP-27-18 09:20:00	DONE	Lucas Cell	01-MAR-18 00:00
459187009	SAMPLE	PCW	LUCAS1	SEP-27-18 09:55:00	DONE	Lucas Cell	01-MAY-18 00:00
459187010	SAMPLE	PCW	LUCAS2	SEP-27-18 09:55:00	DONE	Lucas Cell	01-AUG-18 00:00
459187011	SAMPLE	PCW	LUCAS3	SEP-27-18 09:55:00	DONE	Lucas Cell	01-MAR-18 00:00
459193001	SAMPLE	PCW	LUCAS4	SEP-27-18 09:55:00	DONE	Lucas Cell	01-MAR-18 00:00
459193002	SAMPLE	PCW	LUCAS5	SEP-27-18 09:55:00	DONE	Lucas Cell	01-JUN-18 00:00
459193003	SAMPLE	PCW	LUCAS6	SEP-27-18 09:55:00	DONE	Lucas Cell	01-JUL-18 00:00
459193004	SAMPLE	PCW	LUCAS7	SEP-27-18 09:55:00	DONE	Lucas Cell	01-NOV-17 00:00
459193005	SAMPLE	PCW	LUCAS8	SEP-27-18 09:55:00	DONE	Lucas Cell	01-MAR-18 00:00
459193006	SAMPLE	PCW	LUCAS2	SEP-27-18 10:30:00	DONE	Lucas Cell	01-AUG-18 00:00
459193007	SAMPLE	PCW	LUCAS3	SEP-27-18 10:30:00	DONE	Lucas Cell	01-MAR-18 00:00
1204113013	MB	PCW	LUCAS4	SEP-27-18 10:30:00	DONE	Lucas Cell	01-MAR-18 00:00
1204113014	DUP	PCW	LUCAS5	SEP-27-18 10:30:00	DONE	Lucas Cell	01-JUN-18 00:00
1204113015	MS	PCW	LUCAS6	SEP-27-18 10:30:00	DONE	Lucas Cell	01-JUL-18 00:00
1204113016	MSD	PCW	LUCAS7	SEP-27-18 10:30:00	DONE	Lucas Cell	01-NOV-17 00:00
1204113017	LCS	PCW	LUCAS8	SEP-27-18 10:30:00	DONE	Lucas Cell	01-MAR-18 00:00

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2425 New Holland Pike, Lancaster, PA 17601 | 717-656-2300 | Fax: 717-656-2681 | www.LancasterLabs.com

Type III Data Package

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Project: PSEG Mercer
Groundwater and Water Samples
Collected on 10/04/18

SDG# GEJ56

GROUP	SAMPLE NUMBERS
1995508	9839632-9839638

PA Cert. # 36-00037
NY Cert. # 10670
NJ Cert. # PA011
NC Cert. # 521
TX Cert. # T104704194-18-27
AZ Cert. # AZ0780

Through our technical processes and second person review of data, we have established that our data/deliverables are in compliance with the methods and project requirements unless otherwise noted or previously resolved with the client.

Authorized by: Dana M Kauffman

Dana M. Kauffman
Manager

Date: 10/31/2018

Any questions or concerns you might have regarding this data package should be directed to your client representative, Kerri Sachtleben at (717)-556-7376.

2425 New Holland Pike, Lancaster, PA 17601 | 717-656-2300 | Fax: 717-656-2681 | www.LancasterLabs.com

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Sample Reference List for SDG Number GEJ56 with a Data Package Type of III

07701 - GEI Consultants, Inc.

Project: PSEG Mercer

Lab Sample Number	Client Sample ID	Collection Date	Date Received
9839632	FB-20181004	10/04/2018 12:00	10/05/2018 16:45
9839633	MW-4	10/04/2018 10:20	10/05/2018 16:45
9839634	MW-6	10/04/2018 10:20	10/05/2018 16:45
9839635	MW-5	10/04/2018 12:40	10/05/2018 16:45
9839636	MW-2	10/04/2018 11:45	10/05/2018 16:45
9839637	MW-3	10/04/2018 13:40	10/05/2018 16:45
9839638	MW-1	10/04/2018 14:25	10/05/2018 16:45

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Sample pH Log

SDG: GEJ56

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9839632	004A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:36:32PM	13165
9839632	015A	8	5-7	UP	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:08:18AM	25804
9839632	055A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:14:48PM	13165
9839632	055B	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:16:02PM	13165
9839632	070A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:38:04PM	13165
9839632	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:56:58PM	12665
9839632	330A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:36:32PM	13165
9839632	332A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:36:32PM	13165
9839633	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:34:13PM	13165
9839633	015A	8	5-7	UP	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:09:53AM	25804
9839633	055A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:13:46PM	13165
9839633	055B	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:12:31PM	13165
9839633	070A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:29:29PM	13165
9839633	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:47:00PM	12665
9839633	089B	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:54:55PM	12665
9839633	148A	8	5-7	UP	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:05:19AM	25804
9839633	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:34:13PM	13165
9839633	332A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:29:29PM	13165
9839634	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:33:28PM	13165
9839634	015A	8	5-7	UP	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:06:52AM	25804
9839634	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:15:11PM	13165
9839634	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:15:46PM	13165
9839634	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:28:08PM	13165
9839634	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:40:18PM	12665
9839634	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:33:28PM	13165
9839634	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:28:08PM	13165
9839635	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:31:52PM	13165
9839635	015A	9	5-7	UP	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:10:36AM	25804
9839635	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:15:30PM	13165
9839635	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:12:05PM	13165
9839635	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:27:26PM	13165
9839635	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:36:40PM	12665
9839635	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:31:52PM	13165
9839635	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:27:26PM	13165
9839636	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:34:55PM	13165
9839636	015A	5	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:05:59AM	25804
9839636	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:14:10PM	13165
9839636	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:13:29PM	13165

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9839636	070A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:28:48PM	13165
9839636	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:20:55PM	12665
9839636	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:34:55PM	13165
9839636	332A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:28:48PM	13165
9839637	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:30:43PM	13165
9839637	015A	9	5-7	UP	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:09:03AM	25804
9839637	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:14:31PM	13165
9839637	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:16:22PM	13165
9839637	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:25:32PM	13165
9839637	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:25:03PM	12665
9839637	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:30:43PM	13165
9839637	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:25:32PM	13165
9839638	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:32:32PM	13165
9839638	015A	8	5-7	UP	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/6/2018 9:07:38AM	25804
9839638	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:13:11PM	13165
9839638	055B	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:12:55PM	13165
9839638	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:26:31PM	13165
9839638	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/10/2018 3:38:28PM	12665
9839638	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:32:32PM	13165
9839638	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/5/2018 11:26:31PM	13165

***pH Check Code Key**
PK = Original container checked - pH is within the correct range. (No preservative was added)
PA = Original container checked - pH adjusted to correct range. (Preservative was added)
PV = Volatile container checked
PC = pH checked (unpreserved container)
SPK = Subsampled from an original container. Original container checked - pH is within correct range
SPA = Subsampled from an original container. Subsample container checked - pH adjusted to correct range.
SPC = Subsampled from an original container. pH checked (unpreserved container).
SUP = Subsampled from original container. Unable to be preserved due to the matrix of the sample.
UP = Unable to preserve due to matrix of the sample.
NA = Not applicable

****Chlorine Present Code Key**
NA = Chlorine Not Checked
Y = Chlorine Present
N = Chlorine Not Present

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00259 Mercury

The solution resulting from the mercury digestion is analyzed by Cold Vapor AA.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

14044 ICP-WW, 3005A (tot rec) - U5

The sample is digested with nitric acid and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3005A, July 1992

14047 ICPMS - Water, 3020A - U5

The sample is digested with nitric and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3020A, July 1992

05713 WW SW846 Hg Digest

The sample is heated at 95 c with nitric acid, sulfuric acid, potassium persulfate, and potassium permanganate. Excess potassium permanganate is reduced with sodium chloride/hydroxylamine hydrochloride. Mercuric ions are reduced to mercury metal using stannous chloride.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

07046 Barium
08014 Boron
01750 Calcium
07051 Chromium
07052 Cobalt
01756 Lithium
07036 Selenium
07022 Thallium

The solution resulting from the metals digestion is analyzed by Trace ICP.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6010D, Rev. 4, July 2014.

06024 Antimony
06025 Arsenic
06027 Beryllium
06028 Cadmium
06035 Lead
06038 Molybdenum

The solution resulting from the metals digestion is analyzed by ICP/MS.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6020B, Rev.2, July 2014.

00224 Chloride
01504 Fluoride
00228 Sulfate

A small volume of sample is introduced into an ion chromatograph. The anions are then separated and measured by a system consisting of a guard column, separator column, suppressor, and conductivity detector.

Reference: Method 300.0, Revision 2.1 (1993), Methods for Chemical Analysis of Water and Wastes USEPA 600.

12152 pH

The activity of hydrogen ions in the sample is measured using a glass electrode and a reference electrode.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 4500-H+ B-2011

00212 Total Dissolved Solids

A well-mixed sample is filtered through a glass fiber filter. The filtrate is collected in a tared beaker, evaporated in a steam bath and dried in an oven at 180C +/- 2C to a constant weight. The increase in weight is the total dissolved solids.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2540 C-2011

12151 Temperature of pH

The temperature of the sample measured during the pH analysis.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2550 B-2010

Analysis Reports / Field Chain of Custody

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Report Date: October 19, 2018 16:11

Project: PSEG Mercer

Account #: 07701
Group Number: 1995508
SDG: GEJ56
PO Number: 1504710
State of Sample Origin: NJ

Electronic Copy To	GEI Consultants, Inc.	Attn: Jason Kohl
Electronic Copy To	GEI Consultants, Inc.	Attn: Data Group

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
FB-20181004 Grab Water	10/04/2018 12:00	9839632
MW-4 Grab Groundwater	10/04/2018 10:20	9839633
MW-6 Grab Groundwater	10/04/2018 10:20	9839634
MW-5 Grab Groundwater	10/04/2018 12:40	9839635
MW-2 Grab Groundwater	10/04/2018 11:45	9839636
MW-3 Grab Groundwater	10/04/2018 13:40	9839637
MW-1 Grab Groundwater	10/04/2018 14:25	9839638

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: GEI Consultants, Inc.
Project: PSEG Mercer
Sampling Date(s): 10/04/18
Laboratory Sample ID(s): 9839632-9839638
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	No
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality."
***The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.**

Kenneth Boley
Senior Specialist, Quality Assurance

10/19/2018



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Project Name: PSEG Mercer
ELLE Group #: 1995508

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 9839632, 9839633, 9839634, 9839635, 9839636, 9839637, 9839638

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

Sample #s: 9839632, 9839633, 9839634, 9839635, 9839636, 9839637, 9839638

The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.

EPA 300.0, Wet Chemistry

Batch #: 18288520109A (Sample number(s): 9839633-9839638 UNSPK: 9839633 BKG: 9839633)

The recovery(ies) for the following analyte(s) in the MS exceeded the acceptance window indicating a positive bias: Fluoride

Sample Description: **FB-20181004 Grab Water**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 12:00
SDG#: GEJ56-01FB

GEI Consultants, Inc.
ELLE Sample #: GW 9839632
ELLE Group #: 1995508
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D.	0.0010	0.0050	1
08014	Boron	7440-42-8	N.D.	0.0120	0.0500	1
01750	Calcium	7440-70-2	0.0407 J	0.0330	0.500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.8	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181004 Grab Water**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 12:00
SDG#: GEJ56-01FB

GEI Consultants, Inc.
ELLE Sample #: GW 9839632
ELLE Group #: 1995508
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	5.9	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:51	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/18/2018 14:11	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:01	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:01	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:01	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:01	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182841404702C	10/15/2018 20:01	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	2	182840571302	10/12/2018 08:21	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182841404402	10/12/2018 06:20	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182841404702	10/12/2018 03:59	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182840571302	10/11/2018 16:25	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18288520115B	10/16/2018 02:46	Ashlynn M Cornelius	1
01504	Fluoride	EPA 300.0	1	18288520115B	10/16/2018 23:16	Ashlynn M Cornelius	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181004 Grab Water**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 12:00
SDG#: GEJ56-01FB

GEI Consultants, Inc.
ELLE Sample #: GW 9839632
ELLE Group #: 1995508
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18288520115B	10/16/2018 02:46	Ashlynn M Cornelius	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	18283921203A	10/10/2018 16:56	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18281003203A	10/09/2018 04:42	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18281003203A	10/09/2018 04:42	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 10:20
SDG#: GEJ56-02

GEI Consultants, Inc.
ELLE Sample #: GW 9839633
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0090	0.0010	0.0050	1
08014	Boron	7440-42-8	0.0336 J	0.0120	0.0500	1
01750	Calcium	7440-70-2	2.92	0.0330	0.500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0017 J	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	1.1 J	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	N.D.	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	29.0 J	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.9	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 10:20
SDG#: GEJ56-02

GEI Consultants, Inc.
ELLE Sample #: GW 9839633
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:35	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/18/2018 13:58	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 19:44	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 19:44	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 19:44	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 19:44	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182841404702C	10/15/2018 19:44	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	2	182840571302	10/12/2018 08:23	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182841404402	10/12/2018 06:20	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182841404702	10/12/2018 03:59	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182840571302	10/11/2018 16:25	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18288520109A	10/15/2018 13:05	Ashlynn M Cornelius	5
01504	Fluoride	EPA 300.0	1	18288520109A	10/15/2018 13:05	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 10:20
SDG#: GEJ56-02

GEI Consultants, Inc.
ELLE Sample #: GW 9839633
ELLE Group #: 1995508
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18288520109A	10/15/2018 13:05	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18283921201A	10/10/2018 16:00	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18281003203A	10/09/2018 04:34	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18281003203A	10/09/2018 04:34	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 10:20
SDG#: GEJ56-03

GEI Consultants, Inc.
ELLE Sample #: GW 9839634
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.166	0.0010	0.0050	1
08014	Boron	7440-42-8	0.224	0.0120	0.0500	1
01750	Calcium	7440-70-2	34.3	0.0330	0.500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0035	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	136	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	6.5	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	309	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.8	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 10:20
SDG#: GEJ56-03

GEI Consultants, Inc.
ELLE Sample #: GW 9839634
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.5	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 06:54	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/18/2018 14:18	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:10	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:10	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:10	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:10	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182841404702C	10/15/2018 20:10	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	2	182840571302	10/12/2018 08:25	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182841404402	10/12/2018 06:20	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182841404702	10/12/2018 03:59	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182840571302	10/11/2018 16:25	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18288520109A	10/15/2018 14:16	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18288520109A	10/15/2018 13:58	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 10:20
SDG#: GEJ56-03

GEI Consultants, Inc.
ELLE Sample #: GW 9839634
ELLE Group #: 1995508
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18288520109A	10/15/2018 13:58	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18283921201A	10/10/2018 16:00	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18281003203A	10/09/2018 05:20	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18281003203A	10/09/2018 05:20	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 12:40
SDG#: GEJ56-04

GEI Consultants, Inc.
ELLE Sample #: GW 9839635
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.212	0.0010	0.0050	1
08014	Boron	7440-42-8	0.427	0.0120	0.0500	1
01750	Calcium	7440-70-2	101	0.0330	0.500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0211	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	102	10.0	20.0	50
01504	Fluoride	16984-48-8	0.72	0.25	0.50	5
00228	Sulfate	14808-79-8	135	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	602	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.7	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 12:40
SDG#: GEJ56-04

GEI Consultants, Inc.
ELLE Sample #: GW 9839635
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	8.0	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:02	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/18/2018 14:20	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:12	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:12	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:12	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:12	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182841404702C	10/15/2018 20:12	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	2	182840571302	10/12/2018 08:27	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182841404402	10/12/2018 06:20	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182841404702	10/12/2018 03:59	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182840571302	10/11/2018 16:25	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18288520109A	10/15/2018 14:51	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18288520109A	10/15/2018 14:34	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 12:40
SDG#: GEJ56-04

GEI Consultants, Inc.
ELLE Sample #: GW 9839635
ELLE Group #: 1995508
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18288520109A	10/15/2018 14:51	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18283921201A	10/10/2018 16:00	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18281003203A	10/09/2018 05:09	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18281003203A	10/09/2018 05:09	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 11:45
SDG#: GEJ56-05

GEI Consultants, Inc.
ELLE Sample #: GW 9839636
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0368	0.0010	0.0050	1
08014	Boron	7440-42-8	0.0639	0.0120	0.0500	1
01750	Calcium	7440-70-2	38.3	0.0330	0.500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	0.00075 J	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0038	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0033	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	1.5 J	1.0	2.0	5
01504	Fluoride	16984-48-8	0.69	0.25	0.50	5
00228	Sulfate	14808-79-8	4.6 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	140	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.8	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 11:45
SDG#: GEJ56-05

GEI Consultants, Inc.
ELLE Sample #: GW 9839636
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.9	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:04	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/18/2018 14:22	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:15	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:15	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:15	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:15	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182841404702C	10/15/2018 20:15	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	2	182840571302	10/12/2018 08:29	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182841404402	10/12/2018 06:20	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182841404702	10/12/2018 03:59	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182840571302	10/11/2018 16:25	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18288520109A	10/15/2018 15:09	Ashlynn M Cornelius	5
01504	Fluoride	EPA 300.0	1	18288520109A	10/15/2018 15:09	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 11:45
SDG#: GEJ56-05

GEI Consultants, Inc.
ELLE Sample #: GW 9839636
ELLE Group #: 1995508
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18288520109A	10/15/2018 15:09	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18283921203A	10/10/2018 16:56	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18281003203A	10/09/2018 04:38	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18281003203A	10/09/2018 04:38	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 13:40
SDG#: GEJ56-06

GEI Consultants, Inc.
ELLE Sample #: GW 9839637
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.186	0.0010	0.0050	1
08014	Boron	7440-42-8	0.276	0.0120	0.0500	1
01750	Calcium	7440-70-2	47.4	0.0330	0.500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0231 J	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0014 J	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0098	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	113	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	14.7	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	398	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.8	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 13:40
SDG#: GEJ56-06

GEI Consultants, Inc.
ELLE Sample #: GW 9839637
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.7	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:07	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/18/2018 14:24	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:18	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:18	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:18	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:18	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182841404702C	10/15/2018 20:18	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	2	182840571302	10/12/2018 08:09	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182841404402	10/12/2018 06:20	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182841404702	10/12/2018 03:59	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182840571302	10/11/2018 16:25	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18288520109A	10/15/2018 16:37	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18288520109A	10/15/2018 15:44	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 13:40
SDG#: GEJ56-06

GEI Consultants, Inc.
ELLE Sample #: GW 9839637
ELLE Group #: 1995508
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18288520109A	10/15/2018 15:44	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18283921201A	10/10/2018 16:00	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18281003203A	10/09/2018 05:16	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18281003203A	10/09/2018 05:16	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 14:25
SDG#: GEJ56-07

GEI Consultants, Inc.
ELLE Sample #: GW 9839638
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.180	0.0010	0.0050	1
08014	Boron	7440-42-8	1.10	0.0120	0.0500	1
01750	Calcium	7440-70-2	208	0.0330	0.500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0036	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	146	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	297	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,070	160	480	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.7	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 14:25
SDG#: GEJ56-07

GEI Consultants, Inc.
ELLE Sample #: GW 9839638
ELLE Group #: 1995508
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.7	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	182841404402	10/16/2018 07:10	Lisa J Cooke	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/18/2018 14:26	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:21	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:21	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:21	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	182841404702A	10/15/2018 20:21	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	182841404702C	10/15/2018 20:21	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	2	182840571302	10/12/2018 08:31	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	182841404402	10/12/2018 06:20	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	182841404702	10/12/2018 03:59	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	182840571302	10/11/2018 16:25	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18288520109A	10/15/2018 17:13	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18288520109A	10/17/2018 00:27	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/05/2018 16:45
Collection Date/Time: 10/04/2018 14:25
SDG#: GEJ56-07

GEI Consultants, Inc.
ELLE Sample #: GW 9839638
ELLE Group #: 1995508
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18288520109A	10/15/2018 17:13	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18283921203A	10/10/2018 16:56	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18281003203A	10/09/2018 05:13	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18281003203A	10/09/2018 05:13	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1995508
Reported: 10/19/2018 16:11

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 182840571302	Sample number(s): 9839632-9839638		
Mercury	N.D.	0.000050	0.00020
Batch number: 182841404402	Sample number(s): 9839632-9839638		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	0.0886 J	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	N.D.	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 182841404702A	Sample number(s): 9839632-9839638		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Batch number: 182841404702C	Sample number(s): 9839632-9839638		
Molybdenum	N.D.	0.00031	0.0020
Batch number: 18288520109A	Sample number(s): 9839633-9839638		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 18288520115B	Sample number(s): 9839632		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 18283921201A	Sample number(s): 9839633-9839635,9839637		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 18283921203A	Sample number(s): 9839632,9839636,9839638		
Total Dissolved Solids	N.D.	20.0	60.0

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1995508
Reported: 10/19/2018 16:11

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 182840571302	Sample number(s): 9839632-9839638								
Mercury	0.00100	0.000801			80		80-120		
Batch number: 182841404402	Sample number(s): 9839632-9839638								
Barium	2.00	1.94			97		80-120		
Boron	2.00	1.88			94		80-120		
Calcium	4.00	4.03			101		80-120		
Chromium	0.200	0.193			96		80-120		
Cobalt	0.500	0.509			102		80-120		
Lithium	1.00	1.01			101		80-120		
Selenium	0.150	0.146			97		80-120		
Thallium	0.150	0.154			103		80-120		
Batch number: 182841404702A	Sample number(s): 9839632-9839638								
Antimony	0.00600	0.00658			110		80-120		
Arsenic	0.0100	0.00993			99		80-120		
Beryllium	0.00400	0.00398			100		80-120		
Cadmium	0.00500	0.00430			86		80-120		
Lead	0.0150	0.0156			104		80-120		
Batch number: 182841404702C	Sample number(s): 9839632-9839638								
Molybdenum	0.0500	0.0501			100		80-120		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18288520109A	Sample number(s): 9839633-9839638								
Chloride	3.00	2.73			91		90-110		
Fluoride	0.750	0.810			108		90-110		
Sulfate	7.50	7.34			98		90-110		
Batch number: 18288520115B	Sample number(s): 9839632								
Chloride	3.00	2.85			95		90-110		
Fluoride	0.750	0.745			99		90-110		
Sulfate	7.50	7.00			93		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18283921201A	Sample number(s): 9839633-9839635,9839637								
Total Dissolved Solids	200	192			96		62-127		
Batch number: 18283921203A	Sample number(s): 9839632,9839636,9839638								
Total Dissolved Solids	200	194			97		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 18281003203A	Sample number(s): 9839632-9839638								
pH	7.00	7.01			100		95-105		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1995508
Reported: 10/19/2018 16:11

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 182840571302	Sample number(s): 9839632-9839638 UNSPK: 9839637									
Mercury	N.D.	0.00100	0.000787	0.00100	0.000790	79	79	75-125	0	20
Batch number: 182841404402	Sample number(s): 9839632-9839638 UNSPK: 9839633									
Barium	0.00899	2.00	2.03	2.00	1.99	101	99	75-125	2	20
Boron	0.0336	2.00	1.99	2.00	1.93	98	95	75-125	3	20
Calcium	2.92	4.00	6.99	4.00	6.91	102	100	75-125	1	20
Chromium	N.D.	0.200	0.201	0.200	0.195	101	98	75-125	3	20
Cobalt	N.D.	0.500	0.512	0.500	0.503	102	101	75-125	2	20
Lithium	N.D.	1.00	1.01	1.00	1.01	101	101	75-125	0	20
Selenium	N.D.	0.150	0.143	0.150	0.149	95	100	75-125	4	20
Thallium	N.D.	0.150	0.154	0.150	0.155	103	103	75-125	0	20
Batch number: 182841404702A	Sample number(s): 9839632-9839638 UNSPK: 9839633									
Antimony	N.D.	0.00600	0.00681	0.00600	0.00658	114	110	75-125	3	20
Arsenic	N.D.	0.0100	0.0105	0.0100	0.0111	105	111	75-125	6	20
Beryllium	N.D.	0.00400	0.00406	0.00400	0.00416	102	104	75-125	2	20
Cadmium	N.D.	0.00500	0.00545	0.00500	0.00446	109	89	75-125	20	20
Lead	N.D.	0.0150	0.0150	0.0150	0.0159	100	106	75-125	5	20
Batch number: 182841404702C	Sample number(s): 9839632-9839638 UNSPK: 9839633									
Molybdenum	0.00166	0.0500	0.0507	0.0500	0.0515	98	100	75-125	1	20
	mg/l	**mg/l**	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18288520109A	Sample number(s): 9839633-9839638 UNSPK: 9839633									
Chloride	1.10	10	10.13			90		90-110		
Fluoride	N.D.	2.50	2.82			113*		90-110		
Sulfate	N.D.	25	26.75			107		90-110		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc mg/l	DUP Conc mg/l	DUP RPD	DUP RPD Max
Batch number: 182840571302	Sample number(s): 9839632-9839638 BKG: 9839637			
Mercury	N.D.	N.D.	0 (1)	20
Batch number: 182841404402	Sample number(s): 9839632-9839638 BKG: 9839633			
Barium	0.00899	0.00868	4 (1)	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 1995508
Reported: 10/19/2018 16:11

Laboratory Duplicate (continued)

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Boron	0.0336	0.0304	10 (1)	20
Calcium	2.92	2.94	1	20
Chromium	N.D.	N.D.	0 (1)	20
Cobalt	N.D.	N.D.	0 (1)	20
Lithium	N.D.	N.D.	0 (1)	20
Selenium	N.D.	N.D.	0 (1)	20
Thallium	N.D.	N.D.	0 (1)	20
Batch number: 182841404702A	Sample number(s): 9839632-9839638 BKG: 9839633			
Antimony	N.D.	N.D.	0 (1)	20
Arsenic	N.D.	N.D.	0 (1)	20
Beryllium	N.D.	N.D.	0 (1)	20
Cadmium	N.D.	N.D.	0 (1)	20
Lead	N.D.	N.D.	0 (1)	20
Batch number: 182841404702C	Sample number(s): 9839632-9839638 BKG: 9839633			
Molybdenum	0.00166	0.00142	16 (1)	20
	mg/l	mg/l		
Batch number: 18288520109A	Sample number(s): 9839633-9839638 BKG: 9839633			
Chloride	1.10	1.01	8 (1)	15
Fluoride	N.D.	N.D.	0 (1)	15
Sulfate	N.D.	N.D.	0 (1)	15

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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For Eurofins Lancaster Laboratories Environmental use only

Acct. # 7701 Group # 1995508 Sample # 9839632-38

COC # 566948

Client Information

Client: GEI Consultants, Inc.	Acct. #:
Project Name/#: 1504710 / DSEG Mercer	PWSID #:
Project Manager: Jason Kohl	P.O. #:
Sampler: Anthony J. Shields	Quote #:
State where samples were collected: NJ	For Compliance: Yes ☑ No ☐

Matrix: Soil ☐ Sediment ☐ Tissue ☐ | Water: Potable ☐ Ground ☑ NPDES ☐ Surface ☐ | Other: ____

Analysis Requested — Preservation and Filtration Codes

For Lab Use Only

FSC: 232050

SCR#:

Preservation Codes

H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 P=H_3PO_4
F=Field Filtered O=Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Site List of Metals	Mercury	Chloride	Fluoride	Sulfate	NH	TDS	Ra 226 + 228	Metals QC
FB-20181004	10.4.18	1200	✓		3	✓	✓	✓	✓	✓	✓	✓	✓	
MW-4	10.4.18	1020	✓		8	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW-6	10.4.18	1020	✓		3	✓	✓	✓	✓	✓	✓	✓	✓	
MW-5	10.4.18	1240	✓		7	✓	✓	✓	✓	✓	✓	✓	✓	
MW-2	10.4.18	1145	✓		7	✓	✓	✓	✓	✓	✓	✓	✓	
MW-3	10.4.18	1340	✓		7	✓	✓	✓	—	—	—	✓	✓	
MW-1	10.4.18	1425	✓		3	✓	✓	✓	—	—	—	✓	✓	

Turnaround Time (TAT) Requested (please circle)

Standard Rush

(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days: ____

E-mail address: ~~Jason Kohl~~ JKohl@GEIConsultants.com

Data Package Options (circle if required)

Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only)

Type III (Reduced non-CLP) NJ DKQP TX TRRP-13

NYSDEC Category A or B MA MCP CT RCP

Relinquished by	Date	Time	Received by	Date	Time
Bottlestorage				10/3/18	0900
	10/5/18	1215		10/5/18	1215
	10/5/18	1645			
				10-5-18	1645

EDD Required? Yes No

If yes, format: ____

Site-Specific QC (MS/MSD/Dup)? Yes No

(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier: UPS ____ FedEx ____ Other ____

Temperature upon receipt 1.4 - 1.6 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 229254

Group Number(s): 1995508

Client: GEI Consultings, Inc

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	10/05/2018 16:45
Number of Packages:	2	Number of Projects:	1
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	No	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	No	Sample Date/Times match COC:	Yes
Samples Chilled:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	0
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Cory Jeremiah (10469) at 19:10 on 10/05/2018

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-03	1.4	DT	Wet	Y	Bagged	N
2	DT42-03	1.6	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17601-2425
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Metals in Liquid Data

Case Narrative/Conformance Summary

Metals in Liquid

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

ICP Metals

Fraction: Metals in Liquid

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9839632	FB-20181004	X		1	Field Blank
9839633	MW-4	X		1	
9839634	MW-6	X		1	
9839635	MW-5	X		1	
9839636	MW-2	X		1	
9839637	MW-3	X		1	
9839638	MW-1	X		1	

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

Method Blank

For noncompliant preparation/method blanks, corrective action is not required if the sample is ND or > 10 times the blank concentration, unless otherwise specified in the method or by the client.

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

ICP Metals

Fraction: Metals in Liquid

SAMPLE ANALYSIS:

The instrument detection limits (IDLs) are used for determining the U flags on the initial and continuing calibration blanks. The highest IDL is selected when multiple instruments are used for an analysis. The method detection limits (MDLs) are used for determining all other U flags.

(Sample number(s): 9839632-9839638: Analysis: 07036)
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium.

(Sample number(s): 9839632-9839638: Analysis: 01750)
The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

No other problems were encountered with the analysis of the samples.

Abbreviation Key

BKG – Background	AF - Cold Vapor Atomic Fluorescence
DUP – Duplicate	U - Below MDL
MS - Matrix Spike	B - Below LOQ
MSD - Matrix Spike Dup	N - Matrix Spike out of specifications
B – Blank	* - Duplicate out of specifications
Q - Laboratory Control Sample	E - Matrix Effects exist as proven by Serial Dilution or Spiked Dilution
Y - Laboratory Control Sample Duplicate	A - Post Digestion Spike
P - ICP Atomic Emission Spectrometer	L - Serial Dilution
MS - ICP Mass Spectrometry	R - Internal Standard Relative Intensity OOS
CV - Cold Vapor	NR - Not Required

Sample Data

Metals in Liquid

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9839632 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/05/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	12.0	U		P
7440-43-9	Cadmium	0.15	U		MS
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	0.31	U		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9839633, 9839633BKG % Solids: 0.0
Concentration Units: UG/L Date Received: 10/05/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	9.0			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	33.6	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	2920			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	1.7	B		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9839634 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/05/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	166			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	224			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	34300			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	3.5			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9839635 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/05/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	212			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	427			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	101000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	21.1			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9839636 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/05/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.75	B		MS
7440-38-2	Arsenic	3.8			MS
7440-39-3	Barium	36.8			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	63.9			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	38300			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	3.3			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9839637, 9839637BKG % Solids: 0.0
Concentration Units: UG/L Date Received: 10/05/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	1.4	B		MS
7440-39-3	Barium	186			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	276			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	47400			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	23.1	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	9.8			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9839638 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/05/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	180			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	1100			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	208000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	3.6			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
_____
_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

Quality Control and Calibration Summary Forms

Metals in Liquid

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ56
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Barium	182841404402	9839632
Boron		9839633BKG
Calcium		9839633MS
Chromium		9839633MSD
Cobalt		9839633DUP
Lithium		9839634
Selenium		9839635
Thallium		9839636
		9839637
		9839638
		P28404BB
		P28404BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ56
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Antimony	182841404702	9839632
Arsenic		9839633BKG
Beryllium		9839633MS
Cadmium		9839633MSD
Lead		9839633DUP
Molybdenum		9839634
		9839635
		9839636
		9839637
		9839638
		P28404BB
		P28404BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ56
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Mercury	182840571302	9839632
		9839633
		9839634
		9839635
		9839636
		9839637BKG
		9839637MS
		9839637MSD
		9839637DUP
		9839638
		P28471BB
		P28471BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ56

Method: P
Run Name: 1828901T73
Calibration Date(s): 10/16/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Barium		600.0	593.43	98.9	500.0	489.27	97.9	500.0	490.79	98.2
Boron		600.0	622.14	103.7	500.0	510.76	102.2	500.0	514.99	103.0
Calcium		30000.0	29702.18	99.0	25000.0	24533.23	98.1	25000.0	24739.85	99.0
Chromium		600.0	571.49	95.2	500.0	470.47	94.1	500.0	474.53	94.9
Cobalt		600.0	576.65	96.1	500.0	482.85	96.6	500.0	485.35	97.1
Lithium		600.0	605.18	100.9	500.0	501.36	100.3	500.0	505.66	101.1
Selenium		600.0	576.13	96.0	500.0	497.84	99.6	500.0	492.53	98.5
Thallium		600.0	585.05	97.5	500.0	487.29	97.5	500.0	496.89	99.4

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1828901T73
Calibration Date(s): 10/16/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	483.86	96.8	500.0	484.12	96.8
Boron					500.0	507.11	101.4	500.0	506.99	101.4
Calcium					25000.0	24588.75	98.4	25000.0	24770.97	99.1
Chromium					500.0	469.01	93.8	500.0	472.23	94.4
Cobalt					500.0	476.20	95.2	500.0	480.41	96.1
Lithium					500.0	494.07	98.8	500.0	495.71	99.1
Selenium					500.0	479.40	95.9	500.0	475.57	95.1
Thallium					500.0	487.42	97.5	500.0	490.86	98.2

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1828806E05
Calibration Date(s): 10/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic	75	500.0	492.13	98.4	250.0	260.83	104.3	250.0	265.95	106.4
Beryllium	9	50.0	49.81	99.6	25.0	25.74	103.0	25.0	26.28	105.1
Cadmium	111	50.0	46.20	92.4	25.0	24.88	99.5	25.0	24.09	96.4
Lead	208	50.0	51.56	103.1	25.0	26.80	107.2	25.0	25.52	102.1
Molybdenum	98	50.0	48.50	97.0	25.0	25.61	102.4	25.0	24.47	97.9

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ56

Method: MS
Run Name: 1828806E05
Calibration Date(s): 10/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic	75				250.0	257.95	103.2			
Beryllium	9				25.0	26.90	107.6			
Cadmium	111				25.0	23.39	93.6			
Lead	208				25.0	27.07	108.3			
Molybdenum	98				25.0	24.62	98.5			

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ56

Method: MS
Run Name: 1829104E07
Calibration Date(s): 10/18/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Antimony	121	50.0	53.19	106.4	25.0	26.56	106.2	25.0	25.17	100.7
Arsenic										
Beryllium										
Cadmium	111	50.0	51.73	103.5	25.0	25.57	102.3	25.0	26.34	105.4
Lead										
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ56

Method: MS
Run Name: 1829104E07
Calibration Date(s): 10/18/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121				25.0	25.19	100.8			
Arsenic										
Beryllium										
Cadmium										
Lead										
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ56

Method: CV
Run Name: 1828501M09
Calibration Date(s): 10/12/2018
Concentration Units: UG/L

		Initial Calibration			Continuing Calibration					
Analyte	Mass	True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Mercury		2.5	2.43	97.2	1.0	0.98	98.0	1.0	0.96	96.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ56

Method: CV
Run Name: 1828501M09
Calibration Date(s): 10/12/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.97	97.0	1.0	0.96	96.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Run Name: 1828501M09
Calibration Date(s): 10/12/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.95	95.0	1.0	0.96	96.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1828901T73
Calibration Date(s): 10/16/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium		5.0	5.05	101.0		
Boron		50.0	49.76	99.5		
Calcium		500.0	502.34	100.5		
Chromium		15.0	14.82	98.8		
Cobalt		5.0	5.38	107.6		
Lithium		50.0	58.13	116.3		
Selenium		50.0	55.28	110.6		
Thallium		30.0	33.35	111.2		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1828806E05
Calibration Date(s): 10/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony						
Arsenic	75	2.0	2.26	113.0		
Beryllium	9	0.5	0.48	96.0		
Cadmium	111	1.0	0.84	84.0		
Lead	208	3.0	3.31	110.3		
Molybdenum	98	2.0	2.24	112.0		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1829104E07
Calibration Date(s): 10/18/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony	121	2.0	2.01	100.5		
Arsenic						
Beryllium						
Cadmium	111	1.0	1.01	101.0		
Lead						
Molybdenum						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2B
LOW LEVEL CHECK STANDARD
SDG No.: GEJ56

Method: CV
Run Name: 1828501M09
Calibration Date(s): 10/12/2018
Concentration Units: UG/L

		Initial			Final	
Analyte	Mass	True	Found	%R	Found	%R
Mercury		0.2	0.19	95.0		

Control limits: 50% - 150%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1828901T73
Calibration Date(s): 10/16/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium		0.33	U	0.33	U	0.33	U	0.33	U		1.000	U	182841404402
Boron		8.4	U	8.4	U	8.4	U	8.4	U		12.000	U	182841404402
Calcium		33.4	U	33.4	U	33.4	U	33.4	U		88.640	B	182841404402
Chromium		0.55	U	0.55	U	0.55	U	0.55	U		5.300	U	182841404402
Cobalt		0.40	U	0.43	B	0.40	U	0.40	U		1.500	U	182841404402
Lithium		5.3	U	5.3	U	5.3	U	5.3	U		11.000	U	182841404402
Selenium		9.2	U	9.2	U	9.2	U	9.2	U		21.000	U	182841404402
Thallium		3.1	U	3.1	U	3.1	U	3.1	U		14.000	U	182841404402

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ56

Method: P
Run Name: 1828901T73
Calibration Date(s): 10/16/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium				0.33	U								
Boron				8.4	U								
Calcium				33.4	U								
Chromium				0.55	U								
Cobalt				0.40	U								
Lithium				5.3	U								
Selenium				9.8	B								
Thallium				-5.4	B								

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ56

Method: MS
Run Name: 1828806E05
Calibration Date(s): 10/15/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony													
Arsenic	75	0.40	U	0.40	U	0.40	U	0.40	U	75	0.680	U	182841404702A
Beryllium	9	0.067	U	0.099	B	0.067	U	0.067	U	9	0.091	U	182841404702A
Cadmium	111	0.18	U	0.18	U	0.18	U	0.18	U	111	0.150	U	182841404702A
Lead	208	0.21	U	0.21	U	0.21	U	0.21	U	208	1.100	U	182841404702A
Molybdenum	98	0.36	U	0.36	U	0.36	U	0.36	U	98	0.310	U	182841404702A

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ56

Method: MS
Run Name: 1829104E07
Calibration Date(s): 10/18/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121	0.29	U	0.72	B	0.32	B	0.29	U	121	0.410	U	182841404702A
Arsenic													
Beryllium													
Cadmium	111	0.18	U	0.18	U	0.18	U						
Lead													
Molybdenum													

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ56

Method: CV
Run Name: 1828501M09
Calibration Date(s): 10/12/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury		0.050	U	0.050	U	0.050	U	0.050	U		0.050	U	182840571302

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ56

Method: CV
Run Name: 1828501M09
Calibration Date(s): 10/12/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U	0.050	U				

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ56

Instrument ID: 18255
Run Name: 1828901T73
Concentration Units: ug/L

Analyte	True		Initial Found				Final Found			
	Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R	Sol. A	%R	Sol. AB	%R
Aluminum	500000		484075	96.8						
Barium	0		0							
Boron	0		4							
Calcium	500000		491973	98.4						
Chromium	0		0							
Cobalt	0		0							
Iron	200000		197191	98.6						
Lithium	0		-10							
Magnesium	500000		511954	102.4						
Selenium	0		1							
Thallium	0		6							

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ56

Instrument ID: 19204
Run Name: 1828806E05
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		87064	87.1		
Antimony							
Arsenic	75	0		1			
Beryllium	9	0		0			
Cadmium	111	0		0			
Calcium	44	300000		254856	85.0		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		218946	87.6		
Lead	208	0		1			
Magnesium	24	100000		91526	91.5		
Molybdenum	98	2000		1919	96.0		
Phosphorus	31	10000		NA			
Potassium	39	100000		87657	87.7		
Sodium	23	250000		219677	87.9		
Sulfur	34	10000		NA			
Titanium	47	2000		1830	91.5		

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ56

Instrument ID: 27813
Run Name: 1829104E07
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		106904	106.9		
Antimony	121	0		1			
Arsenic							
Beryllium							
Cadmium	111	0		0			
Calcium	44	300000		312916	104.3		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		248028	99.2		
Lead							
Magnesium	24	100000		100721	100.7		
Molybdenum	98	2000		2203	110.2		
Phosphorus	31	10000		NA			
Potassium	39	100000		107144	107.1		
Sodium	23	250000		253448	101.4		
Sulfur	34	10000		NA			
Titanium	47	2000		2127	106.4		

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 5A(MS/MSD)
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9839633BKG Matrix Spike Lab Sample ID: 9839633MS Matrix Spike Duplicate Lab Sample ID: 9839633MSD
Batch Number(s): 182841404702, 182841404402

		BKG Sample		MS Sample		MSD Sample		MS Spike	MSD Spike		MS		MSD				Control Limit		
Analyte	Mass	Result	C	Result	C	Result	C	Added	Added	Units	%R	Q	%R	Q	RPD	Q	%R	RPD	M
Antimony	121	0.4060	U	6.8141		6.5829		6.0000	6.0000	UG/L	114		110		3		75 - 125	20	MS
Arsenic	75	0.6800	U	10.5400		11.1450		10.0000	10.0000	UG/L	105		111		6		75 - 125	20	MS
Barium		8.9900		2026.2200		1987.5100		2000.0000	2000.0000	UG/L	101		99		2		75 - 125	20	P
Beryllium	9	0.0910	U	4.0630		4.1560		4.0000	4.0000	UG/L	102		104		2		75 - 125	20	MS
Boron		33.5500	B	1986.7300		1930.2400		2000.0000	2000.0000	UG/L	98		95		3		75 - 125	20	P
Cadmium	111	0.1510	U	5.4463		4.4590		5.0000	5.0000	UG/L	109		89		20		75 - 125	20	MS
Calcium		2915.1800		6990.9800		6908.2000		4000.0000	4000.0000	UG/L	102		100		1		75 - 125	20	P
Chromium		5.3000	U	201.1800		195.0800		200.0000	200.0000	UG/L	101		98		3		75 - 125	20	P
Cobalt		1.5000	U	512.0100		502.5600		500.0000	500.0000	UG/L	102		101		2		75 - 125	20	P
Lead	208	1.0700	U	15.0400		15.8520		15.0000	15.0000	UG/L	100		106		5		75 - 125	20	MS
Lithium		11.0000	U	1011.1700		1010.3900		1000.0000	1000.0000	UG/L	101		101		0		75 - 125	20	P
Molybdenum	98	1.6640	B	50.7160		51.4800		50.0000	50.0000	UG/L	98		100		1		75 - 125	20	MS
Selenium		21.0000	U	142.7300		149.2900		150.0000	150.0000	UG/L	95		100		4		75 - 125	20	P
Thallium		14.0000	U	154.0400		154.7800		150.0000	150.0000	UG/L	103		103		0		75 - 125	20	P

Note: Results shown are reported on an as-received basis.
If Matrix Spike/ Matrix Spike Duplicate were out of specification, see Post Digestion Spike form.

METHODS:
P = ICP Atomic Emission Spectrometer CV = Cold Vapor
MS = ICP Mass Spectrometry AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL, B= Below LOQ
FLAGS:
N = Matrix Spike OOS, * = Duplicate OOS

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QUALITY ASSURANCE SUMMARY
FORM 5A(MS/MSD)
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9839637BKG Matrix Spike Lab Sample ID: 9839637MS Matrix Spike Duplicate Lab Sample ID: 9839637MSD
Batch Number(s): 182840571302

		BKG Sample		MS Sample		MSD Sample		MS Spike	MSD Spike		MS		MSD				Control Limit		
Analyte	Mass	Result	C	Result	C	Result	C	Added	Added	Units	%R	Q	%R	Q	RPD	Q	%R	RPD	M
Mercury		0.0500	U	0.7872		0.7898		1.0000	1.0000	UG/L	79		79		0		75 - 125	20	CV

Note: Results shown are reported on an as-received basis.
If Matrix Spike/ Matrix Spike Duplicate were out of specification, see Post Digestion Spike form.

METHODS:
P = ICP Atomic Emission Spectrometer CV = Cold Vapor
MS = ICP Mass Spectrometry AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL, B= Below LOQ
FLAGS:
N = Matrix Spike OOS, * = Duplicate OOS

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QUALITY ASSURANCE SUMMARY
FORM 6
DUPLICATES
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9839633BKG Duplicate Lab Sample ID: 9839633DUP
Batch Number(s): 182841404702, 182841404402
Concentration Units: UG/L

Analyte	Mass	Control Limit	Samples (S)	C	Duplicate (D)	C	RPD	Q	M
Antimony	121		0.4060	U	0.4060	U			MS
Arsenic	75		0.6800	U	0.6800	U			MS
Barium		5.0	8.9900		8.6800		4		P
Beryllium	9		0.0910	U	0.0910	U			MS
Boron			33.5500	B	30.3900	B	10		P
Cadmium	111		0.1510	U	0.1510	U			MS
Calcium			2915.1800		2937.8600		1		P
Chromium			5.3000	U	5.3000	U			P
Cobalt			1.5000	U	1.5000	U			P
Lead	208		1.0700	U	1.0700	U			MS
Lithium			11.0000	U	11.0000	U			P
Molybdenum	98		1.6640	B	1.4170	B	16		MS
Selenium			21.0000	U	21.0000	U			P
Thallium			14.0000	U	14.0000	U			P

NOTE: An asterisk (*) in column "Q" indicates poor duplicate precision (RPD > 20% OR |(S) - (D)| > LOQ for values < 5x LOQ).
The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample.

Note: Results shown are reported on an as-received basis.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
* = Duplicate Out of Spec

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QUALITY ASSURANCE SUMMARY
FORM 6
DUPLICATES
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9839637BKG Duplicate Lab Sample ID: 9839637DUP
Batch Number(s): 182840571302
Concentration Units: UG/L

Analyte	Mass	Control Limit	Samples (S)	C	Duplicate (D)	C	RPD	Q	M
Mercury			0.0500	U	0.0500	U			CV

NOTE: An asterisk (*) in column "Q" indicates poor duplicate precision (RPD > 20% OR |(S) - (D)| > LOQ for values < 5x LOQ).
The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample.

Note: Results shown are reported on an as-received basis.

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	FLAGS:
AF = Cold Vapor Atomic Fluorescence	* = Duplicate Out of Spec

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QUALITY ASSURANCE SUMMARY
FORM 7
LABORATORY CONTROL SAMPLE
SDG No.: GEJ56
Matrix: WATER

Analyte	Mass	Batch Number	Units	True	Found	C	Control Limits (%)	%R	M	In Spec
Antimony	121	182841404702	UG/L	6.000	6.583		80 - 120	110	MS	Yes
Arsenic	75	182841404702	UG/L	10.000	9.928		80 - 120	99	MS	Yes
Barium		182841404402	UG/L	2000.000	1944.780		80 - 120	97	P	Yes
Beryllium	9	182841404702	UG/L	4.000	3.982		80 - 120	100	MS	Yes
Boron		182841404402	UG/L	2000.000	1882.640		80 - 120	94	P	Yes
Cadmium	111	182841404702	UG/L	5.000	4.298		80 - 120	86	MS	Yes
Calcium		182841404402	UG/L	4000.000	4028.080		80 - 120	101	P	Yes
Chromium		182841404402	UG/L	200.000	192.950		80 - 120	96	P	Yes
Cobalt		182841404402	UG/L	500.000	509.300		80 - 120	102	P	Yes
Lead	208	182841404702	UG/L	15.000	15.637		80 - 120	104	MS	Yes
Lithium		182841404402	UG/L	1000.000	1007.470		80 - 120	101	P	Yes
Mercury		182840571302	UG/L	1.000	0.801		80 - 120	80	CV	Yes
Molybdenum	98	182841404702	UG/L	50.000	50.117		80 - 120	100	MS	Yes
Selenium		182841404402	UG/L	150.000	146.020		80 - 120	97	P	Yes
Thallium		182841404402	UG/L	150.000	154.240		80 - 120	103	P	Yes

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ56
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9839633BKG Serial Dilution Lab Sample ID: 9839633L
Batch Number(s): 182841404702, 182841404402
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Antimony	121	0.4060	U	2.0300	U			MS
Arsenic	75	0.6800	U	3.4000	U			MS
Barium		8.9900		9.2500	B	3		P
Beryllium	9	0.0910	U	0.4550	U			MS
Boron		33.5500	B	63.0000	B	88		P
Cadmium	111	0.1510	U	0.7550	U			MS
Calcium		2915.1800		2887.2500		1		P
Chromium		5.3000	U	26.5000	U			P
Cobalt		1.5000	U	7.5000	U			P
Lead	208	1.0700	U	5.3500	U			MS
Lithium		11.0000	U	55.0000	U			P
Molybdenum	98	1.6640	B	2.5600	B	54		MS
Selenium		21.0000	U	105.0000	U			P
Thallium		14.0000	U	70.0000	U			P

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

Method: P
Instrument ID: 18255
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium	455.40		0.33
Boron	249.67		8.4
Calcium	317.93		33.4
Chromium	267.72		0.55
Cobalt	228.62		0.40
Lithium	670.78		5.3
Selenium	196.09		9.2
Thallium	190.86		3.1

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Instrument ID: 19204
Date: 07/2018

Analyte	MASS (amu)	Background	IDL (UG/L)
Antimony			
Arsenic	75		0.40
Beryllium	9		0.067
Cadmium	111		0.17
Lead	208		0.21
Molybdenum	98		0.36

Comments:

_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Instrument ID: 27813
Date: 09/2018

Analyte	MASS (amu)	Background	IDL (UG/L)
Antimony	121		0.29
Arsenic			
Beryllium			
Cadmium	111		0.18
Lead			
Molybdenum			

Comments:

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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Instrument ID: 23283
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Mercury			0.050

Comments:

_____
_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ56
Matrix: WATER

Method: P
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium	455.40		5.0	1.0
Boron	249.67		50.0	12.0
Calcium	317.93		500	33.0
Chromium				
Cobalt	228.62		5.0	1.5
Lithium	670.78		50.0	11.0
Selenium				
Thallium				

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ56
Matrix: WATER

Method: P
Date: 09/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium				
Boron				
Calcium				
Chromium	267.72		15.0	5.3
Cobalt				
Lithium				
Selenium	196.09		50.0	21.0
Thallium	190.86		30.0	14.0

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
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_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ56
Matrix: WATER

Method: MS
Date: 07/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony				
Arsenic				
Beryllium	9		0.50	0.091
Cadmium	111		1.0	0.15
Lead				
Molybdenum	98		2.0	0.31

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ56
Matrix: WATER

Method: MS
Date: 09/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony	121		2.0	0.41
Arsenic	75		2.0	0.68
Beryllium				
Cadmium	111		1.0	0.15
Lead	208		3.0	1.1
Molybdenum				

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ56
Matrix: WATER

Method: CV
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Mercury			0.20	0.050

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Tune Report

Batch Folder D:\Agilent\ICPMH\1\DATA\~EPATUNEaa.b
Report Comment ICP-MS #19204 (E05) Daily Tune Check
Instrument Name G3281A JP12071581

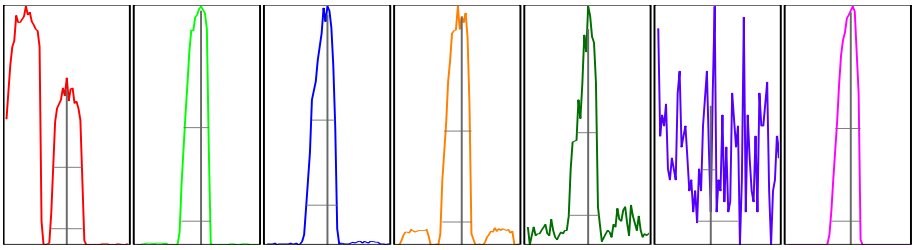
[No Gas]

Mass	Range	Count (Actual)	Response (Actual) [cps/ug/l]	Response (Required) [cps/ug/l]	Response (Flag)	Resp Ratio (Actual)	Resp Ratio (Required)	Resp Ratio (Flag)
7		1771	17708.56	2000.00		0.04	-	
89		5830	58301.73	6000.00		0.13	-	
205		2244	22436.34	3000.00		0.05	-	
70		2370	23697.49	0.00		0.05	0 - 0.015	[F]
156		127	1266.09	0.00		0.00	0 - 0.03	
220		21	207.01	0.00		0.00	-	
140		43665	436653.72	0.00		1.00	1 - 1	

Mass	RSD% (Actual)	RSD% (Required)	RSD% (Flag)	Background (Actual)	Background (Required)	Background (Flag)
7	3.18	5.00				
89	1.99	5.00				
205	2.62	5.00				
70	11.18					
156	10.15					
220	19.37					
140	1.83					

Mass	Replicate 1 Count	Replicate 2 Count	Replicate 3 Count	Replicate 4 Count	Replicate 5 Count
7	1856	1791	1749	1707	1751
89	5815	5941	5907	5846	5642
205	2245	2277	2295	2256	2144
70	2745	2511	2333	2173	2086
156	137	111	130	140	116
220	20	16	26	19	24
140	44100	43404	44366	44075	42381

Integration Time [sec] 0.1



Mass	Peak Height	Axis (Actual)	Axis (Required)	Axis (Flag)	W-50%	W-X% (Actual)	W-X% (Required)	W-X% (Flag)
7	265.96	7.00	6.9 - 7.1		0.69	0.772	0.800	
89	1012.68	89.10	88.9 - 89.1		0.60	0.726	0.800	
205	407.65	205.00	204.9 - 205.1		0.56	0.733	0.800	
70	402.00	70.10	-		0.62	0.734		
156	23.88	156.00	-		0.51	0.722		
220	2.96	219.80	-		0.32	0.988		
140	8080.87	140.05	-		0.57	0.715		

X = 10 **Integration Time [sec]** 0.1 **Acquisition Time [sec]** 260.3 **Y Axis** Linear

Tune Parameters
Plasma Paramters

RF Power	1600 W	Carrier Gas	0.25 L/min	S/C Temp	20 ℃
RF Matching	1.60 V	Option Gas	0.0 %	Makeup/Dilution Gas	0.70 L/min
Smpl Depth	10.0 mm	Nebulizer Pump	0.10 rps	Gas Switch	Dilution Gas

Lenses Parameters

Tune Report

Extract 1	0.0 V	Omega Lens	8.1 V	Deflect	16.4 V				
Extract 2	-190.0 V	Cell Entrance	-32 V	Plate Bias	-40 V				
Mass	**Peak Height**	**Axis (Actual)**	**Axis (Required)**	**Axis (Flag)**	**W-50%**	**W-X% (Actual)**	**W-X% (Required)**	**W-X% (Flag)**	
Omega Bias	-90 V	Cell Exit	-58 V						

Cell Parameters

OctP Bias	-8.0 V	He Flow	0.0 mL/min	Energy Discrimination	5.0 V
OctP RF	200 V	H2 Flow	0.0 mL/min		
Use Gas	false	3rd Gas Flow	0 %		

US EPA Tune Check Report

Operator Name	US19_USR_INS27814
Acq/Data Batch	D:\Agilent\ICPMH\1\DATA\EPA_Tune.b
Acq. Date-Time	2018-10-18 05:21:17
Report Comment	---
Instrument Name	G8403A SG18254097

[No Gas]

Sensitivity

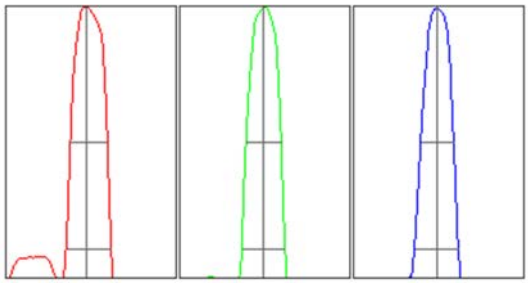
Mass	Conc. [ug/l]	Count	CPS	Resp (Required) [cps/ug/l]	Resp (Flag)	RSD%	RSD% (Required)
7	10.00	932	9318.16			0.504	5.000
89	10.00	5983	59827.49			0.410	5.000
205	10.00	2866	28661.41			0.667	5.000

Mass	RSD% (Flag)
7	
89	
205	

Mass	Rep#1 Count	Rep#2 Count	Rep#3 Count	Rep#4 Count	Rep#5 Count
7	931	938	930	933	925
89	5987	5964	5952	6001	6009
205	2889	2880	2861	2860	2840

Integration Time [sec] 0.1

Resolution/Axis



Mass	Peak Height	Axis	Axis (Required)	Axis (Flag)
7	1476.17	6.95	6.90 - 7.10	
89	9978.90	89.00	88.90 - 89.10	
205	5039.43	205.00	204.90 - 205.10	

Mass	W-50%	W-10%	W-10% (Required)	W-10% (Flag)
7	0.66	0.797	0.800	
89	0.63	0.765	0.800	
205	0.59	0.780	0.800	

Integration Time [sec] 0.1

Acquisition Time [sec] 113.7

Y Axis Linear

US EPA Tune Check Report

Tune Parameters

Plasma Parameters

Plasma Mode	---	Nebulizer Gas	0.65 L/min	Dilution Gas	0.45 L/min
RF Power	1550 W	Option Gas	---	Auxiliary Gas	0.90 L/min
RF Matching	1.10 V	Nebulizer Pump	0.10 rps	Plasma Gas	15.0 L/min
Sample Depth	10.0 mm	S/C Temp	2 °C		

Lens Parameters

Extract 1	0.0 V	Omega Lens	11.4 V	Deflect	15.6 V
Extract 2	-240.0 V	Cell Entrance	-40 V	Plate Bias	-50 V
Omega Bias	-85 V	Cell Exit	-60 V		

Cell Parameters

Use Gas	No	3rd Gas Flow	---	Energy Discrimination	5.0 V
He Flow	0.0 mL/min	OctP Bias	-8.0 V		
H2 Flow	0.0 mL/min	OctP RF	200 V		

QP Parameters

Mass Gain	124	Axis Gain	0.9993	QP Bias	-3.0 V
Mass Offset	124	Axis Offset	0.06		

Hardware Settings

Torch

Torch H	0.2 mm	Torch V	-0.2 mm		

EM

Discriminator	4.0 mV	Analog HV	2139 V	Pulse HV	1393 V

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ56

Instrument ID: 19204
Run Name: 1828806E05

Start Date: 10/15/2018
End Date: 10/15/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-1-209	PB	GE-1-72	AS,MO
IN-1-115	CD	SC-2-45	BE

Lab Sample ID	Time	Internal Standards %RI For: Element SC-2-45	Q	Element GE-1-72	Q	Element IN-1-115	Q	Element BI-1-209	Q	Element	Q	Element	Q	Element	Q
S0	19:05	100		100		100		100							
S	19:07	100		102		88		102							
ICV	19:10	101		105		97		99							
ICB	19:13	99		104		95		96							
LLC	19:16	101		103		94		98							
ICSA	19:19	94		95		87		92							
LRS2	19:22	98		96		90		91							
LRS3	19:24	101		102		94		95							
CCS	19:27	88		90		82		84							
CCS	19:30	98		99		94		95							
CCV	19:33	99		97		84		95							
CCB	19:36	96		97		87		92							
P28404BB	19:39	95		98		98		95							
P28404BQ	19:41	96		97		92		94							
9839633BKG	19:44	99		95		91		95							
9839633A	19:47	103		98		91		95							
9839633DUP	19:50	103		101		96		100							
9839633MS	19:53	101		101				100							
9839633MSD	19:55	101		101		95		98							
9839633L	19:58	101		101		101		97							
9839632	20:01	99		103		91		101							
CCV	20:04	100		101		97		99							
CCB	20:07	103		98		93		91							
9839634	20:10	102		101		93		99							
9839635	20:12	101		101		95		100							
9839636	20:15	102		103		93		96							
9839637	20:18	99		101		97		96							
9839638	20:21	101		100		91		96							
ZZZZZZ	20:24														
ZZZZZZ	20:27														
CCV	20:29	102		103		96		100							
CCB	20:32	102		103		99		99							

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ56

Instrument ID: 27813
Run Name: 1829104E07

Start Date: 10/18/2018
End Date: 10/18/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-3-115	CD,SB		

Lab Sample ID	Time	Internal Standards %RI For: Element IN-3-115	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	13:28	100													
S	13:30	100													
ICV	13:32	96													
ICB	13:35	96													
LLC	13:37	97													
ICSA	13:39	90													
LRS2	13:41	92													
LRS3	13:43	95													
CCS	13:45	96													
CCS	13:47	95													
CCV	13:50	98													
CCB	13:52	96													
P28404BB	13:54	98													
P28404BQ	13:56	97													
9839633BKG	13:58	98													
9839633A	14:00	91													
9839633DUP	14:03	98													
9839633MS	14:05	96													
9839633MSD	14:07	96													
9839633L	14:09	98													
9839632	14:11	97													
CCV	14:13	100													
CCB	14:15	97													
9839634	14:18	97													
9839635	14:20	88													
9839636	14:22	99													
9839637	14:24	97													
9839638	14:26	95													
CCV	14:28	100													
CCB	14:30	97													

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

Preparation and Run Logs

Metals in Liquid

Method: P
Batch Number: 182841404402

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9839632	10/12/2018	50.00	50
9839634	10/12/2018	50.00	50
9839635	10/12/2018	50.00	50
9839636	10/12/2018	50.00	50
9839637	10/12/2018	50.00	50
9839638	10/12/2018	50.00	50
9839633BKG	10/12/2018	50.00	50
9839633DUP	10/12/2018	50.00	50
9839633MSD	10/12/2018	50.00	50
9839633MS	10/12/2018	50.00	50
P28404BB	10/12/2018	50.00	50
P28404BQ	10/12/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: MS
Batch Number: 182841404702

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9839632	10/12/2018	50.00	50
9839634	10/12/2018	50.00	50
9839635	10/12/2018	50.00	50
9839636	10/12/2018	50.00	50
9839637	10/12/2018	50.00	50
9839638	10/12/2018	50.00	50
9839633BKG	10/12/2018	50.00	50
9839633DUP	10/12/2018	50.00	50
9839633MSD	10/12/2018	50.00	50
9839633MS	10/12/2018	50.00	50
P28404BB	10/12/2018	50.00	50
P28404BQ	10/12/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: CV
Batch Number: 182840571302

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9839632	10/11/2018	40.00	40
9839633	10/11/2018	40.00	40
9839634	10/11/2018	40.00	40
9839635	10/11/2018	40.00	40
9839636	10/11/2018	40.00	40
9839638	10/11/2018	40.00	40
9839637BKG	10/11/2018	40.00	40
9839637DUP	10/11/2018	40.00	40
9839637MSD	10/11/2018	40.00	40
9839637MS	10/11/2018	40.00	40
P28471BB	10/11/2018	40.00	40
P28471BQ	10/11/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ56

Method: P
Instrument ID: 18255
Run Name: 1828901T73

Run Start Date: 10/16/2018
Run End Date: 10/16/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ56

Method: MS
Instrument ID: 19204
Run Name: 1828806E05

Run Start Date: 10/15/2018
Run End Date: 10/15/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ56

Method: MS
Instrument ID: 27813
Run Name: 1829104E07

Run Start Date: 10/18/2018
Run End Date: 10/18/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
S0	1.00	13:28	X					X																																	
S	1.00	13:30	X					X																																	
ICV	1.00	13:32	X					X																																	
ICB	1.00	13:35	X					X																																	
LLC	1.00	13:37	X					X																																	
ICSA	1.00	13:39	X					X																																	
LRS2	1.00	13:41	X					X																																	
LRS3	1.00	13:43	X					X																																	
CCS	1.00	13:45	X					X																																	
CCS	1.00	13:47	X					X																																	
CCV	1.00	13:50	X					X																																	
CCB	1.00	13:52	X					X																																	
P28404BB	1.00	13:54	X																																						
P28404BQ	1.00	13:56	X																																						
9839633BKG	1.00	13:58	X																																						
9839633A	1.00	14:00																																							
9839633DUP	1.00	14:03	X																																						
9839633MS	1.00	14:05	X					X																																	
9839633MSD	1.00	14:07	X																																						
9839633L	5.00	14:09	X																																						
9839632	1.00	14:11	X																																						
CCV	1.00	14:13	X					X																																	
CCB	1.00	14:15	X					X																																	
9839634	1.00	14:18	X																																						
9839635	1.00	14:20	X																																						
9839636	1.00	14:22	X																																						
9839637	1.00	14:24	X																																						
9839638	1.00	14:26	X																																						
CCV	1.00	14:28	X																																						
CCB	1.00	14:30	X																																						

METHODS:	LEGEND:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	BKG = Background DUP = Duplicate MS = Matrix Spike MSD = Matrix Spike Duplicate A = Post Digest Spike L = Serial Dilution B = Blank Q = Laboratory Control Sample Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ56

Method: CV
Instrument ID: 23283
Run Name: 1828501M09

Run Start Date: 10/12/2018
Run End Date: 10/12/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ56

Method: CV
Instrument ID: 23283
Run Name: 1828501M09

Run Start Date: 10/12/2018
Run End Date: 10/12/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
ZZZZZZ	1.00	07:36																																							
ZZZZZZ	1.00	07:38																																							
ZZZZZZ	1.00	07:40																																							
ZZZZZZ	1.00	07:42																																							
ZZZZZZ	1.00	07:44																																							
ZZZZZZ	1.00	07:46																																							
ZZZZZZ	1.00	07:49																																							
CCV	1.00	07:51												X																											
CCB	1.00	07:53												X																											
ZZZZZZ	1.00	07:55																																							
ZZZZZZ	1.00	07:57																																							
ZZZZZZ	1.00	07:59																																							
ZZZZZZ	1.00	08:01																																							
ZZZZZZ	1.00	08:03																																							
P28471BB	1.00	08:05												X																											
P28471BQ	1.00	08:07												X																											
9839637BKG	1.00	08:09												X																											
9839637DUP	1.00	08:11												X																											
9839637MS	1.00	08:13												X																											
CCV	1.00	08:15												X																											
CCB	1.00	08:17												X																											
9839637MSD	1.00	08:19												X																											
9839632	1.00	08:21												X																											
9839633	1.00	08:23												X																											
9839634	1.00	08:25												X																											
9839635	1.00	08:27												X																											
9839636	1.00	08:29												X																											
9839638	1.00	08:31												X																											
CCV	1.00	08:35												X																											
CCB	1.00	08:37												X																											

METHODS:	LEGEND:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	BKG = Background DUP = Duplicate MS = Matrix Spike MSD = Matrix Spike Duplicate A = Post Digest Spike L = Serial Dilution B = Blank Q = Laboratory Control Sample Y = Laboratory Control Sample Duplicate

Instrumental Wet Chemistry Data

Case Narrative/Conformance Summary

Instrumental Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

Sample #	Client ID	Matrix Liquid	Matrix Solid	Comments
9839632	FB-20181004	X		Field Blank
9839633	MW-4	X		
9839634	MW-6	X		
9839635	MW-5	X		
9839636	MW-2	X		
9839637	MW-3	X		
9839638	MW-1	X		

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Method defined actions are taken for any failed matrix QC.

Batch#: 18288520109A (Sample number(s): 9839633-9839638, UNSPK: 9839633, BKG: 9839633)
The recovery(ies) for the following analyte(s) in the MS exceeded the acceptance window indicating a positive bias: Fluoride

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

SAMPLE ANALYSIS:

Samples	Chloride	Fluoride	Sulfate
9839632	DF1	DF1	DF1
9839633	UNSPK,MS,D/ DF5	UNSPK,MS,D/ DF5	UNSPK,MS,D/ DF5
9839634	DF50	DF5	DF5
9839635	DF50	DF5	DF50
9839636	DF5	DF5	DF5
9839637	DF50	DF5	DF5
9839638	DF50	DF5	DF50

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

Quality Control and Calibration Summary Forms

Instrumental Wet Chemistry

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Quality Control Reference List
Instrumental Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

Fraction: Instrumental Wet Chemistry

Batch Number	Sample Number	Analysis Date	Chloride	Fluoride	Sulfate
18288520109A	9839633 BKG	10/15/2018 13:05:00	X	X	X
	9839633 DUP	10/15/2018 13:23:00	X	X	X
	9839633 MS	10/15/2018 13:40:00	X	X	X
	9839634	10/15/2018 13:58:00		X	X
	9839634	10/15/2018 14:16:00	X		
	9839635	10/15/2018 14:34:00		X	
	9839635	10/15/2018 14:51:00	X		X
	9839636	10/15/2018 15:09:00	X	X	X
	9839637	10/15/2018 15:44:00		X	X
	9839637	10/15/2018 16:37:00	X		
	9839638	10/15/2018 17:13:00	X		X
	9839638	10/17/2018 00:27:00		X	
	P28820IB	10/16/2018 01:10:00	X	X	X
	P28820IQ	10/16/2018 00:53:00	X	X	X
18288520115A	P28820OB	10/15/2018 12:17:00	X		X
	P28820OB	10/18/2018 11:31:00		X	
	P28820OQ	10/15/2018 12:01:00	X		X
	P28820OQ	10/18/2018 11:13:00		X	
18288520115B	9839632	10/16/2018 02:46:00	X		X
	9839632	10/16/2018 23:16:00		X	

Quality Control Summary
Method Blank
Instrumental Water Quality
SDG: GEJ56
Matrix: LIQUID

Fraction: Instrumental Wet Chemistry

18288520109A / P28820IB Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Chloride	IC	10/16/18	N.D.	mg/l	0.20	0.40
Fluoride	IC	10/16/18	N.D.	mg/l	0.050	0.10
Sulfate	IC	10/16/18	N.D.	mg/l	0.30	1.0

18288520115A / P28820OB Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Chloride	IC	10/15/18	N.D.	mg/l	0.20	0.40
Fluoride	IC	10/18/18	N.D.	mg/l	0.050	0.10
Sulfate	IC	10/15/18	N.D.	mg/l	0.30	1.0

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

UNSPK: 9839633 MS: 9839633	Batch: **18288520109A** (Sample number(s): 9839633-9839638)									
Parameter	**ME**	**Spike Added mg/l**	**Unspiked Conc mg/l**	**MS Conc mg/l**	**MSD Conc mg/l**	**MS %Rec**	**MSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	10	1.10 J	10.13	NA	90	NA	90-110	NA	NA
Fluoride	IC	2.50	N.D.	2.82	NA	113 *	NA	90-110	NA	NA
Sulfate	IC	25	N.D.	26.75	NA	107	NA	90-110	NA	NA

Comments:
(2) The unspiked sample result is greater than four times the spike added.
* = Out of Specification

Results are being reported on an as received basis.

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

BKG: 9839633 DUP: 9839633 **Parameter**	Batch: **18288520109A** (Sample number(s): 9839633-9839638) **ME**	**Unspiked Conc mg/l**	**DUP Conc mg/l**	**%RPD**	**%RPD Limits**
Chloride	IC	1.1 J	1.01 J	8 (1)	15
Fluoride	IC	N.D.	N.D.	0 (1)	15
Sulfate	IC	N.D.	N.D.	0 (1)	15

Comments:
(1) The sample and/or duplicate result is less than five times the LOQ.
* = Out of Specification

Results are being reported on an as received basis.

Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ56
Matrix: LIQUID

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

LCS: P28820IQ	Batch: **18288520109A** (Sample number(s): 9839633-9839638)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	3.00	2.73	NA	91	NA	90-110	NA	NA
Fluoride	IC	0.750	0.810	NA	108	NA	90-110	NA	NA
Sulfate	IC	7.50	7.34	NA	98	NA	90-110	NA	NA

LCS: P28820OQ	Batch: **18288520115B** (Sample number(s): 9839632)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	3.00	2.85	NA	95	NA	90-110	NA	NA
Fluoride	IC	0.750	0.745	NA	99	NA	90-110	NA	NA
Sulfate	IC	7.50	7.00	NA	93	NA	90-110	NA	NA

Instrument ID: 18919
Calibration Date: 09/21/2018

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Fluoride	0.145206	0.494347	1.238762	2.616398	4.000046	0.9997	0.9998

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18288520109A
Run Start Dates: 10/16/2018
Run Names: 1828901D12

	Fluoride		
Sample	True	Result	%Rec
ICV	0.75	0.7264	97
ICB	0	ND	NA
Low Chk	0.75	2.2960	306
High Chk	2.25	0.7746	34
CCV2	0.75	0.7806	104
CCB	0	ND	NA
CCV2	0.75	0.7993	107
CCB	0	ND	NA

* = Out of Specifications

Instrument ID: 24811
Calibration Date: 09/21/2018

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Fluoride	0.214472	0.799734	2.100835	4.484078	6.993469	0.9994	0.9997

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18288520115B
Run Start Dates: 10/16/2018
Run Names: 1828901D17

	Fluoride		
Sample	True	Result	%Rec
ICV	0.75	0.7918	106
ICB	0	ND	NA
Low Chk	0.75	0.8481	113
High Chk	2.25	2.4074	107
CCV2	0.75	0.8560	114
CCB	0	ND	NA
CCV2	0.75	1.0144	135
CCB	0	ND	NA

* = Out of Specifications

Quality Control Summary
Initial And Continuing Calibration
Instrumental Analysis/Anion Scan

SDG: GEJ56

Instrument ID: 17694
Calibration Date: 09/21/2018

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18288520109A
Run Start Dates: 10/15/2018
Run Names: 1828801D09

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	0.730945	1.150491	2.791808	5.746708	8.922221	0.9964	0.9982
Fluoride	0.111799	0.630133	1.612750	3.375325	5.314184	0.9988	0.9994
Sulfate	0.370067	0.713432	1.821674	3.807377	5.921426	0.9995	0.9998

	Chloride			Sulfate			Fluoride		
Sample	True	Result	%Rec	True	Result	%Rec	True	Result	%Rec
ICV	3	2.9738	99	7.5	7.5571	101	0.75	0.7933	106
ICB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.8005	93	7.5	7.4287	99	0.75	0.8276	110
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7255	91	7.5	7.3084	97	0.75	0.8001	107
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7788	93	7.5	7.4341	99			
CCB	0	ND	NA	0	ND	NA			
CCV2	3	2.7352	91	7.5	7.3116	97	0.75	0.7820	104
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7212	91	7.5	7.2822	97	0.75	0.8060	107
CCB	0	ND	NA	0	ND	NA	0	ND	NA

* = Out of Specifications

Instrument ID: 12115
Calibration Date: 09/29/2018

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	1.037403	2.041477	5.219284	10.851470	17.490093	0.9954	0.9977
Sulfate	0.625176	1.274492	3.246368	6.855216	11.396219	0.9963	0.9981

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18288520115B
Run Start Dates: 10/15/2018
Run Names: 1828801D15

	Chloride			Sulfate		
Sample	True	Result	%Rec	True	Result	%Rec
ICV	3	2.9780	99	7.5	7.4559	99
ICB	0	ND	NA	0	ND	NA
CCV2	3	2.9111	97	7.5	7.2768	97
CCB	0	ND	NA	0	ND	NA
CCV2	3	2.8956	97	7.5	7.2565	97
CCB	0	ND	NA	0	ND	NA
CCV2	3	2.8838	96	7.5	7.2927	97
CCB	0	ND	NA	0	ND	NA
CCV2	3	2.9020	97	7.5	7.1909	96
CCB	0	ND	NA	0	ND	NA

* = Out of Specifications

Instrument ID: 24811
Calibration Date: 10/17/2018

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Fluoride	0.207718	0.766276	1.954591	4.133266	6.534954	0.9991	0.9996

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18288520115B
Run Start Dates: 10/18/2018
Run Names: 1829101D17

	Fluoride		
Sample	True	Result	%Rec
ICV	0.75	0.7584	101
ICB	0	ND	NA
CCV2	0.75	0.7397	99
CCB	0	ND	NA
Low Chk	0.75	0.7954	106
High Chk	2.25	2.3805	106
CCV2	0.75	0.7288	97
CCB	0	ND	NA

* = Out of Specifications

Fraction: Instrumental Wet Chemistry

00224: Chloride Analyte Name	Default MDL	Default LOQ	Units
Chloride	0.20	0.40	mg/l

01504: Fluoride Analyte Name	Default MDL	Default LOQ	Units
Fluoride	0.050	0.10	mg/l

00228: Sulfate Analyte Name	Default MDL	Default LOQ	Units
Sulfate	0.30	1.0	mg/l

Wet Chemistry Data

Case Narrative/Conformance Summary

Wet Chemistry

eurofins | Lancaster Laboratories Environmental

Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

Water Quality

Fraction: Wet Chemistry

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9839632	FB-20181004	X		1	Field Blank
9839633	MW-4	X		1	
9839634	MW-6	X		1	
9839635	MW-5	X		1	
9839636	MW-2	X		1	
9839637	MW-3	X		1	
9839638	MW-1	X		1	

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

SAMPLE ANALYSIS:

No problems were encountered with the analysis of the samples.

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

Water Quality

Fraction: Wet Chemistry

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

QC Summary

Wet Chemistry

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

Fraction: Wet Chemistry

Analysis	Batch Number	Sample Number	Analysis Date
Total Dissolved Solids	18283921201A	B283871B	10/10/2018 16:00
		L283871Q	10/10/2018 16:00
		9839633	10/10/2018 16:00
		9839634	10/10/2018 16:00
		9839635	10/10/2018 16:00
		9839637	10/10/2018 16:00
Total Dissolved Solids	18283921203A	B283873B	10/10/2018 16:56
		L283873Q	10/10/2018 16:56
		9839632	10/10/2018 16:56
		9839636	10/10/2018 16:56
		9839638	10/10/2018 16:56

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ56

Fraction: Wet Chemistry

Batch Number	Sample Number	Analysis Date	pH	Temperature of pH
18281003203A	9839632	10/09/2018 04:42:00	X	X
	9839633	10/09/2018 04:34:00	X	X
	9839634	10/09/2018 05:20:00	X	X
	9839635	10/09/2018 05:09:00	X	X
	9839636	10/09/2018 04:38:00	X	X
	9839637	10/09/2018 05:16:00	X	X
	9839638	10/09/2018 05:13:00	X	X
	P003203Q	10/09/2018 03:42:00	X	

Quality Control Summary
Method Blank
Water Quality
SDG: GEJ56
Matrix: LIQUID

Fraction: Wet Chemistry

18283921201A / B283871B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	10/10/18	N.D.	mg/l	20.0	60.0

18283921203A / B283873B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	10/10/18	N.D.	mg/l	20.0	60.0

Water Quality

Fraction: Wet Chemistry

LCS: P003203Q	Batch: **18281003203A** (Sample number(s): 9839632-9839638)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	7.01	NA	100	NA	95-105	NA	NA

LCS: L283871Q	Batch: **18283921201A** (Sample number(s): 9839633-9839635, 9839637)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	192	NA	96	NA	62-127	NA	NA

LCS: L283873Q	Batch: **18283921203A** (Sample number(s): 9839632, 9839636, 9839638)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	194	NA	97	NA	62-127	NA	NA

Fraction: Wet Chemistry

12152: pH Analyte Name	Default MDL	Default LOQ	Units
pH	0.010	0.010	Std. Units

12151: Temperature of pH Analyte Name	Default MDL	Default LOQ	Units
Temperature of pH	0.010	0.010	Degrees C

00212: Total Dissolved Solids Analyte Name	Default MDL	Default LOQ	Units
Total Dissolved Solids	20.0	60.0	mg/l

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

November 05, 2018

Ms. Hannah Cottman
Eurofins Lancaster Laboratories
2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994

Re: NJ Radiochemistry Analyses
Work Order: 461244

Dear Ms. Cottman:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 09, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Taylor Cannon for
Julie Robinson
Project Manager

Purchase Order: 1995509
Chain of Custody: 1995509
Enclosures

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Case Narrative

Receipt Narrative
for
Eurofins Lancaster Laboratories
SDG: 461244

November 05, 2018

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on October 09, 2018 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
461244001	FB-20181004 Grab Water
461244002	MW-4 Grab Groundwater
461244003	MW-6 Grab Groundwater
461244004	MW-5 Grab Groundwater
461244005	MW-2 Grab Groundwater
461244006	MW-3 Grab Groundwater
461244007	MW-1 Grab Groundwater

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

Taylor Cannon for
Julie Robinson
Project Manager

Chain of Custody and Supporting Documentation

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

401244

Acct. # _____ Group # 1995509 Sample # 9839639-45

Subcontractor:	GEL		
Project Name/#:	1995509	Site ID #:	
Requestor	Hannah Cottman	P.O. #:	NA
Sampler:		PWSID #:	
Phone #:	717-656-2300 Ext 1896	Quote #:	
State where samples were collected:	NJ	For Compliance: Yes ☑ No ☐	

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil ☐ Sediment ☐ Tissue ☐	Water: Potable ☐ Ground ☐ NPDES ☐ Surface ☐	Other:	Total # of Containers	Analyses Requested: Preservation and Filtration Codes: Radium-226 (EPA 903.1) N	Radium-228 (EPA 904.0 mod) N	Remarks
FB-20181004 Grab Water	10/4/2018	1200	X			X		2	X	X	9839639
MW-4 Grab Groundwater	10/4/2018	1020	X			X		2	X	X	9839640
MW-6 Grab Groundwater	10/4/2018	1020	X			X		2	X	X	9839641
MW-5 Grab Groundwater	10/4/2018	1240	X			X		2	X	X	9839642
MW-2 Grab Groundwater	10/4/2018	1145	X			X		2	X	X	9839643
MW-3 Grab Groundwater	10/4/2018	1340	X			X		2	X	X	9839644
MW-1 Grab Groundwater	10/4/2018	1425	X			X		2	X	X	9839645

For Lab Use Only
SF #: _____
SCR #: _____

Preservation Codes
H = HCl T = Thiosulfate
N = HNO_3 B = NaOH
S = H_2SO_4 P = H_3PO_4
F = Field Filtered O = Other

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by(please check): E-Mail ☐ Phone ☐

E-mail Address: ENVsubcontracting@EurofinsUS.com

Phone: 717-656-2300 Ext 1896

Data Package Options (please check if required) ☐ Level IV DOD

Type I (Validation/non-CLP) ☐ MA MCP ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type VI (Raw Data Only) ☐ TX TRRP-13 ☐

NJ DKQP ☑ NYSDEC Category ☐ A or ☐ B

EDD Required? Yes ☑ No ☐ If yes, format: Hazsite

	Relinquished by:	Date	Time	Received by:	Date	Time
1	Hannah Cottman	10-8-18	1638	A. Almen	10/9/18	8:55
2						
3						
4						
5						

Relinquished by Commercial Carrier:

UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

GEL Laboratories LLC JR

SAMPLE RECEIPT & REVIEW FORM

Client: LANC	**SDG/AR/COC/Work Order:** 401744
Received By: LM	**Date Received:** 10-9-18
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 5035 4245 2075 2°C 5035 4245 2089 2°C

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: Wet Ice Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: See Above
4	Daily check performed and passed on IR temperature gun?	✓			**Temperature Device Serial #:** IR2-18 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH? LM 10/9/18			✓	Sample ID's and Containers Affected: 983813 8260 A; B, C & D No Preservative If Preservation added, Lot#: 190730 983816 8260 A, B, C & D
7	Do any samples require Volatile Analysis?			✓	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes No___ N/A Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KG Date 10/10/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

Laboratory Certifications

There are no "Data Exception Reports" associated with this analytical report.

List of current GEL Certifications as of 05 November 2018

State	Certification
Alaska	17−018
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−27
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Eurofins Lancaster Laboratories (LANC)
SDG #: 461244

Product: **GFPC, Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 2
Analytical Batch: 1811253

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
461244001	FB-20181004 Grab Water
461244002	MW-4 Grab Groundwater
461244003	MW-6 Grab Groundwater
461244004	MW-5 Grab Groundwater
461244005	MW-2 Grab Groundwater
461244006	MW-3 Grab Groundwater
461244007	MW-1 Grab Groundwater
1204133162	Method Blank (MB)
1204133163	461244004(MW-5 Grab Groundwater) Sample Duplicate (DUP)
1204133164	461244004(MW-5 Grab Groundwater) Matrix Spike (MS)
1204133165	461244004(MW-5 Grab Groundwater) Matrix Spike Duplicate (MSD)
1204133166	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 1204133164 (MW-5 Grab GroundwaterMS) was recounted due to high recovery. The recount is reported.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204133164 (MW-5 Grab GroundwaterMS) and 1204133165 (MW-5 Grab GroundwaterMSD), aliquots were reduced to conserve sample volume.

Product: **Lucas Cell, Ra226, liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 1810204

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
461244001	FB-20181004 Grab Water
461244002	MW-4 Grab Groundwater
461244003	MW-6 Grab Groundwater
461244004	MW-5 Grab Groundwater
461244005	MW-2 Grab Groundwater
461244006	MW-3 Grab Groundwater
461244007	MW-1 Grab Groundwater
1204130926	Method Blank (MB)
1204130927	461244002(MW-4 Grab Groundwater) Sample Duplicate (DUP)
1204130928	461244002(MW-4 Grab Groundwater) Matrix Spike (MS)
1204130929	Laboratory Control Sample (LCS)
1204132247	461244002(MW-4 Grab Groundwater) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Duplication Criteria between MS and MSD
The Matrix Spike and Matrix Spike Duplicate (See Below) do not meet the duplication requirement; however, they both meet the spiked recovery requirement.

Sample	Analyte	Value
1204130928MS and 1204132247MSD (MW-4 Grab Groundwater)	Radium-226	RPD 20.5* (0%-20%)

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204130928 (MW-4 Grab GroundwaterMS) and 1204132247 (MW-4 Grab GroundwaterMSD), aliquots were reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report
for

LANC006 Eurofins Lancaster Laboratories

Client SDG: 461244 GEL Work Order: 461244

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria
** Analyte is a Tracer compound
U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Heather McCarty **Name: Heather McCarty**

Date: 02 NOV 2018 **Title: Analyst II**

Sample Data Summary

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 2, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: FB-20181004 Grab Water
Sample ID: 461244001
Matrix: Water
Collect Date: 04-OCT-18
Receive Date: 09-OCT-18
Collector: Client
Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	-0.271	+/-0.989	1.88	+/-0.989	3.00	pCi/L			JXC9	10/22/18	1127	1811253	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.245	+/-0.192	0.271	+/-0.195	1.00	pCi/L			PCW	10/16/18	0940	1810204	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1811253	89.5	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 2, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-4 Grab Groundwater
Sample ID: 461244002
Matrix: Water
Collect Date: 04-OCT-18
Receive Date: 09-OCT-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	-0.804	+/-0.733	1.55	+/-0.733	3.00	pCi/L			JXC9	10/22/18	1136	1811253	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.365	+/-0.239	0.326	+/-0.245	1.00	pCi/L			PCW	10/16/18	0940	1810204	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1811253	103	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 2, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-6 Grab Groundwater
Sample ID: 461244003
Matrix: Water
Collect Date: 04-OCT-18
Receive Date: 09-OCT-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.550	+/-0.917	1.59	+/-0.930	3.00	pCi/L			JXC9	10/22/18	1137	1811253	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.482	+/-0.283	0.389	+/-0.297	1.00	pCi/L			PCW	10/16/18	0940	1810204	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1811253	96.9	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 2, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-5 Grab Groundwater
Sample ID: 461244004
Matrix: Water
Collect Date: 04-OCT-18
Receive Date: 09-OCT-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.0835	+/-0.690	1.29	+/-0.690	3.00	pCi/L			JXC9	10/22/18	1137	1811253	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.661	+/-0.365	0.482	+/-0.383	1.00	pCi/L			PCW	10/16/18	1015	1810204	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1811253	104	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 2, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-2 Grab Groundwater
Sample ID: 461244005
Matrix: Water
Collect Date: 04-OCT-18
Receive Date: 09-OCT-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.132	+/-0.565	1.06	+/-0.567	3.00	pCi/L			JXC9	10/22/18	1137	1811253	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.337	+/-0.200	0.231	+/-0.206	1.00	pCi/L			PCW	10/16/18	1015	1810204	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1811253	101	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 2, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-3 Grab Groundwater
Sample ID: 461244006
Matrix: Water
Collect Date: 04-OCT-18
Receive Date: 09-OCT-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	-0.0298	+/-0.606	1.20	+/-0.606	3.00	pCi/L			JXC9	10/22/18	1137	1811253	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.747	+/-0.286	0.204	+/-0.311	1.00	pCi/L			PCW	10/16/18	1015	1810204	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1811253	89.5	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 2, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-1 Grab Groundwater
Sample ID: 461244007
Matrix: Water
Collect Date: 04-OCT-18
Receive Date: 09-OCT-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.898	+/-0.883	1.44	+/-0.918	3.00	pCi/L			JXC9	10/22/18	1137	1811253	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		1.13	+/-0.341	0.196	+/-0.409	1.00	pCi/L			PCW	10/16/18	1015	1810204	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1811253	73.8	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

Quality Control Summary

GEL LABORATORIES LLC
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QC Summary

Client : **Eurofins Lancaster Laboratories**
2425 New Holland Pike
Lancaster, Pennsylvania
Contact: **Ms. Hannah Cottman**
Workorder: **461244**

Report Date: November 2, 2018

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 1811253										
QC1204133163 461244004 DUP										
Radium-228	U	0.0835	U	0.243	pCi/L	0		N/A	JXC9	10/22/1811:36
	Uncert:	+/-0.690		+/-0.679						
	TPU:	+/-0.690		+/-0.682						
QC1204133166 LCS										
Radium-228	17.2			16.5	pCi/L		96.3	(75%-125%)	JXC9	10/22/1811:36
	Uncert:			+/-2.04						
	TPU:			+/-5.04						
QC1204133162 MB										
Radium-228			U	0.223	pCi/L				JXC9	10/22/1811:36
	Uncert:			+/-0.568						
	TPU:			+/-0.571						
QC1204133164 461244004 MS										
Radium-228	51.7 U	0.0835		39.0	pCi/L		75.5	(75%-125%)	JXC9	10/22/1813:19
	Uncert:	+/-0.690		+/-6.44						
	TPU:	+/-0.690		+/-12.5						
QC1204133165 461244004 MSD										
Radium-228	51.7 U	0.0835		41.5	pCi/L	6.13	80.2	(0%-20%)	JXC9	10/22/1811:36
	Uncert:	+/-0.690		+/-5.07						
	TPU:	+/-0.690		+/-12.3						
Rad Ra-226										
Batch 1810204										
QC1204130927 461244002 DUP										
Radium-226		0.365	U	0.299	pCi/L	20		(0% - 100%)	PCW	10/16/1810:15
	Uncert:	+/-0.239		+/-0.249						
	TPU:	+/-0.245		+/-0.258						
QC1204130929 LCS										
Radium-226	26.0			26.1	pCi/L		101	(75%-125%)	PCW	10/16/1811:00
	Uncert:			+/-1.77						
	TPU:			+/-6.33						
QC1204130926 MB										
Radium-226			U	0.167	pCi/L				PCW	10/16/1810:15
	Uncert:			+/-0.181						
	TPU:			+/-0.183						
QC1204130928 461244002 MS										
Radium-226	130	0.365		102	pCi/L		78.3	(75%-125%)	PCW	10/16/1810:15
	Uncert:	+/-0.239		+/-6.72						
	TPU:	+/-0.245		+/-16.8						
QC1204132247 461244002 MSD										
Radium-226	130	0.365		125	pCi/L	20.5*	96.3	(0%-20%)	PCW	10/16/1810:15
	Uncert:	+/-0.239		+/-7.61						

QC Summary

Workorder: **461244**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Ra-226										
Batch 1810204										
				TPU:	+/-0.245		+/-21.1			

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 1811253 Check-list

This check-list was completed on 22-OCT-18 by Nat Long

This batch was reviewed by Nat Long on 22-OCT-18 and Kenshalla Oston on 24-OCT-18.

Batch ID: 1811253

Product: GFC28RAL

Description: Gas Flow Radium 228 GL-RAD-A-009

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **1811253**
Analyst: Jasmine Conley (JXC9)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 2
Instrument: GFC−51204863

Due Dates for Lab: 02−NOV−2018 **Package: 04−NOV−2018** **SDG: 06−NOV−2018**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204133166	Radium−228 SPIKE	1810−A	.1	mL
MS	1204133164	Radium−228 SPIKE	1810−A	.1	mL
MSD	1204133165	Radium−228 SPIKE	1810−A	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Ac−228 Ingrow (date)	Ac−228 Separation (date)
1	461244001	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
2	461244002	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
3	461244003	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
4	461244004	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
5	461244005	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
6	461244006	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
7	461244007	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
8	1204133162 MB	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
9	1204133163 DUP (461244004)	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30
10	1204133164 MS (461244004)	17−OCT−2018	3	100	10/18/18 14:00	10/22/18 09:30
11	1204133165 MSD (461244004)	17−OCT−2018	3	100	10/18/18 14:00	10/22/18 09:30
12	1204133166 LCS	17−OCT−2018	3	300	10/18/18 14:00	10/22/18 09:30

Reagent/Solvent Lot ID	Description	Amount
REGNT 2571685.11	2mL Cartridges	2 mL
REGNT 2662331.3	cerium 500 mg/L in 2%HCI	.2 mL
REGNT 2672182	RGF−1.5 Ammonium Sulfate	10 mL
REGNT 2801523.7	Hydrofluoric Acid Poly Bottle	3 mL
REGNT 2832203.5	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 2833686	RGF−7M Nitric Acid	25 mL
REGNT 2836171.10	HNO3	5 mL
REGNT 2838193	RGF−50% Potassium Carbonate	2 mL
REGNT 2840709	RGF−16mg/mL Barium Chloride	1 mL
REGNT 2841696	2M HCl	20 mL
REGNT 2843889	RGF−1M Citric Acid	5 mL
WORK 0487−D	Barium−133 TRACER	.1 mL

Comments:

Pipet Id: RAD−GFC−1795419
Data Entry Date2: 17−OCT−2018 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 0487-D
Tracer Exp Date : 11/8/2018
Tracer Volume Added: 0.10

Batch : 1811253
Analyst : JAS02031
Prep Date : 10/17/2018
Ra-228 Method Uncertainty : 0.1268

Geometry: CeF on 25mm Filter

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 3 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	461244001.1	0.3000	1.8459E-05	10/4/2018 12:00	156.4	8.00%	140.0	8.45%	0.1	0.000200
2	461244002.1	0.3000	1.8459E-05	10/4/2018 10:20	156.4	8.00%	161.5	7.87%	0.1	0.000200
3	461244003.1	0.3000	1.8459E-05	10/4/2018 10:20	156.4	8.00%	151.6	8.12%	0.1	0.000200
4	461244004.1	0.3000	1.8459E-05	10/4/2018 12:40	156.4	8.00%	162.0	7.86%	0.1	0.000200
5	461244005.1	0.3000	1.8459E-05	10/4/2018 11:45	156.4	8.00%	158.2	7.95%	0.1	0.000200
6	461244006.1	0.3000	1.8459E-05	10/4/2018 13:40	156.4	8.00%	140.1	8.45%	0.1	0.000200
7	461244007.1	0.3000	1.8459E-05	10/4/2018 14:25	156.4	8.00%	115.5	9.30%	0.1	0.000200
8	1204133162.1	0.3000	1.8459E-05	10/17/2018 0:00	156.4	8.00%	150.8	8.14%	0.1	0.000200
9	1204133163.1	0.3000	1.8459E-05	10/4/2018 12:40	156.4	8.00%	157.3	7.97%	0.1	0.000200
10	1204133164.1	0.1000	1.1370E-05	10/4/2018 12:40	156.4	8.00%	151.9	8.11%	0.1	0.000200
11	1204133165.1	0.1000	1.1370E-05	10/4/2018 12:40	156.4	8.00%	174.6	7.57%	0.1	0.000200
12	1204133166.1	0.3000	1.8459E-05	10/17/2018 0:00	156.4	8.00%	136.9	8.55%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-063
Instrument SOP: GL-RAD-I-016, GL-RAD-I-006

Count raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	5D	60	11	73	1.217	10/22/2018 11:27	10/18/2018 14:00	10/22/2018 9:30	0.994	0.802	1.000	1.057	89.5%	5.83%
2	6B	60	4	47	0.783	10/22/2018 11:36	10/18/2018 14:00	10/22/2018 9:30	0.994	0.788	1.000	1.057	103%	5.62%
3	6C	60	8	71	1.183	10/22/2018 11:37	10/18/2018 14:00	10/22/2018 9:30	0.994	0.788	1.000	1.057	96.9%	5.71%
4	7A	60	4	45	0.750	10/22/2018 11:37	10/18/2018 14:00	10/22/2018 9:30	0.994	0.787	1.000	1.057	104%	5.61%
5	7B	60	8	30	0.500	10/22/2018 11:37	10/18/2018 14:00	10/22/2018 9:30	0.994	0.787	1.000	1.057	101%	5.65%
6	7C	60	11	26	0.433	10/22/2018 11:37	10/18/2018 14:00	10/22/2018 9:30	0.994	0.787	1.000	1.057	89.5%	5.83%
7	8B	60	3	41	0.683	10/22/2018 11:37	10/18/2018 14:00	10/22/2018 9:30	0.994	0.787	1.000	1.057	73.8%	6.14%
8	8C	60	4	27	0.450	10/22/2018 11:36	10/18/2018 14:00	10/22/2018 9:30	0.998	0.789	1.000	1.057	96.4%	5.71%
9	9A	60	8	43	0.717	10/22/2018 11:36	10/18/2018 14:00	10/22/2018 9:30	0.994	0.788	1.000	1.057	101%	5.65%
10	A1	60	5	264	4.400	10/22/2018 13:19	10/18/2018 14:00	10/22/2018 9:30	0.994	0.650	1.000	1.057	97.1%	5.70%
11	9C	60	9	326	5.433	10/22/2018 11:36	10/18/2018 14:00	10/22/2018 9:30	0.994	0.788	1.000	1.057	112%	5.51%
12	9D	60	16	307	5.117	10/22/2018 11:36	10/18/2018 14:00	10/22/2018 9:30	0.998	0.788	1.000	1.057	87.5%	5.86%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2017	5/31/2019	0.6669	0.00925	1.298	10/19/2018 16:01	500
2	PIC	6/1/2017	5/31/2019	0.6465	0.00851	1.048	10/19/2018 16:05	500
3	PIC	6/1/2017	5/31/2019	0.6594	0.01970	1.010	10/19/2018 16:05	500
4	PIC	6/1/2017	5/31/2019	0.6570	0.00594	0.722	10/19/2018 16:05	500
5	PIC	6/1/2017	5/31/2019	0.6688	0.00627	0.456	10/19/2018 16:05	500
6	PIC	6/1/2017	5/31/2019	0.6600	0.00790	0.442	10/19/2018 16:05	500
7	PIC	6/1/2017	5/31/2019	0.6773	0.02148	0.462	10/19/2018 16:06	500
8	PIC	6/1/2017	5/31/2019	0.6559	0.01955	0.380	10/19/2018 16:06	500
9	PIC	6/1/2017	5/31/2019	0.6688	0.00758	0.636	10/19/2018 16:06	500
10	LB4100	6/1/2017	5/31/2019	0.6357	0.02044	1.134	10/19/2018 16:34	500
11	PIC	6/1/2017	5/31/2019	0.6373	0.00584	0.580	10/19/2018 16:07	500
12	PIC	6/1/2017	5/31/2019	0.6494	0.02610	0.464	10/19/2018 16:07	500

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

* - RPD changed to 0% due to sample & dup activity below MDA

Spike S/N : 1810-A
Spike Exp Date : 5/23/2019
Spike Activity (dpm/ml): 114.36
Spike Volume Added: 0.10

LCS S/N : 1810-A
LCS Exp Date : 5/23/2019
LCS Activity (dpm/ml): 114.36
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	1.2099	0.8542	3	1.8752	**-0.2713**	186.05%	-0.0813	0.1512	0.9889	0.9890		SAMPLE				
2	0.9903	0.6992	3	1.5503	**-0.8043**	46.85%	-0.2647	0.1231	0.7331	0.7333		SAMPLE				
3	1.0153	0.7168	3	1.5923	**0.5501**	85.28%	0.1733	0.1475	0.9172	0.9296		SAMPLE				
4	0.8064	0.5693	3	1.2878	**0.0835**	421.77%	0.0280	0.1181	0.6900	0.6904		SAMPLE				
5	0.6449	0.4553	3	1.0606	**0.1320**	218.60%	0.0440	0.0962	0.5654	0.5665		SAMPLE				
6	0.7267	0.5130	3	1.1978	**-0.0298**	1038.88%	-0.0087	0.0900	0.6059	0.6061		SAMPLE				
7	0.8782	0.6200	3	1.4429	**0.8983**	50.55%	0.2213	0.1110	0.8827	0.9176		SAMPLE				
8	0.6259	0.4419	3	1.0432	**0.2233**	129.98%	0.0700	0.0909	0.5681	0.5714		MB				
9	0.7648	0.5399	3	1.2305	**0.2430**	142.63%	0.0807	0.1150	0.6788	0.6820	461244004.1	DUP	* 0.0%			
10	4.0508	2.8599	3	6.3172	**39.0264**	10.37%	3.2660	0.2750	6.4397	12.5306	461244004.1	MS			51.7241	75.5%
11	2.0728	1.4634	3	3.3543	**41.4943**	8.35%	4.8533	0.3028	5.0749	12.3466	461244004.1	MSD	6.1%		51.7241	80.2%
12	0.7704	0.5439	3	1.2654	**16.5297**	9.00%	4.6527	0.2936	2.0445	5.0376		LCS			17.1705	96.3%

1811253r1.xls

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
461244001	5D	60	11	73	10/22/2018 11:27	10/22/2018 12:27	PIC	1811253
461244002	6B	60	4	47	10/22/2018 11:36	10/22/2018 12:36	PIC	1811253
461244003	6C	60	8	71	10/22/2018 11:37	10/22/2018 12:37	PIC	1811253
461244004	7A	60	4	45	10/22/2018 11:37	10/22/2018 12:37	PIC	1811253
461244005	7B	60	8	30	10/22/2018 11:37	10/22/2018 12:37	PIC	1811253
461244006	7C	60	11	26	10/22/2018 11:37	10/22/2018 12:37	PIC	1811253
461244007	8B	60	3	41	10/22/2018 11:37	10/22/2018 12:37	PIC	1811253
1204133162	8C	60	4	27	10/22/2018 11:36	10/22/2018 12:36	PIC	1811253
1204133163	9A	60	8	43	10/22/2018 11:36	10/22/2018 12:36	PIC	1811253
1204133164	A1	60	5	264	10/22/2018 13:19	10/22/2018 14:19	LB4100	1811253
1204133165	9C	60	9	326	10/22/2018 11:36	10/22/2018 12:36	PIC	1811253
1204133166	9D	60	16	307	10/22/2018 11:36	10/22/2018 12:36	PIC	1811253

ASSAY 18-Oct-18 14:43:40

Protocol	id	8	Ba-133
Time	limit		
Count	limit		
Isotope	Ba-133		
Protocol	date	10/18/2018	
Run	id.	1931	

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
1	96	1	180.04	554.71	156.44	8		02:43:40
2	96	2	180.06	505.34	139.97	8.45	89.47	02:46:53
3	96	3	180.04	569.77	161.45	7.87	103.20	02:50:07
4	96	4	180.03	540.17	151.61	8.12	96.91	02:53:21
5	96	5	180.04	571.48	162.02	7.86	103.57	02:56:35
1	87	1	180.06	560.05	158.2	7.95	101.13	03:00:20
2	87	2	180.04	505.6	140.07	8.45	89.54	03:03:33
3	87	3	180.04	431.88	115.5	9.3	73.83	03:06:47
4	87	4	180.03	537.88	150.84	8.14	96.42	03:10:01
5	87	5	180.06	557.43	157.32	7.97	100.56	03:13:15
1	70	1	180.03	541.02	151.89	8.11	97.09	03:16:52
2	70	2	180.04	609.14	174.58	7.57	111.60	03:20:06
3	70	3	180.04	496.05	136.89	8.55	87.50	03:23:20

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 22-Oct-2018

Detectors LB4100 A1 through J4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
G5400W1Y	Below	Alpha eff	22-Oct 09:01	5	8578	8722	9230	-4.70
G5400W1Y	Above	Alpha XTalk	22-Oct 09:01	5	0.375	0.325	0.358	+6.19
LB4100A2	Below	Beta eff	22-Oct 07:52	5	20881	20920	22890	-3.12
LB4100A2	need 2nd	Beta XTalk	22-Oct 07:52	5	3.32E-4	1.06E-4	4.89E-4	+0.55
LB4100A3	Below	Beta eff	22-Oct 07:52	5	19041	20120	22250	-6.04
LB4100B3	Missing	Alpha bkg	22-Oct 06:18	60	0.00E+0	-6.61E-2	0.276	-1.84
LB4100B3	Missing	Alpha eff	22-Oct 08:20	5	0.00E+0	8427	16450	-9.30
LB4100B3	Missing	Alpha XTalk	22-Oct 08:20	5	0.00E+0	0.270	0.653	-7.22
LB4100B3	Missing	Beta bkg	22-Oct 06:18	60	0.00E+0	-2.44E+2	261	-0.10
LB4100B3	Missing	Beta eff	22-Oct 07:52	5	0.00E+0	22590	31610	-18.03
LB4100B3	Missing	Beta XTalk	22-Oct 07:52	5	0.00E+0	-4.93E-1	0.516	-0.07
LB4100B4	Below	Alpha eff	22-Oct 08:20	5	11208	11560	15170	-3.59
LB4100B4	need 2nd	Beta bkg	22-Oct 06:18	60	1.100	0.607	2.163	-1.10
LB4100C2	need 2nd	Beta XTalk	22-Oct 09:05	5	2.94E-4	1.13E-4	4.85E-4	-0.08
LB4100C4	Above	Beta bkg	22-Oct 06:20	60	2.517	0.686	2.113	+4.70
LB4100E2	need 2nd	Beta bkg	22-Oct 06:17	60	1.667	0.261	3.241	-0.17
LB4100F4	Above	Alpha XTalk	22-Oct 07:36	5	0.555	0.280	0.530	+3.62
LB4100G1	Above	Alpha XTalk	22-Oct 07:44	5	0.275	0.226	0.275	+3.03
LB4100G2	need 2nd	Alpha XTalk	22-Oct 07:44	5	0.351	0.256	0.413	+0.64
LB4100G2	need 2nd	Beta bkg	22-Oct 06:18	60	1.250	0.414	2.180	-0.16
LB4100G2	need 2nd	Beta eff	22-Oct 07:36	5	16726	15140	19980	-1.03
LB4100H2	need 2nd	Alpha bkg	22-Oct 06:17	60	0.100	-5.90E-2	0.235	+0.24
LB4100I2	need 2nd	Beta bkg	22-Oct 06:17	60	1.117	-1.65E+1	28.950	-0.68
LB4100I3	need 2nd	Beta bkg	22-Oct 06:17	60	0.767	-5.60E-1	3.474	-1.03
PIC1A	Above	Alpha bkg	22-Oct 06:05	60	0.333	-4.72E-2	0.399	+2.12
PIC3C	Above	Alpha bkg	22-Oct 04:57	60	0.617	-9.57E-4	0.359	+7.28
PIC3C	Above	Beta bkg	22-Oct 04:57	60	1.633	0.008	1.299	+4.55
PIC4D	Below	Alpha XTalk	22-Oct 08:26	5	0.249	0.256	0.273	-5.20

PIC6A	Above	Alpha bkg	22-Oct 07:37	60	0.333	-2.15E-2	0.405	+1.99
PIC7D	Below	Alpha eff	22-Oct 08:35	5	10369	10390	11090	-3.18
PIC8A	Above	Beta eff	22-Oct 08:39	5	54260	49370	54080	+3.23
PIC8A	Above	Beta XTalk	22-Oct 08:39	5	3.15E-4	5.74E-5	2.92E-4	+3.58
PIC11A	Above	Alpha bkg	22-Oct 06:25	60	0.317	-1.07E-1	0.344	+2.63
PIC12A	Above	Alpha bkg	22-Oct 06:25	60	0.317	-1.44E-2	0.356	+2.36
PIC12D	need 2nd	Alpha bkg	22-Oct 09:09	60	0.133	-3.66E-2	0.228	+0.86
PIC12D	Below	Alpha XTalk	22-Oct 04:44	5	0.319	0.325	0.395	-3.48
PIC12D	Above	Beta bkg	22-Oct 09:09	60	2.050	0.504	1.615	+5.35
PIC14B	Above	Beta bkg	22-Oct 09:09	60	3.250	-6.12E-1	2.082	+5.60

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

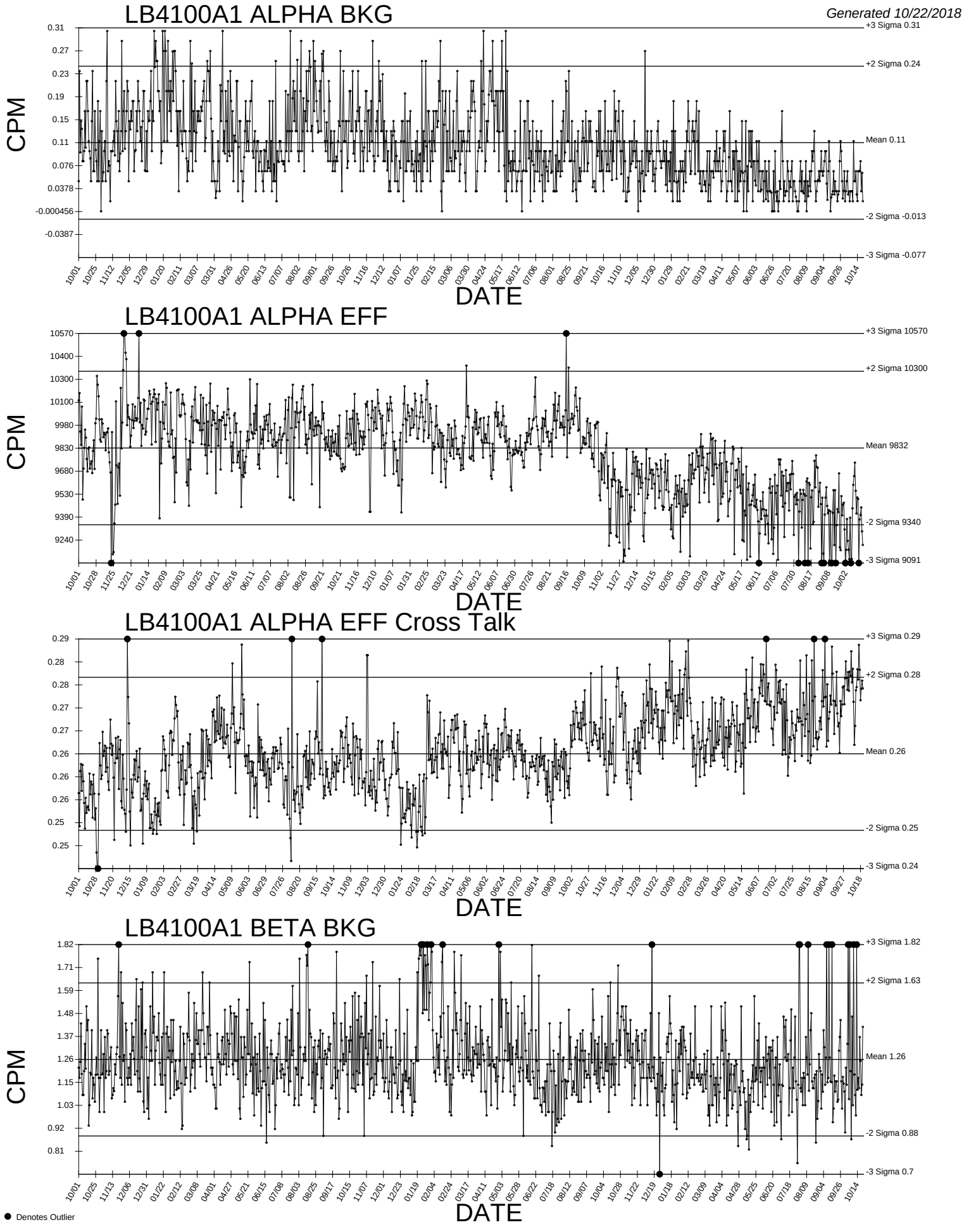
LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC3A	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

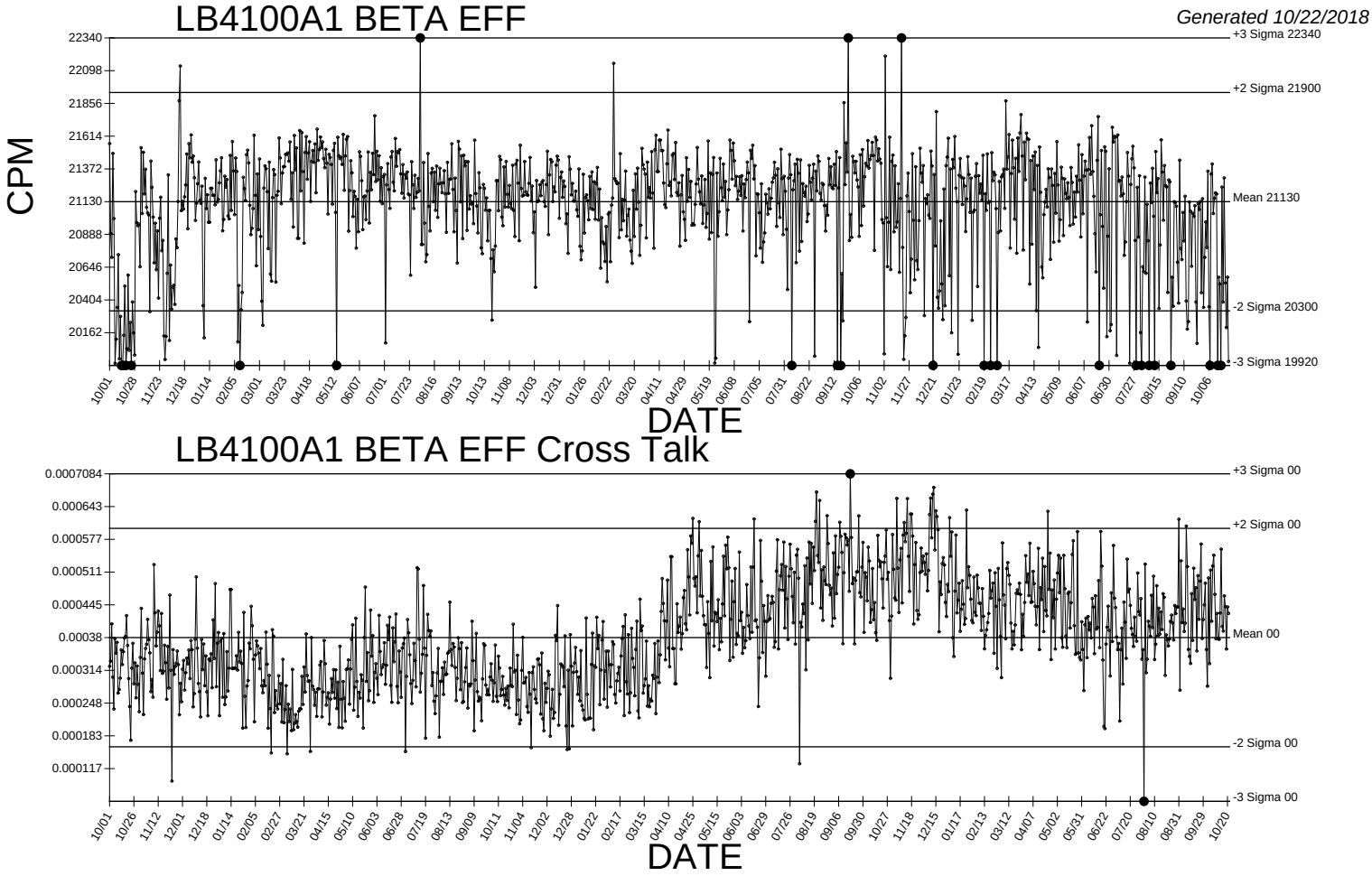
Reviewed by _____

Date 10/22/18

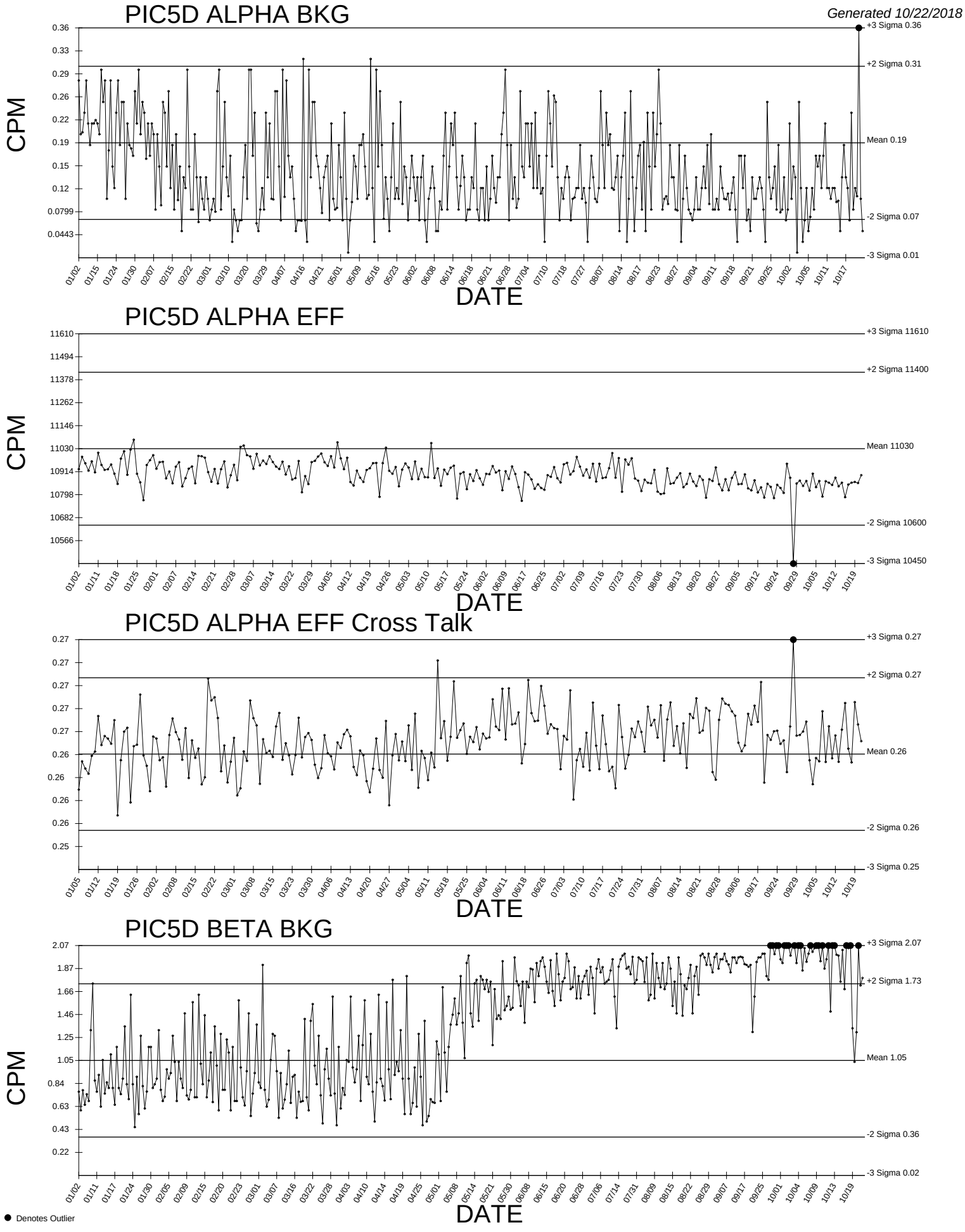
GEL Laboratories LLC

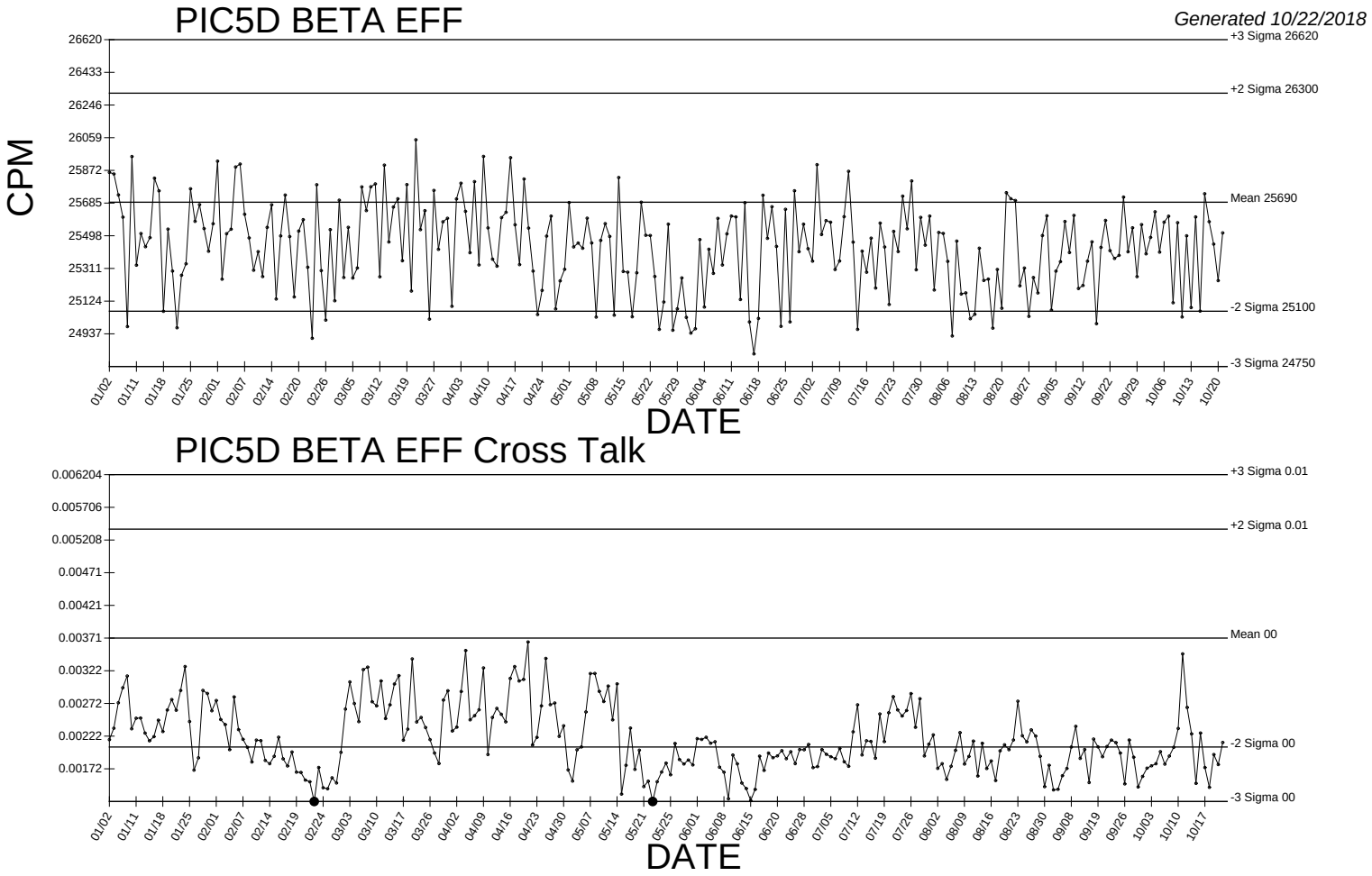
Background and Efficiency Data


LB4100A1 ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.31
+2 Sigma 0.24
Mean 0.11
-2 Sigma -0.013
-3 Sigma -0.077
LB4100A1 ALPHA EFF
+3 Sigma 10570
+2 Sigma 10300
Mean 9832
-2 Sigma 9340
-3 Sigma 9091
LB4100A1 ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.26
-2 Sigma 0.25
-3 Sigma 0.24
LB4100A1 BETA BKG
+3 Sigma 1.82
+2 Sigma 1.63
Mean 1.26
-2 Sigma 0.88
-3 Sigma 0.7
Denotes Outlier

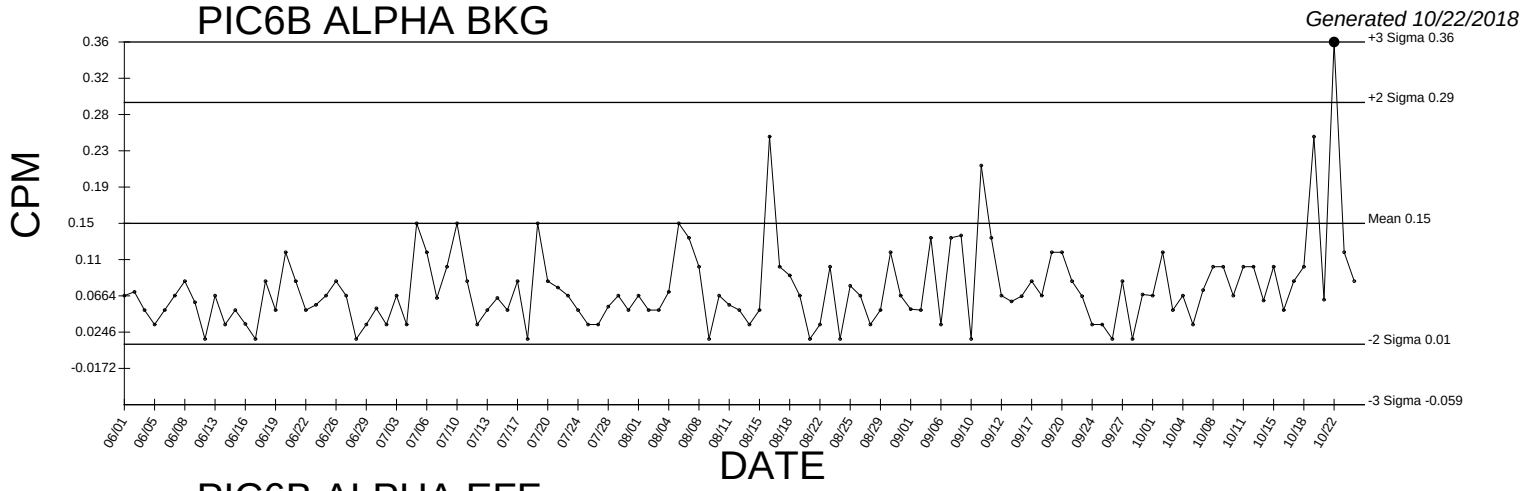


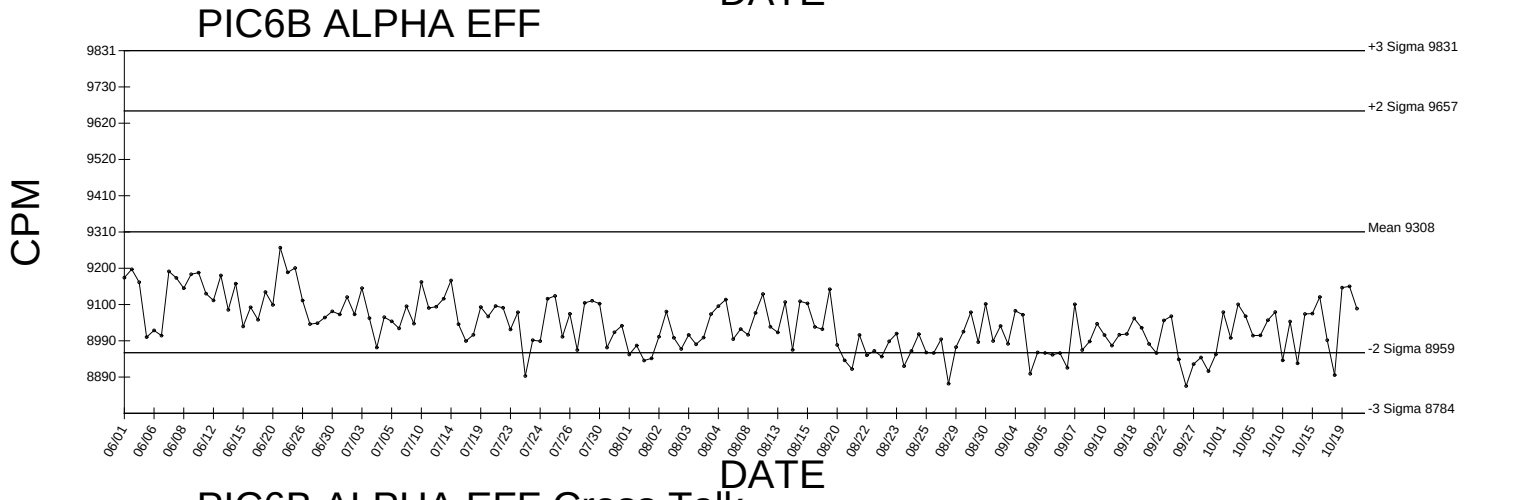
● Denotes Outlier

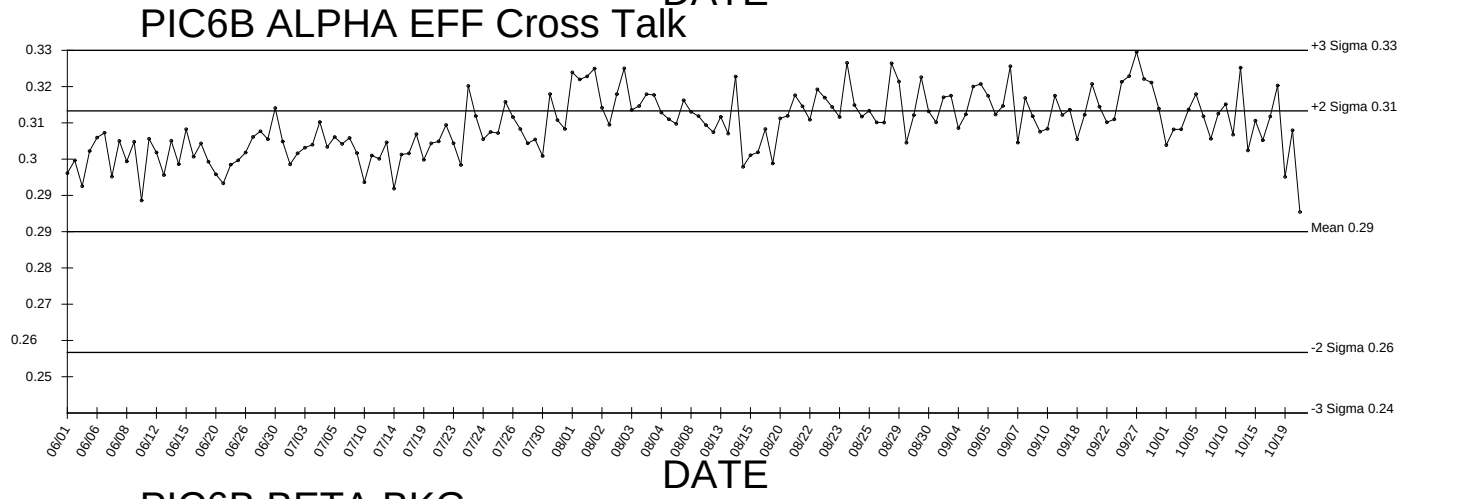

PIC5D ALPHA BKG
Generated 10/22/2018
CPM
0.36
0.33
0.29
0.26
0.22
0.19
0.15
0.12
0.0799
0.0443
+3 Sigma 0.36
+2 Sigma 0.31
Mean 0.19
-2 Sigma 0.07
-3 Sigma 0.01
01/02 01/15 01/24 01/30 02/07 02/15 02/22 03/01 03/10 03/20 03/29 04/07 04/16 04/21 05/01 05/09 05/16 05/23 06/02 06/08 06/14 06/18 06/21 06/28 07/04 07/10 07/18 07/27 08/07 08/14 08/17 08/23 08/27 09/04 09/11 09/18 09/21 09/25 10/02 10/05 10/11 10/17
DATE
PIC5D ALPHA EFF
CPM
11610
11494
11378
11262
11146
11030
10914
10798
10682
10566
+3 Sigma 11610
+2 Sigma 11400
Mean 11030
-2 Sigma 10600
-3 Sigma 10450
01/02 01/11 01/18 01/25 02/01 02/07 02/14 02/21 02/28 03/07 03/14 03/22 03/29 04/05 04/12 04/19 04/26 05/03 05/10 05/17 05/24 06/02 06/09 06/17 06/25 07/02 07/09 07/16 07/23 07/30 08/06 08/13 08/20 08/27 09/05 09/12 09/24 09/29 10/05 10/12 10/19
DATE
PIC5D ALPHA EFF Cross Talk
0.27
0.27
0.27
0.27
0.27
0.26
0.26
0.26
0.26
0.25
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
01/05 01/12 01/19 01/26 02/02 02/08 02/15 02/22 03/01 03/08 03/15 03/23 03/30 04/06 04/13 04/20 04/27 05/04 05/11 05/18 05/25 06/04 06/11 06/18 06/26 07/03 07/10 07/17 07/24 07/31 08/07 08/14 08/21 08/28 09/06 09/17 09/24 09/29 10/05 10/12 10/19
DATE
PIC5D BETA BKG
CPM
2.07
1.87
1.66
1.46
1.25
1.05
0.84
0.63
0.43
0.22
+3 Sigma 2.07
+2 Sigma 1.73
Mean 1.05
-2 Sigma 0.36
-3 Sigma 0.02
01/02 01/11 01/17 01/24 01/30 02/05 02/09 02/15 02/20 02/23 03/01 03/07 03/16 03/22 03/28 04/03 04/10 04/14 04/19 04/25 05/01 05/08 05/14 05/21 05/30 06/08 06/15 06/20 06/28 07/06 07/14 07/31 08/09 08/15 08/22 08/29 09/07 09/17 09/25 10/01 10/04 10/09 10/13 10/19
DATE
● Denotes Outlier

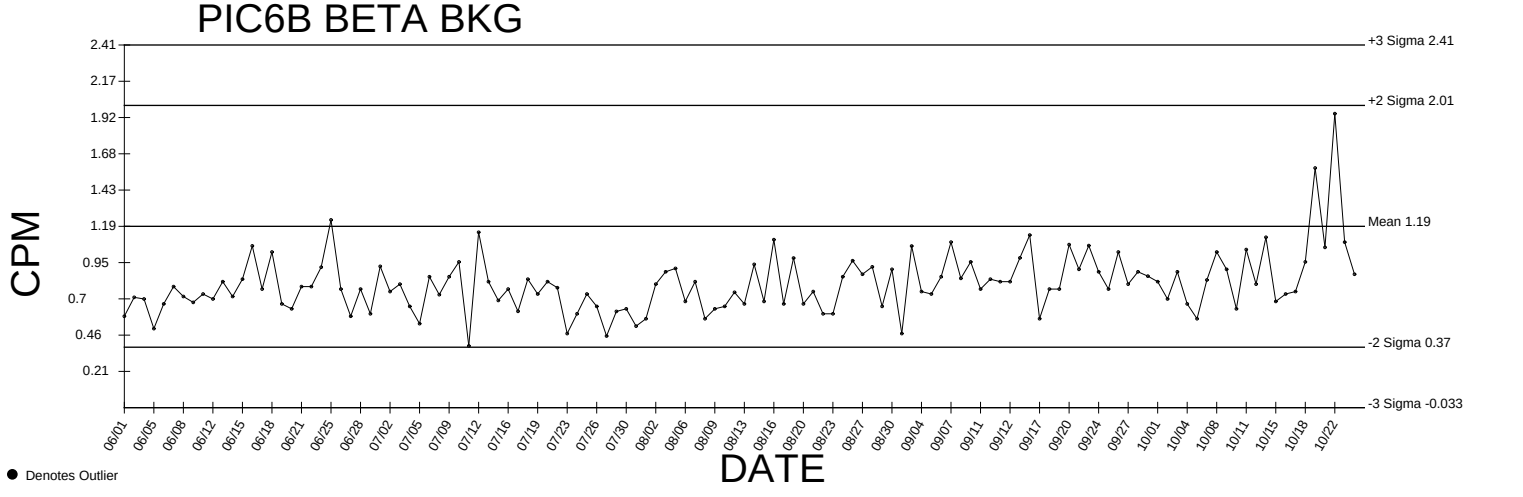


● Denotes Outlier

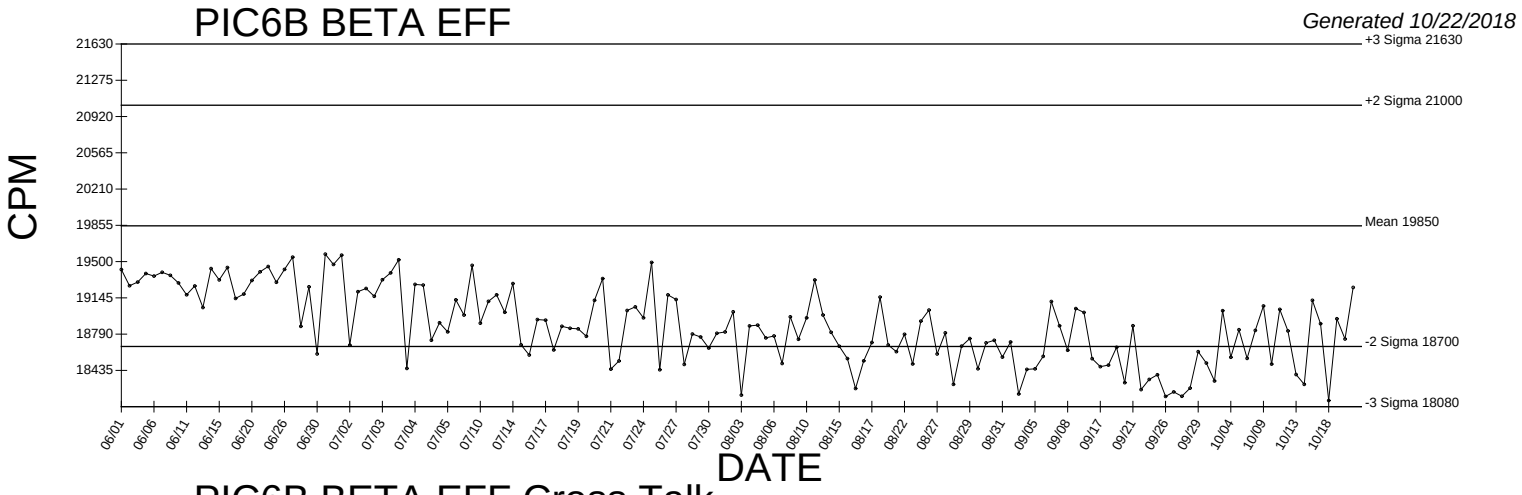


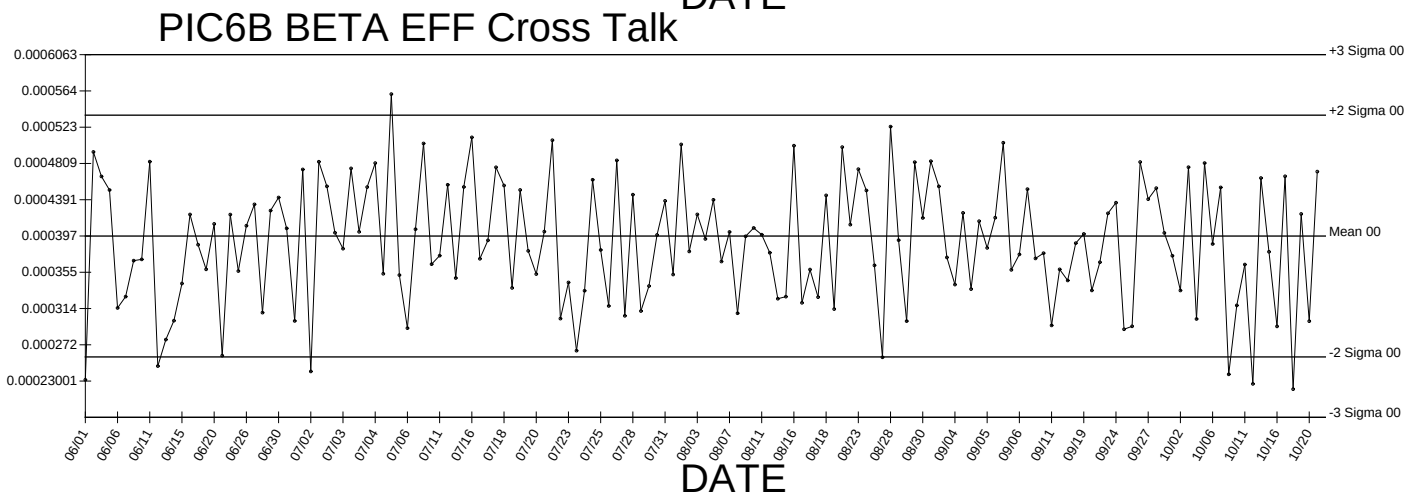




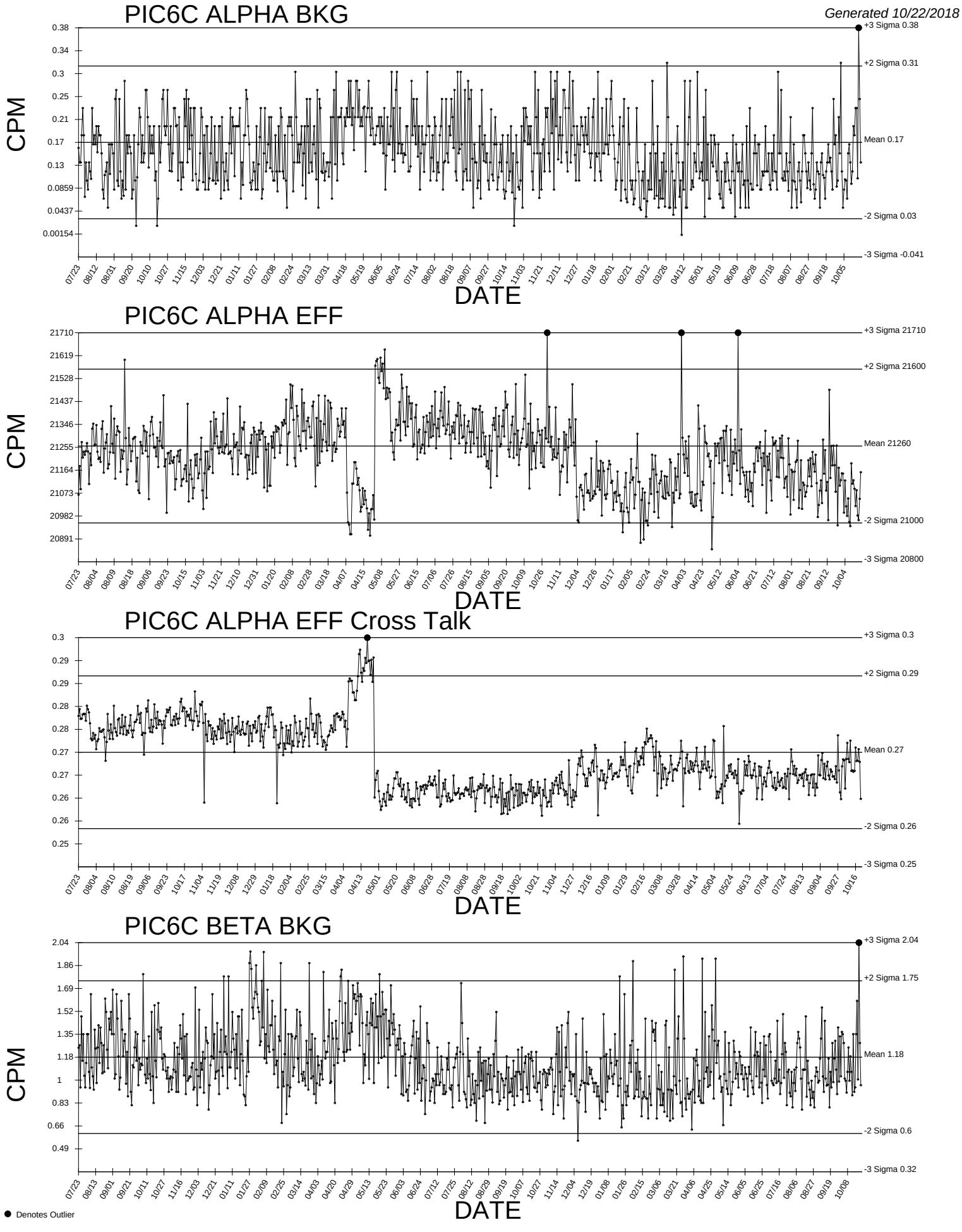


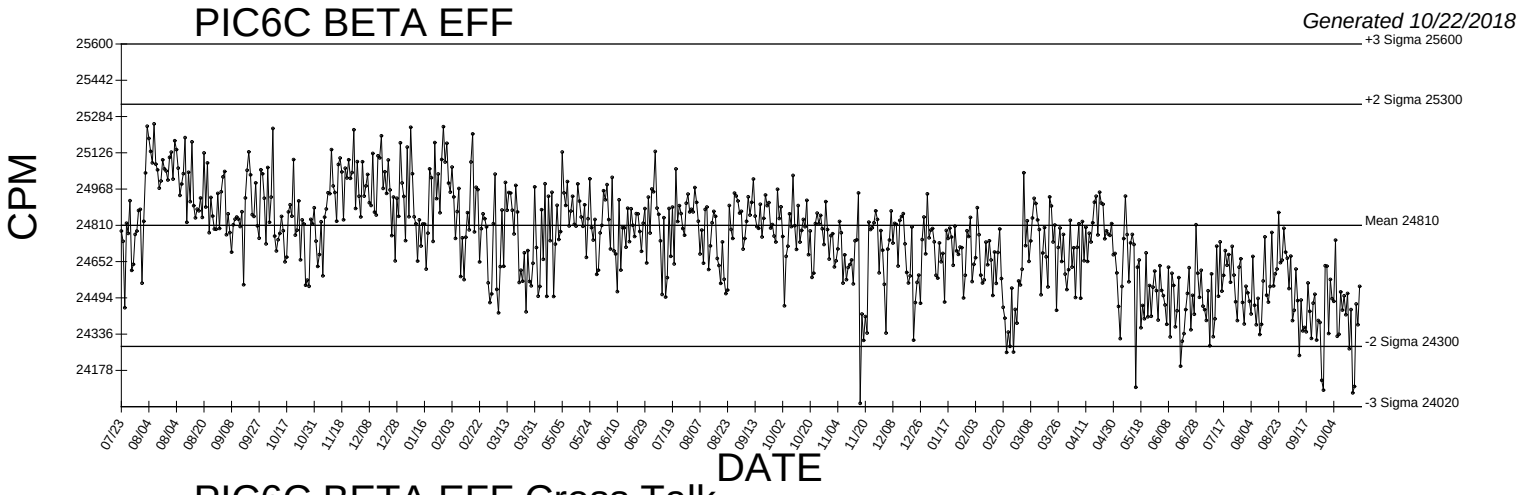
● Denotes Outlier

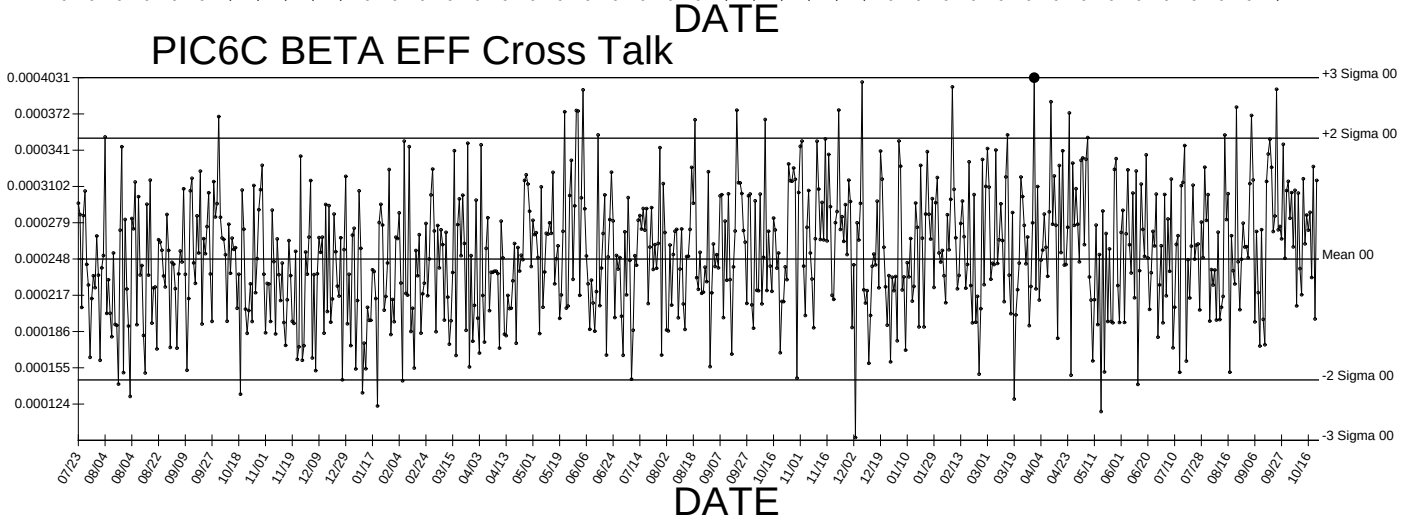




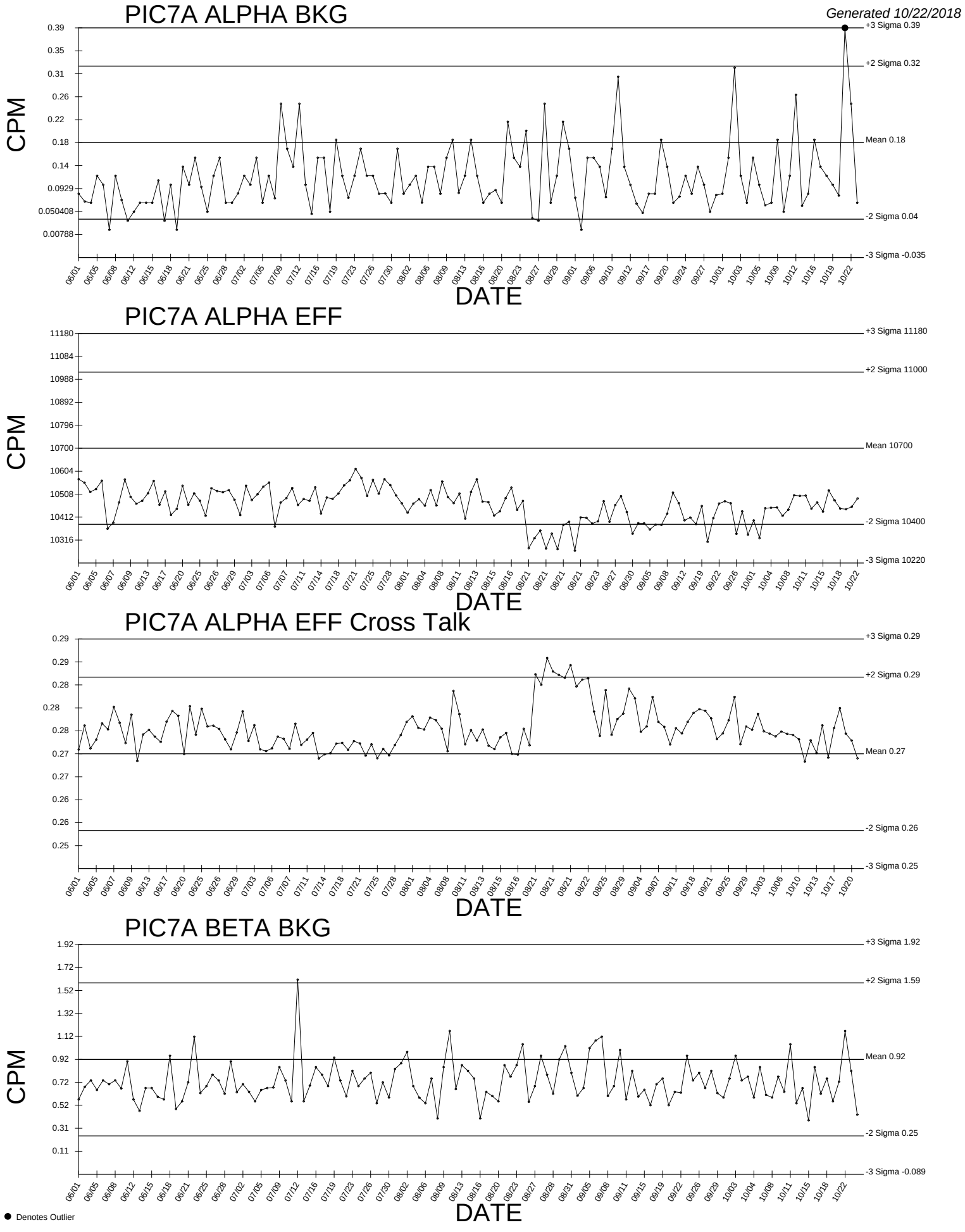
● Denotes Outlier

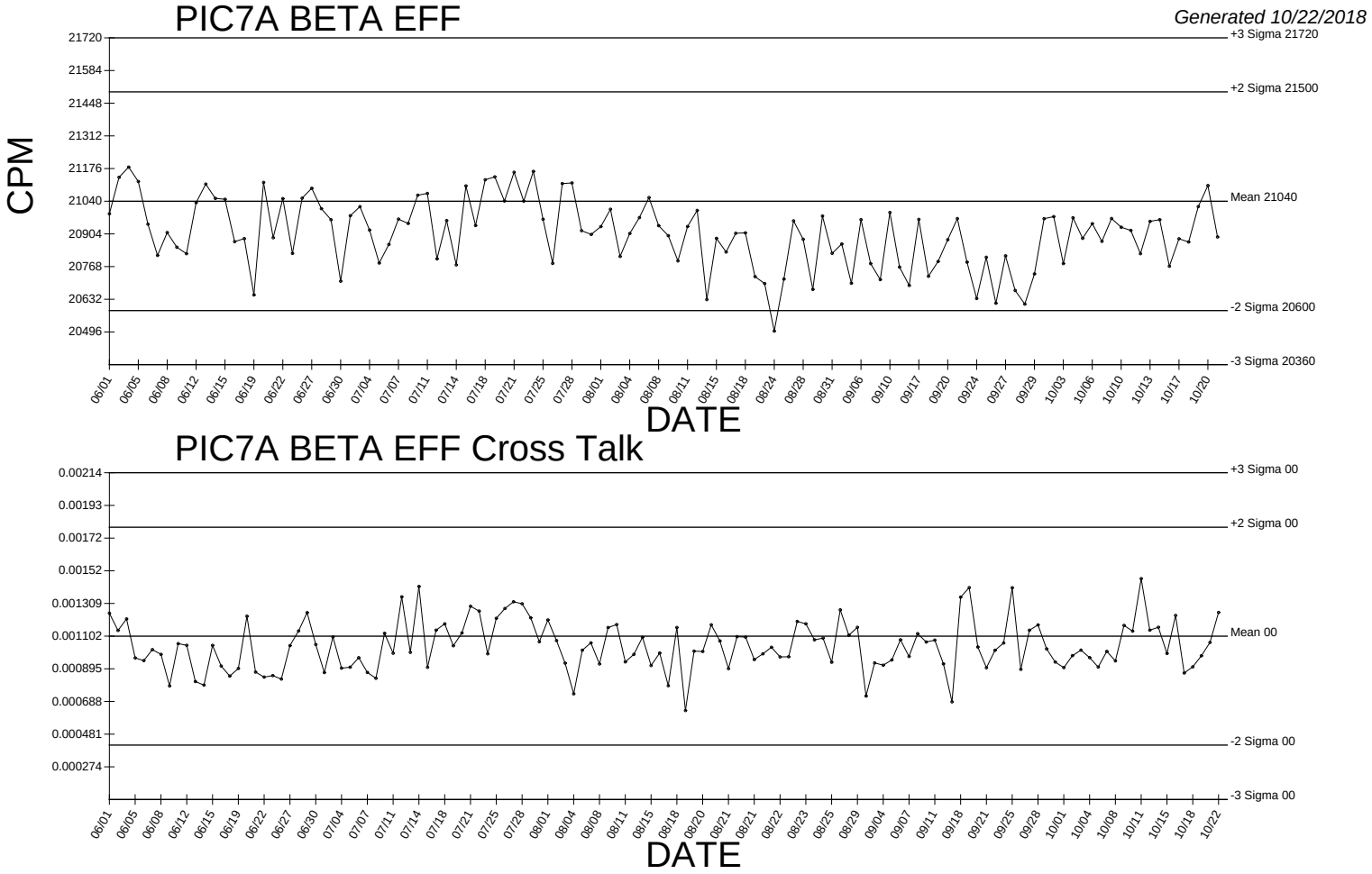

PIC6C ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.31
Mean 0.17
-2 Sigma 0.03
-3 Sigma -0.041
PIC6C ALPHA EFF
+3 Sigma 21710
+2 Sigma 21600
Mean 21260
-2 Sigma 21000
-3 Sigma 20800
PIC6C ALPHA EFF Cross Talk
+3 Sigma 0.3
+2 Sigma 0.29
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.25
PIC6C BETA BKG
+3 Sigma 2.04
+2 Sigma 1.75
Mean 1.18
-2 Sigma 0.6
-3 Sigma 0.32
Denotes Outlier



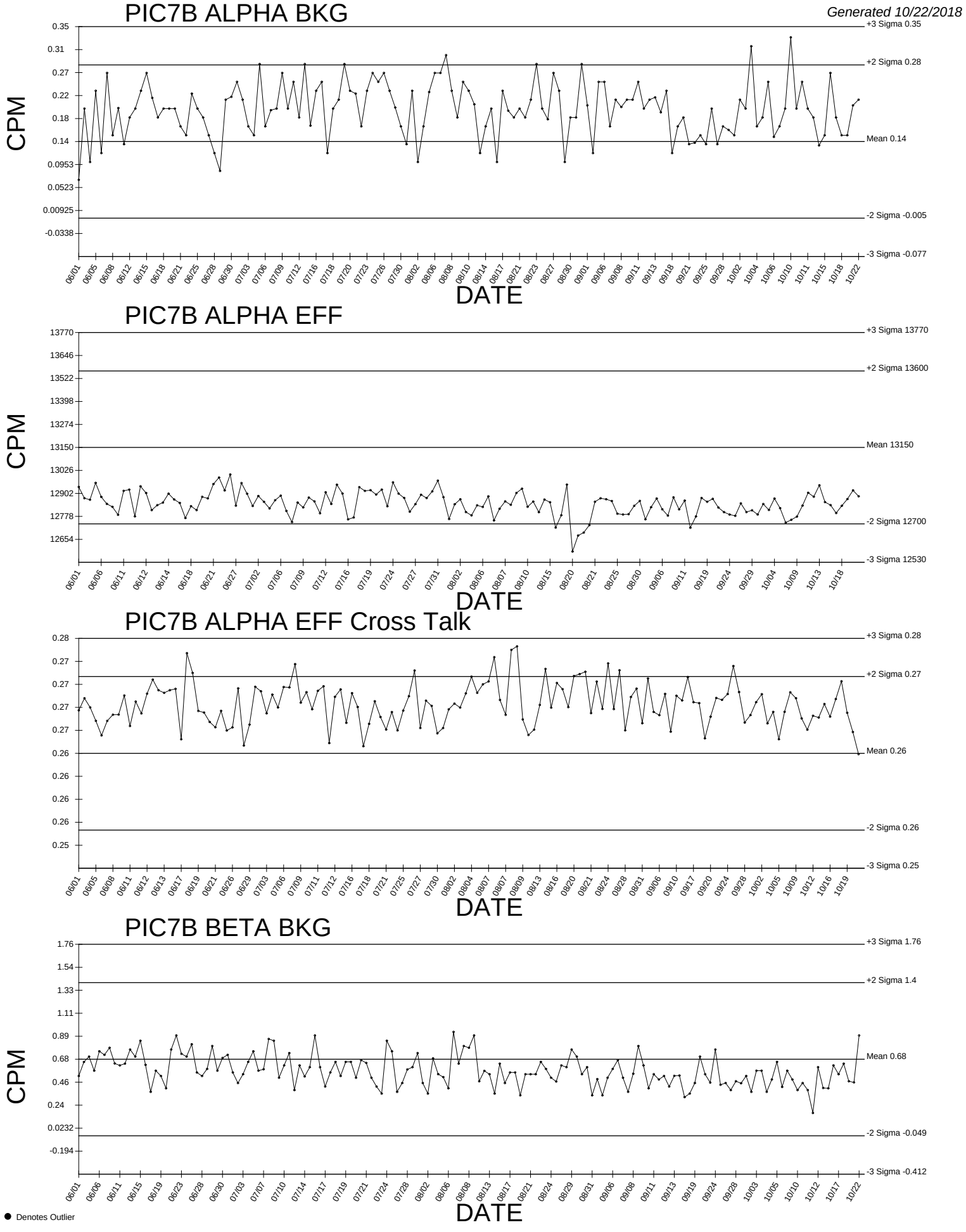


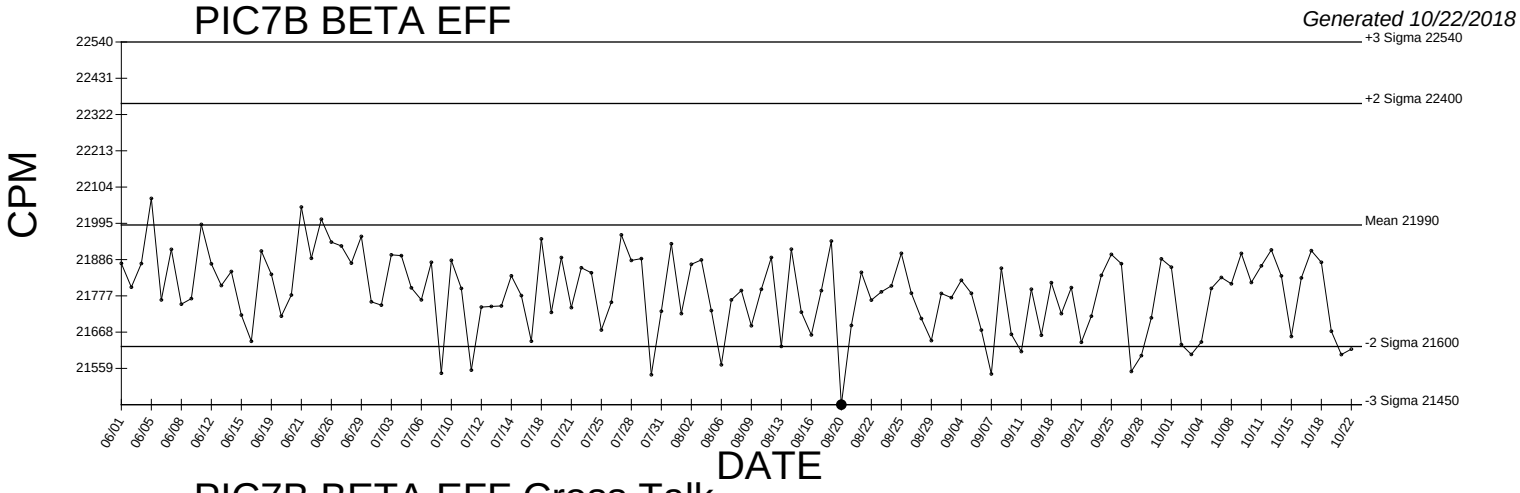
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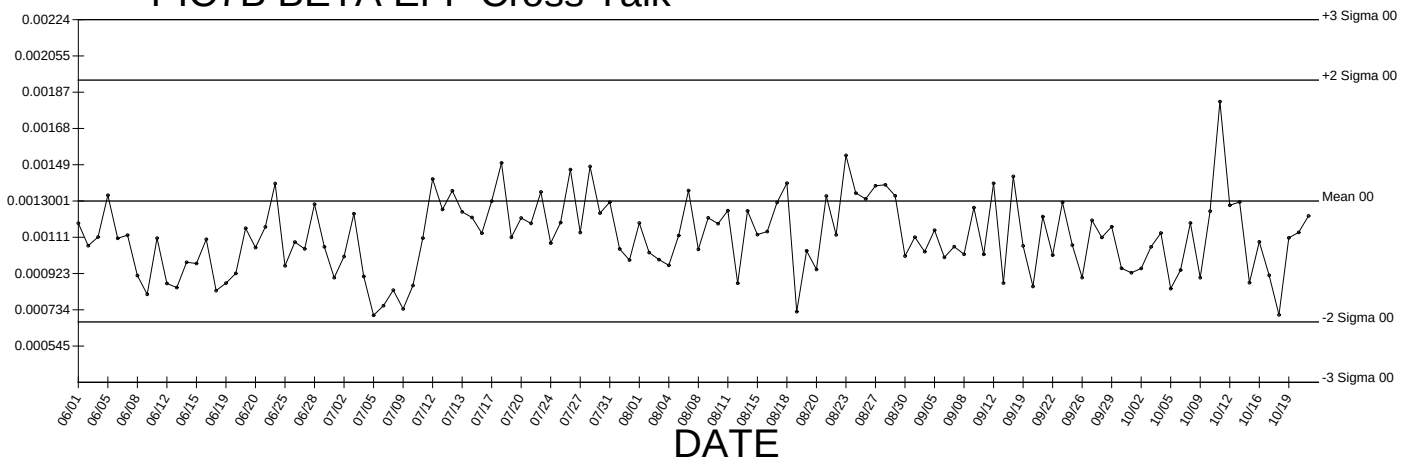

PIC7A ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.39
+2 Sigma 0.32
Mean 0.18
-2 Sigma 0.04
-3 Sigma -0.035
PIC7A ALPHA EFF
+3 Sigma 11180
+2 Sigma 11000
Mean 10700
-2 Sigma 10400
-3 Sigma 10220
PIC7A ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.29
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.25
PIC7A BETA BKG
+3 Sigma 1.92
+2 Sigma 1.59
Mean 0.92
-2 Sigma 0.25
-3 Sigma -0.089
Denotes Outlier



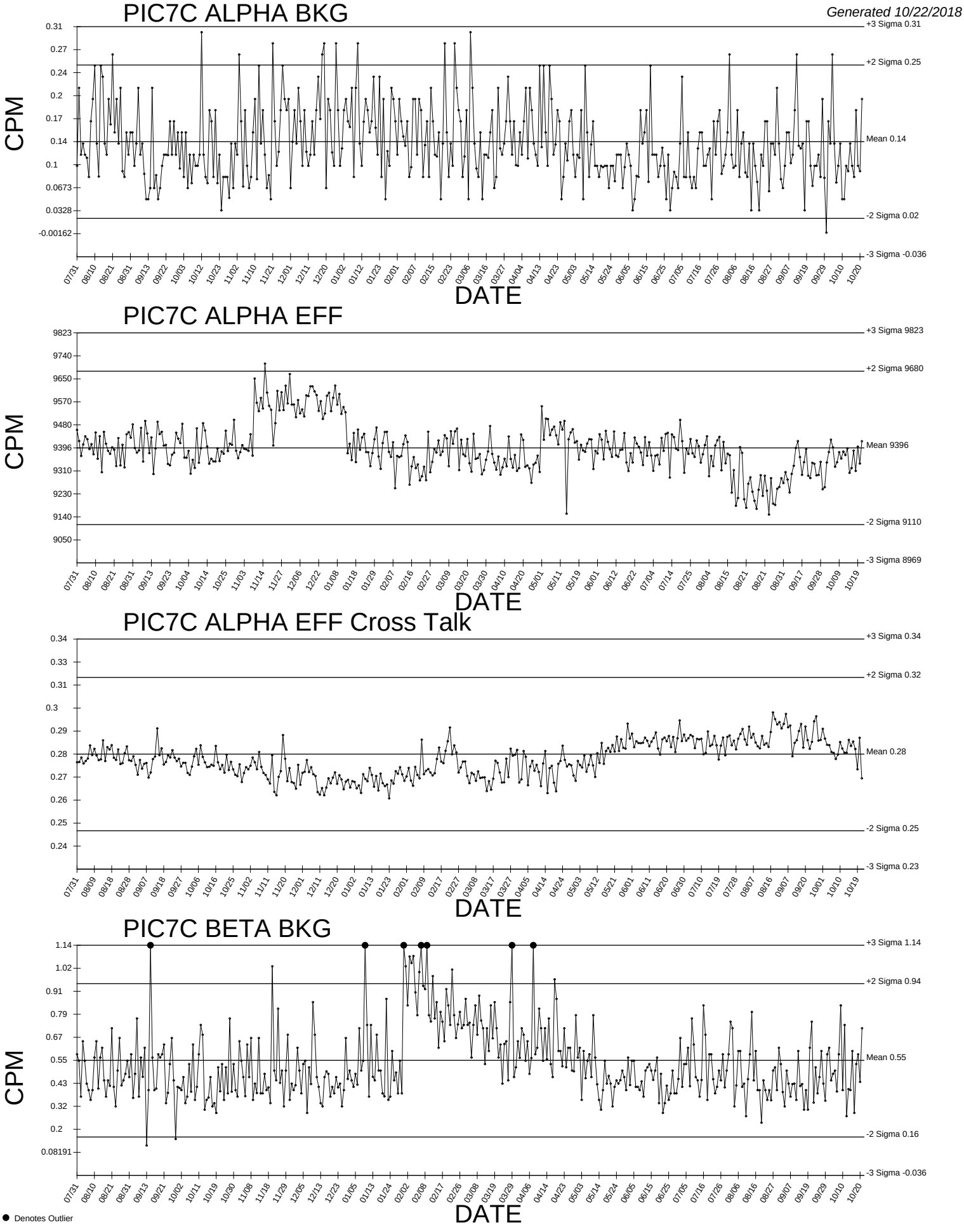
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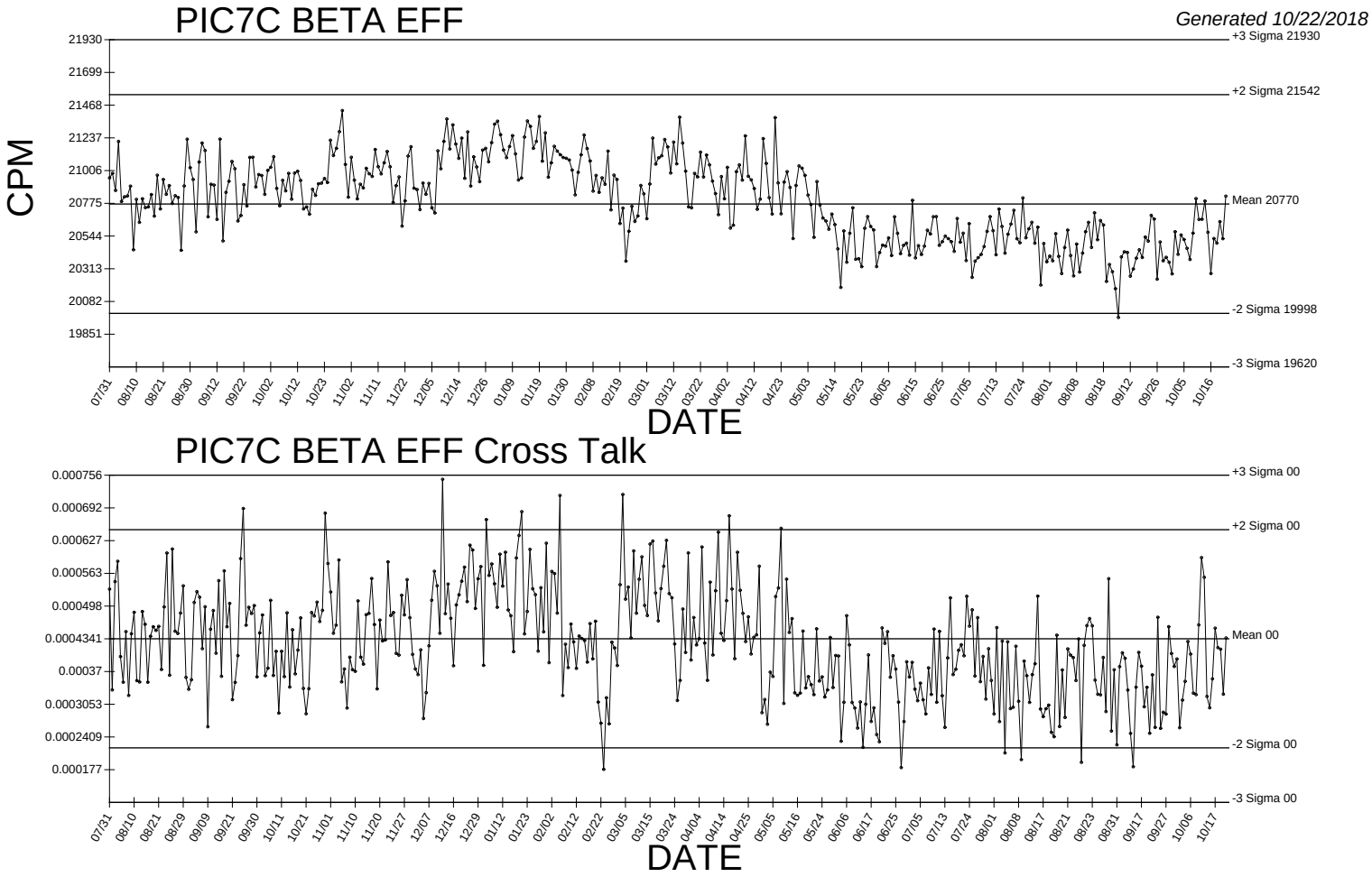

PIC7B ALPHA BKG
Generated 10/22/2018
CPM
0.35
0.31
0.27
0.22
0.18
0.14
0.0953
0.0523
0.00925
-0.0338
+3 Sigma 0.35
+2 Sigma 0.28
Mean 0.14
-2 Sigma -0.005
-3 Sigma -0.077
DATE
PIC7B ALPHA EFF
CPM
13770
13646
13522
13398
13274
13150
13026
12902
12778
12654
+3 Sigma 13770
+2 Sigma 13600
Mean 13150
-2 Sigma 12700
-3 Sigma 12530
DATE
PIC7B ALPHA EFF Cross Talk
0.28
0.27
0.27
0.27
0.27
0.26
0.26
0.26
0.26
0.25
+3 Sigma 0.28
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
DATE
PIC7B BETA BKG
CPM
1.76
1.54
1.33
1.11
0.89
0.68
0.46
0.24
0.0232
-0.194
+3 Sigma 1.76
+2 Sigma 1.4
Mean 0.68
-2 Sigma -0.049
-3 Sigma -0.412
DATE
● Denotes Outlier



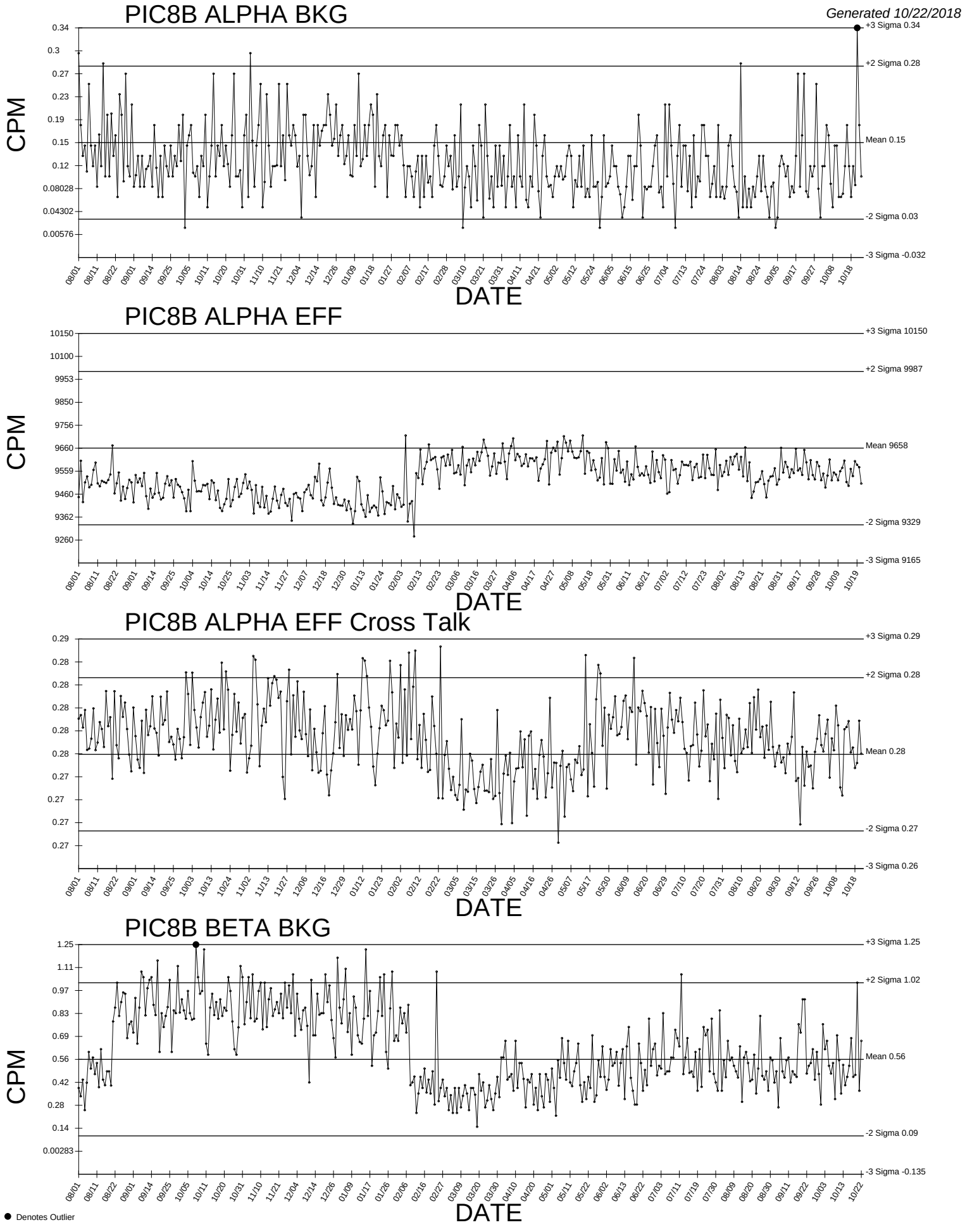


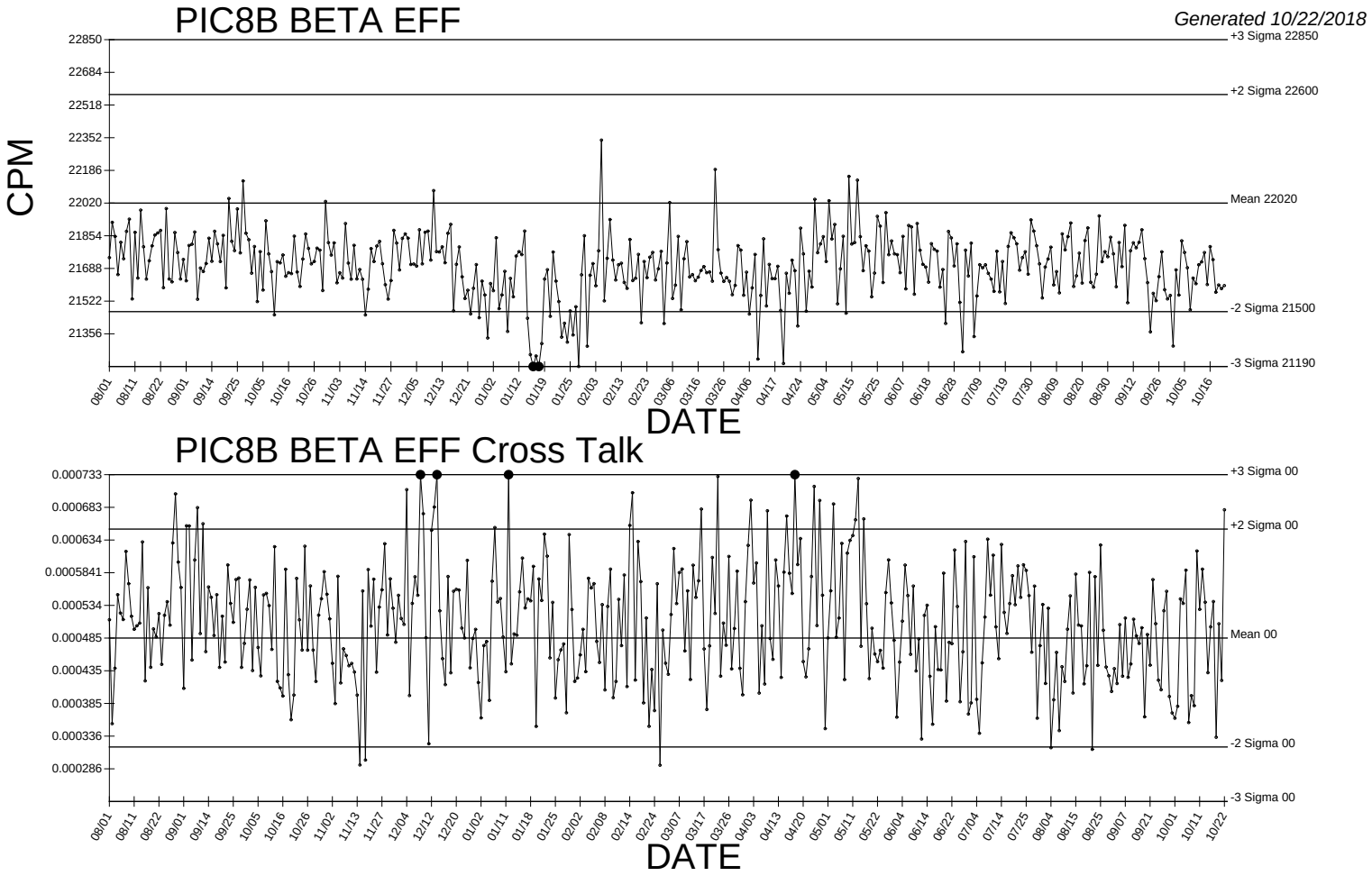
● Denotes Outlier


PIC7C ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.31
+2 Sigma 0.25
Mean 0.14
-2 Sigma 0.02
-3 Sigma -0.036
PIC7C ALPHA EFF
+3 Sigma 9823
+2 Sigma 9680
Mean 9396
-2 Sigma 9110
-3 Sigma 8969
PIC7C ALPHA EFF Cross Talk
+3 Sigma 0.34
+2 Sigma 0.32
Mean 0.28
-2 Sigma 0.25
-3 Sigma 0.23
PIC7C BETA BKG
+3 Sigma 1.14
+2 Sigma 0.94
Mean 0.55
-2 Sigma 0.16
-3 Sigma -0.036
● Denotes Outlier

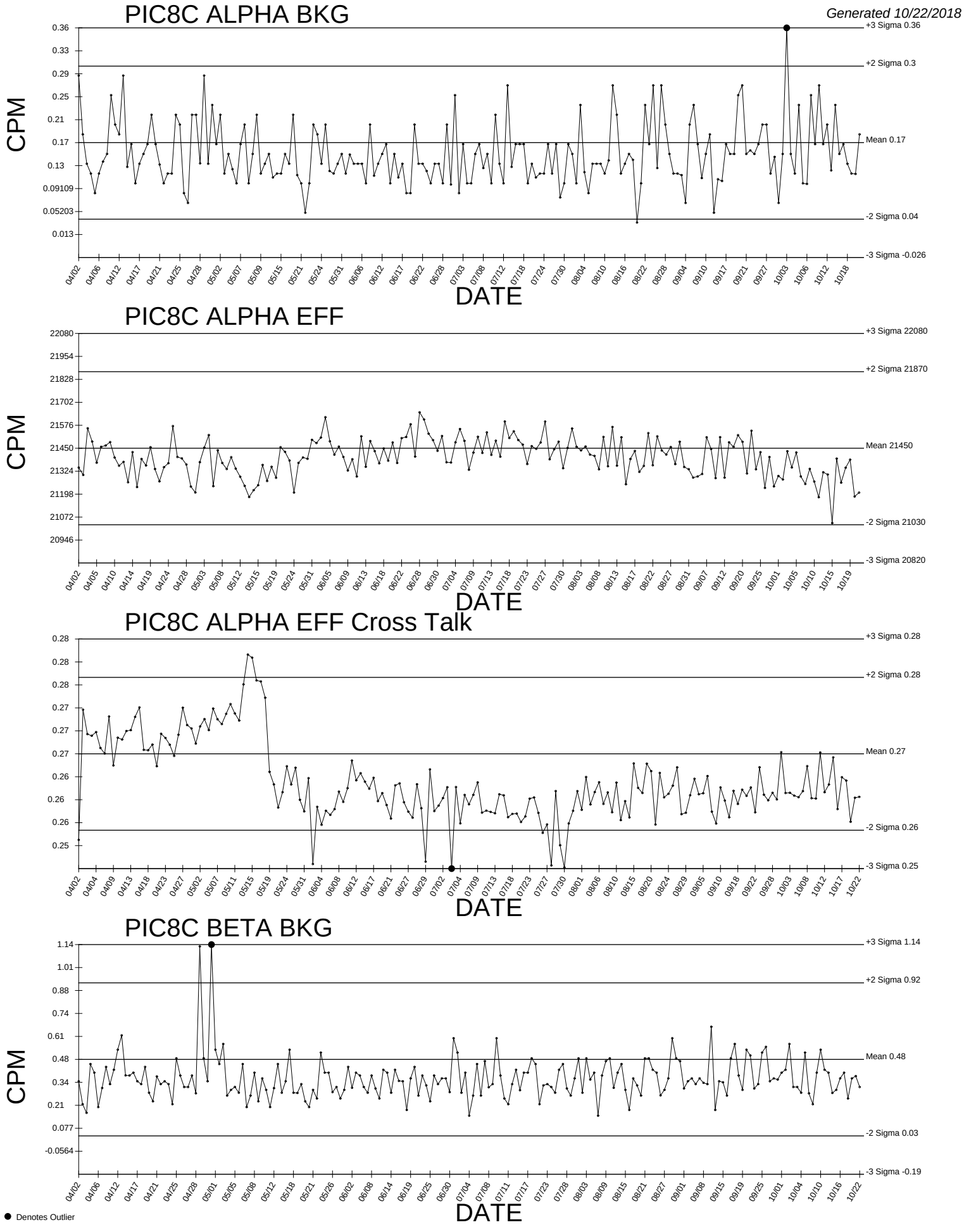


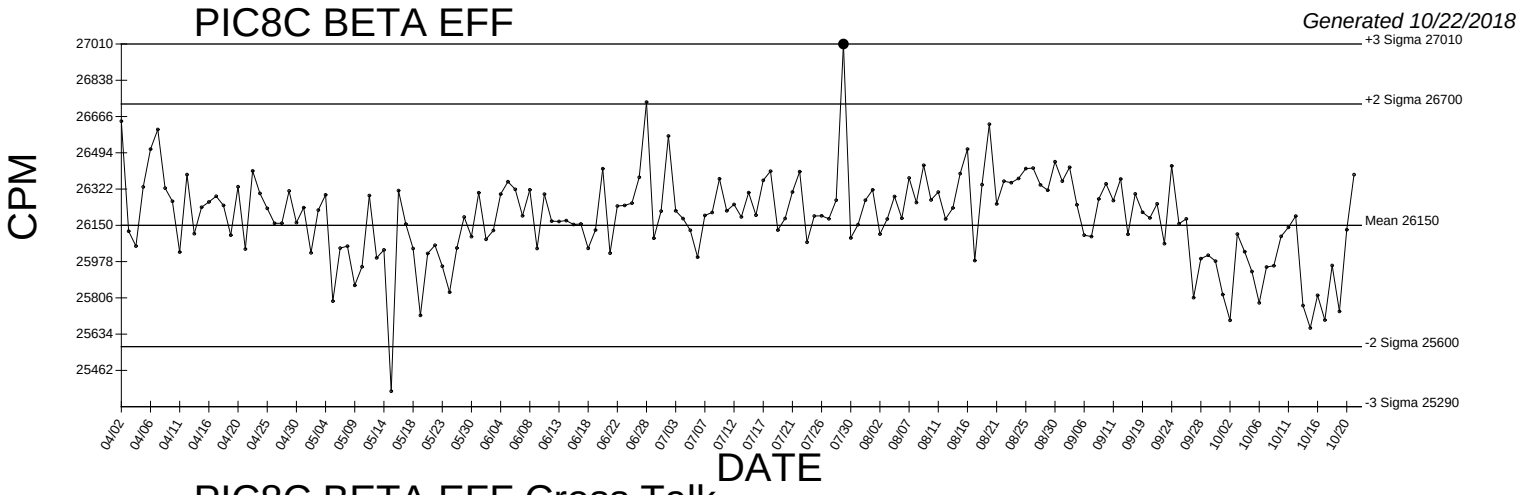
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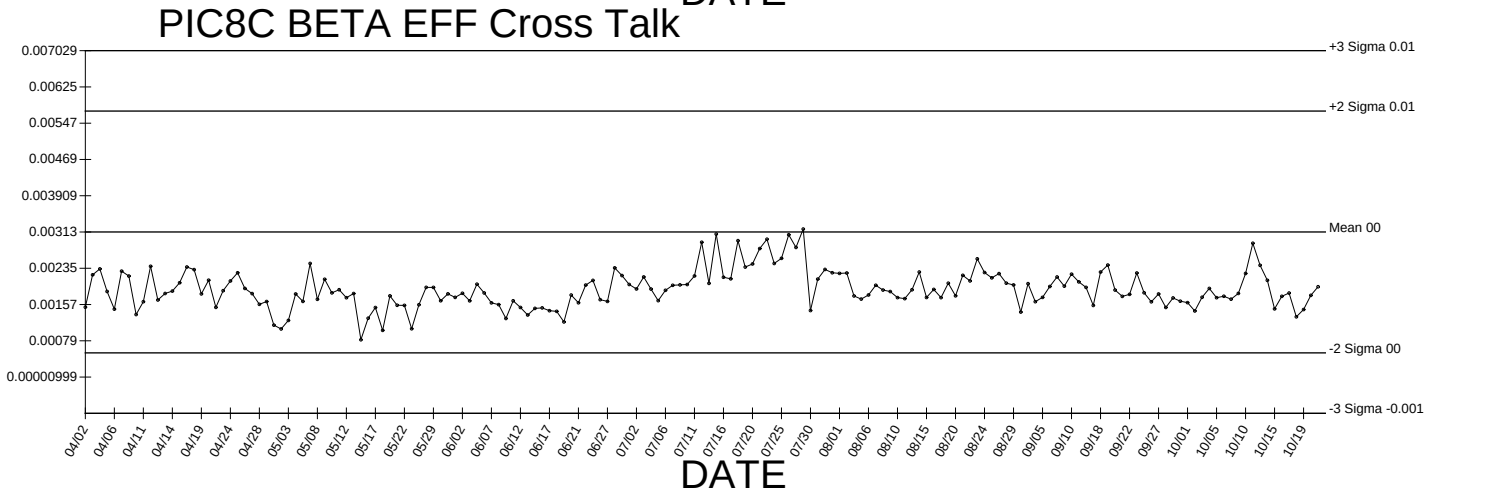

PIC8B ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.34
+2 Sigma 0.28
Mean 0.15
-2 Sigma 0.03
-3 Sigma -0.032
PIC8B ALPHA EFF
+3 Sigma 10150
+2 Sigma 9987
Mean 9658
-2 Sigma 9329
-3 Sigma 9165
PIC8B ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.28
-2 Sigma 0.27
-3 Sigma 0.26
PIC8B BETA BKG
+3 Sigma 1.25
+2 Sigma 1.02
Mean 0.56
-2 Sigma 0.09
-3 Sigma -0.135
● Denotes Outlier



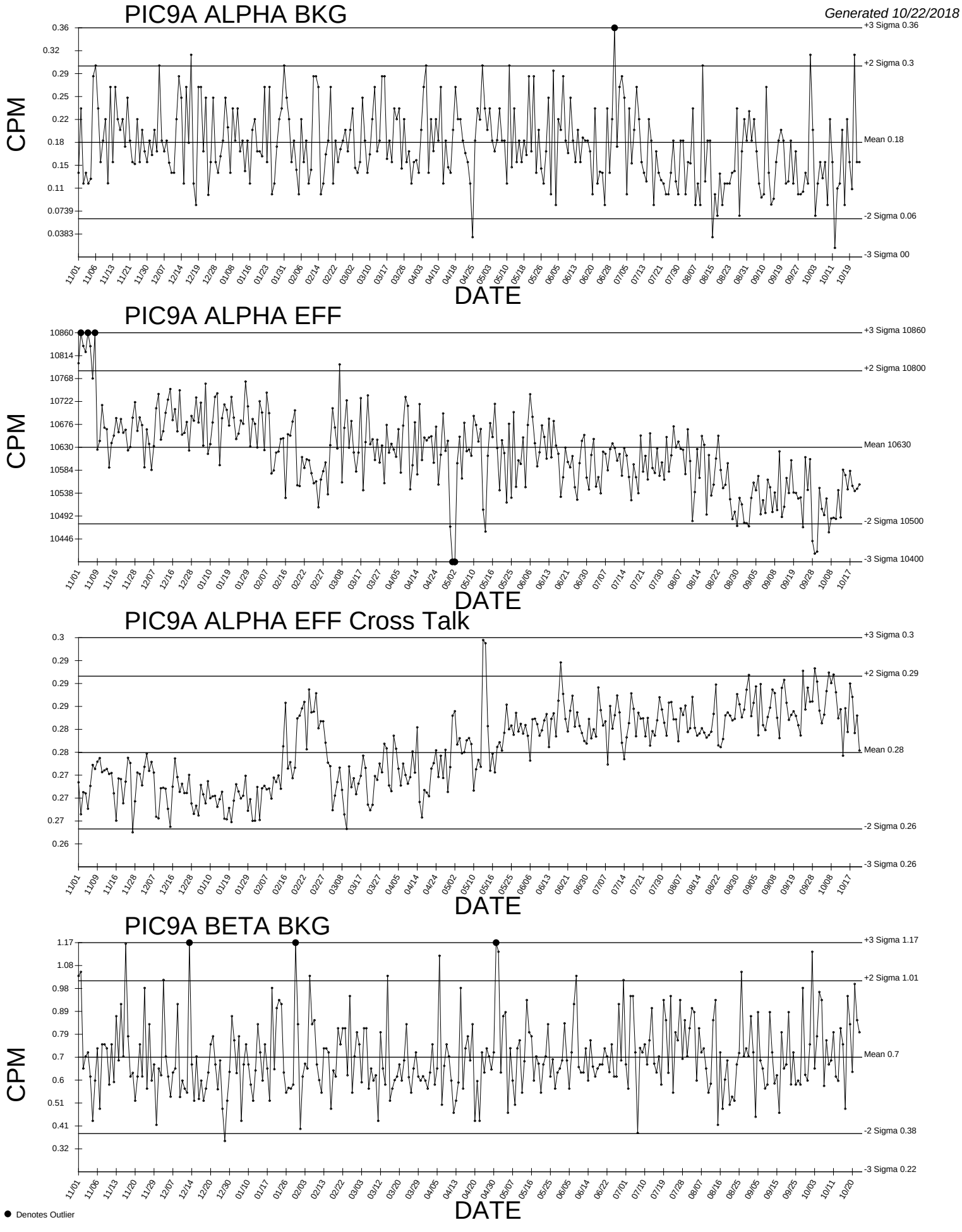
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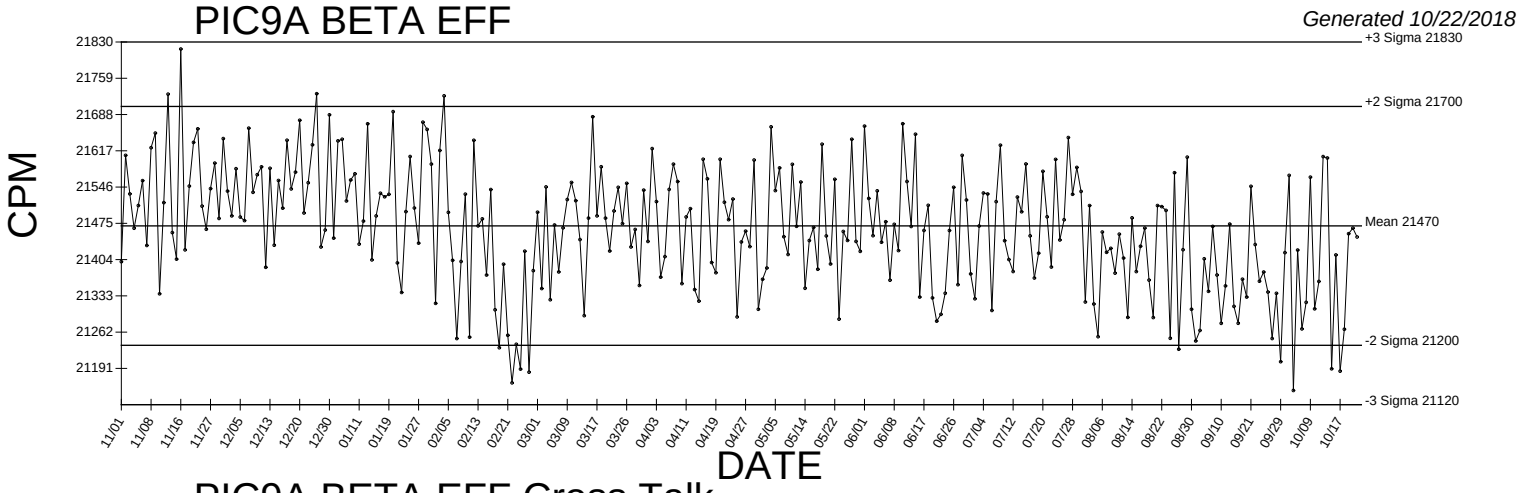

PIC8C ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.36
+2 Sigma 0.3
Mean 0.17
-2 Sigma 0.04
-3 Sigma -0.026
PIC8C ALPHA EFF
+3 Sigma 22080
+2 Sigma 21870
Mean 21450
-2 Sigma 21030
-3 Sigma 20820
PIC8C ALPHA EFF Cross Talk
+3 Sigma 0.28
+2 Sigma 0.28
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.25
PIC8C BETA BKG
+3 Sigma 1.14
+2 Sigma 0.92
Mean 0.48
-2 Sigma 0.03
-3 Sigma -0.19
Denotes Outlier

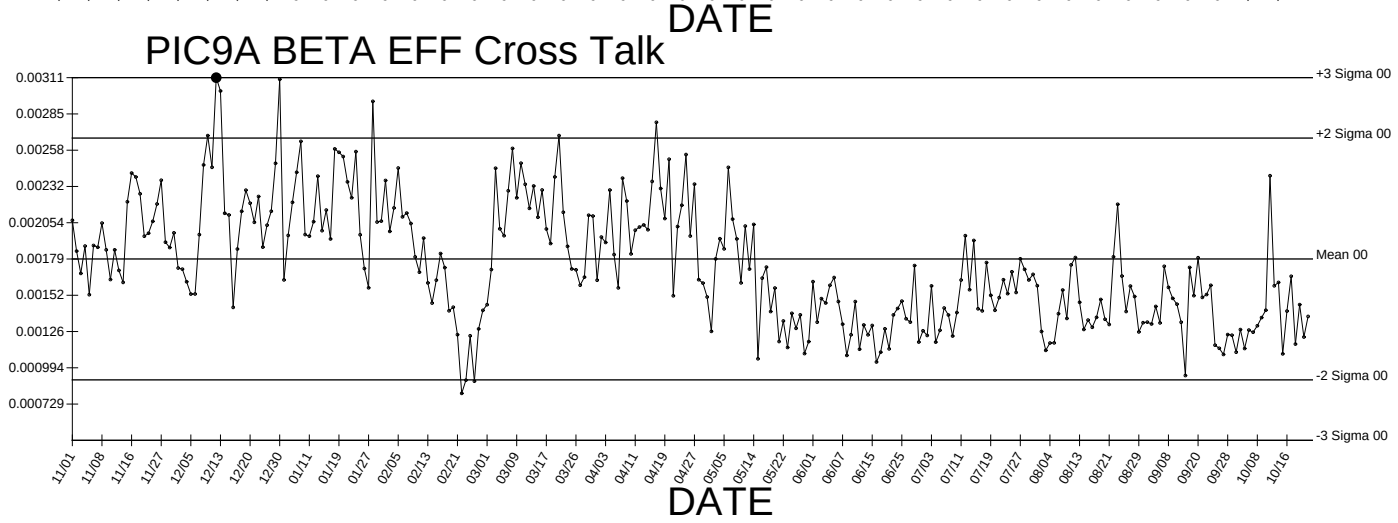




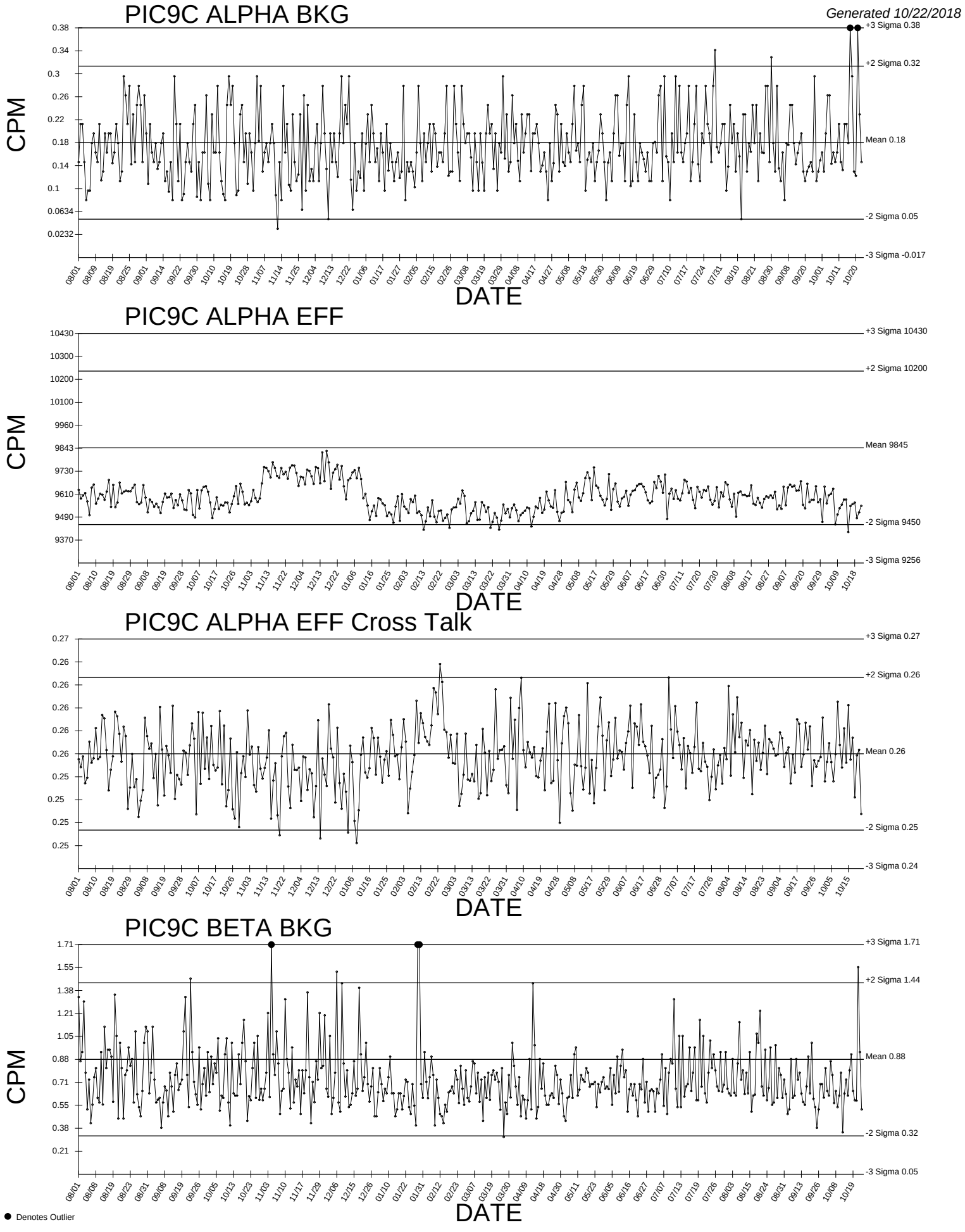
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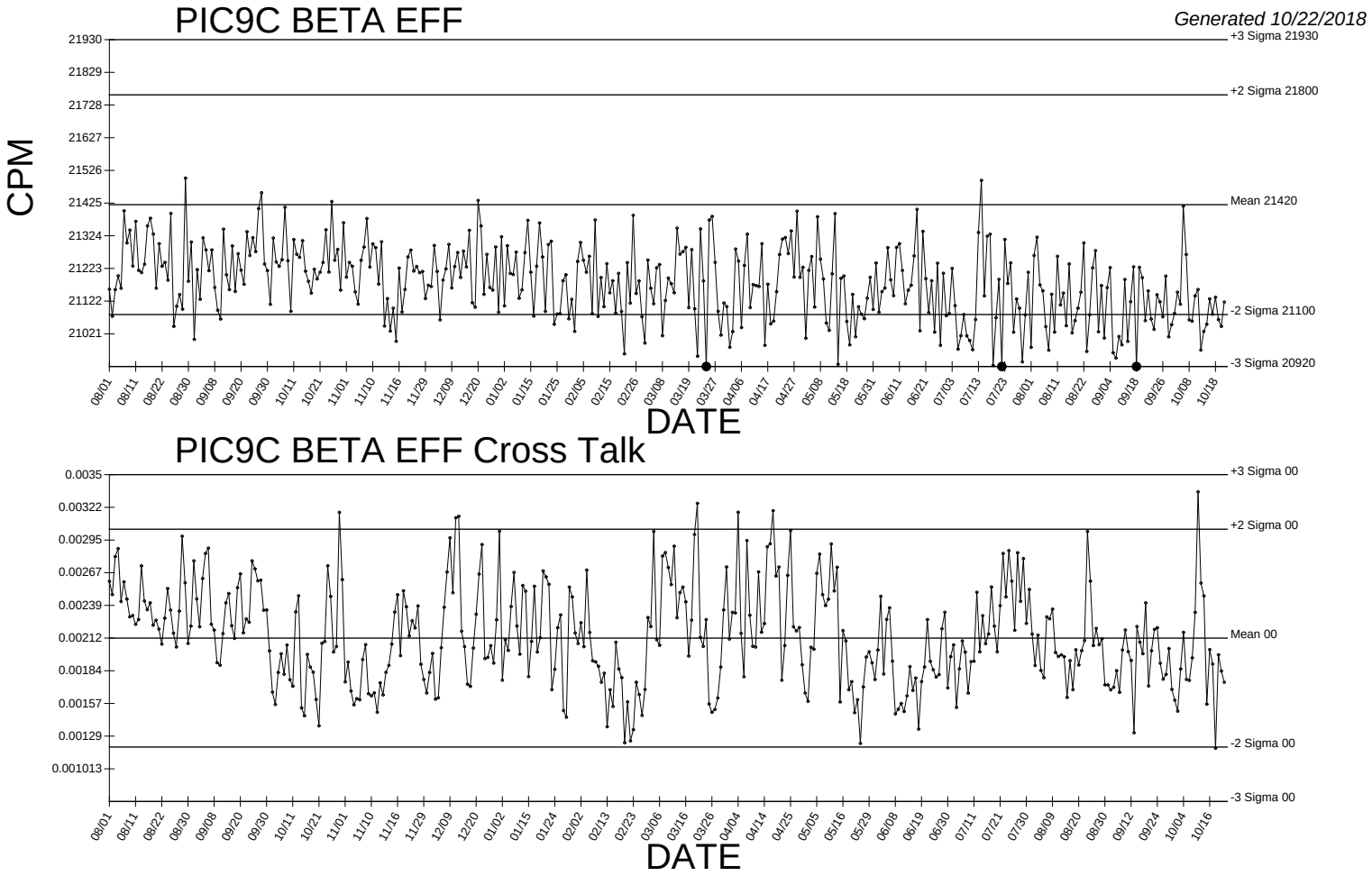

PIC9A ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.36
+2 Sigma 0.3
Mean 0.18
-2 Sigma 0.06
-3 Sigma 00
PIC9A ALPHA EFF
+3 Sigma 10860
+2 Sigma 10800
Mean 10630
-2 Sigma 10500
-3 Sigma 10400
PIC9A ALPHA EFF Cross Talk
+3 Sigma 0.3
+2 Sigma 0.29
Mean 0.28
-2 Sigma 0.26
-3 Sigma 0.26
PIC9A BETA BKG
+3 Sigma 1.17
+2 Sigma 1.01
Mean 0.7
-2 Sigma 0.38
-3 Sigma 0.22
Denotes Outlier



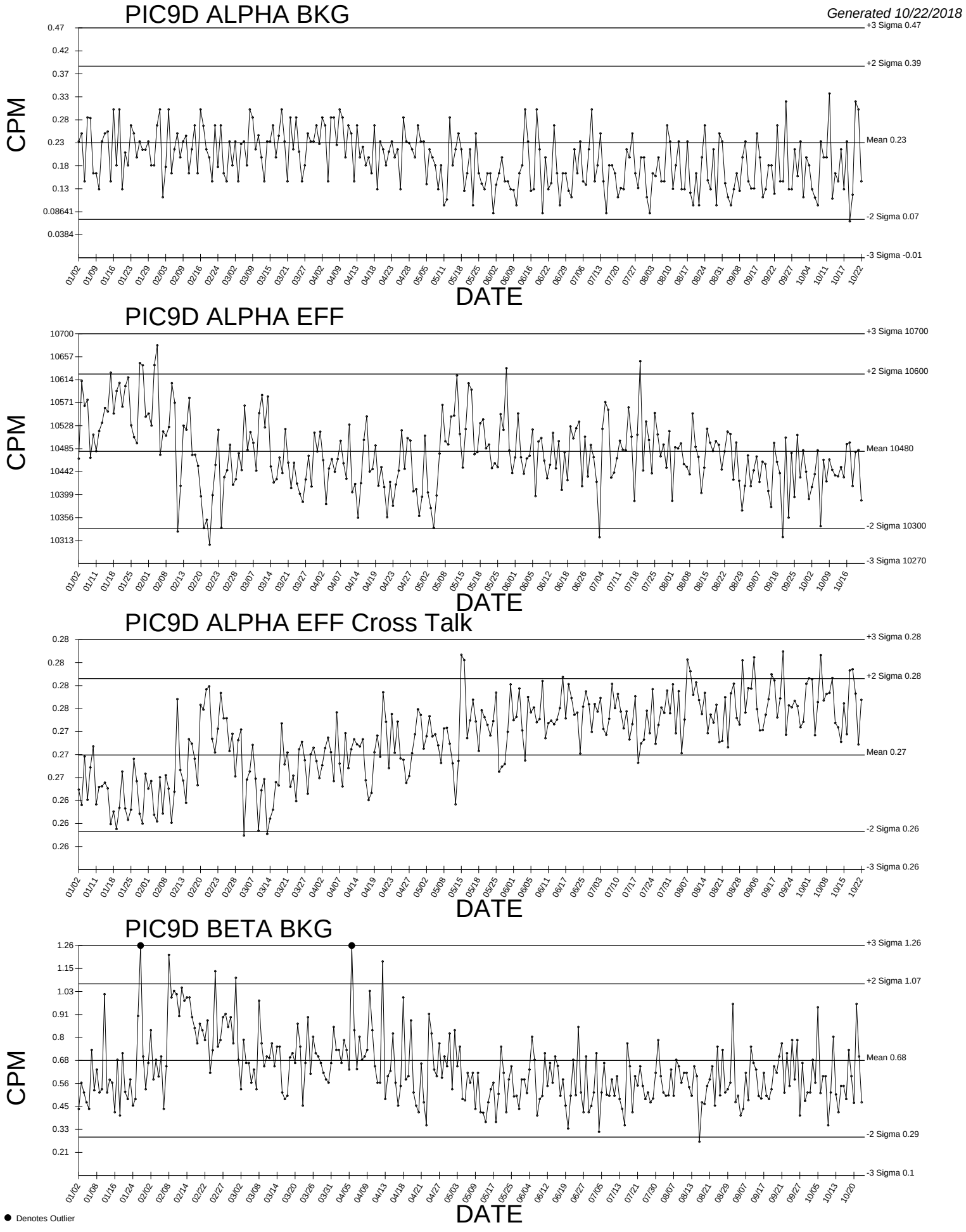


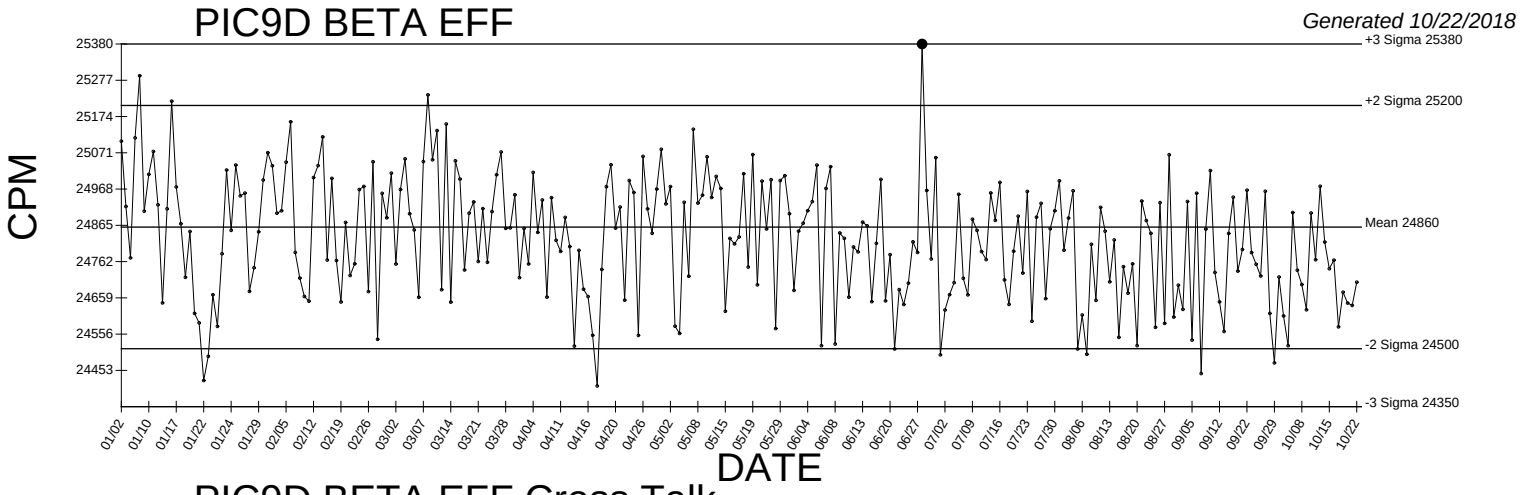
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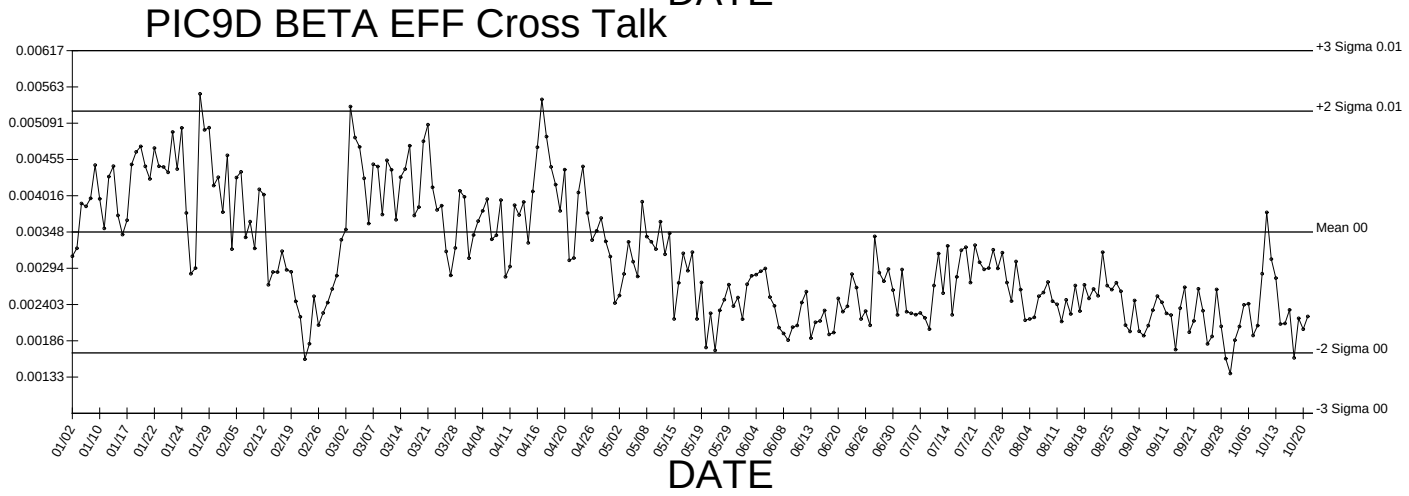

PIC9C ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.32
Mean 0.18
-2 Sigma 0.05
-3 Sigma -0.017
PIC9C ALPHA EFF
+3 Sigma 10430
+2 Sigma 10200
Mean 9845
-2 Sigma 9450
-3 Sigma 9256
PIC9C ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.26
Mean 0.26
-2 Sigma 0.25
-3 Sigma 0.24
PIC9C BETA BKG
+3 Sigma 1.71
+2 Sigma 1.44
Mean 0.88
-2 Sigma 0.32
-3 Sigma 0.05
● Denotes Outlier



● Denotes Outlier


PIC9D ALPHA BKG
Generated 10/22/2018
CPM
DATE
+3 Sigma 0.47
+2 Sigma 0.39
Mean 0.23
-2 Sigma 0.07
-3 Sigma -0.01
PIC9D ALPHA EFF
+3 Sigma 10700
+2 Sigma 10600
Mean 10480
-2 Sigma 10300
-3 Sigma 10270
PIC9D ALPHA EFF Cross Talk
+3 Sigma 0.28
+2 Sigma 0.28
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.26
PIC9D BETA BKG
+3 Sigma 1.26
+2 Sigma 1.07
Mean 0.68
-2 Sigma 0.29
-3 Sigma 0.1
Denotes Outlier





● Denotes Outlier

RAD Standards Traceability

0487

National Institute of Standards & Technology

0487

Certificate

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

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Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have an acid concentration and a carrier concentration comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

*Notes and references are on pages 5 and 6.

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PROPERTIES OF SRM 4251C
(Certified values are shown in bold type)

Source identification number	NIST SRM 4251C		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution density	**(1.015 ± 0.002) g•mL^{-1} at 22.1 °C** [b]*		
Solution mass	**(5.054 ± 0.001) g** [b]		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol•L^{-1})	Mass Fraction (g•g^{-1})
	H_2O HCl $BaCl_2$ $^{133}BaCl_2$	54 1.0 6×10^{-4} 4×10^{-7}	0.96 0.04 1.2×10^{-4} 8×10^{-8}
Radiological Properties:			
Radionuclide	**Barium-133**		
Reference time	**1200 EST, 1 September 1993**		
Massic activity of the solution [c] (Activity per unit mass of solution)	**4.876×10^5 Bq•g^{-1}**		
Relative expanded uncertainty (k=2)	**0.52%** [d]		
Photon-emitting impurities	None detected [e]		
Half lives used	Barium-133: (10.52 ± 0.13) a [f] Radium-226: (1600 ± 7) a [f]		
Measuring instrument	Pressurized "4π"γ ionization chamber A calibrated using a barium-133 solution whose activity was determined by 4π(e+X)-γ-anticoincidence counting		

*Notes and references are on pages 5 and 6.

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EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i, the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [g]	Relative Sensitivity Factor, $\lvert\partial y/\partial x_i\rvert \cdot (x_i/y)$ [h]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [i]
PIC A net response per gram of SRM 4251C, measured relative to RRS20 [j]	Standard deviation of the mean for 1000 repeated measurements (A)	0.008	1.0	0.01
PIC A background response, measured relative to RRS20	Standard deviation of the mean for >150 repeated measurements (A)	0.25	0.001 [k]	0.00
PIC A net response for RRS200, measured relative to RRS20	Standard deviation of the mean for >100 repeated measurements (A)	0.06	1.0	0.06
PIC A net response per Bq of barium-133 in solution, measured relative to RRS200.	Standard deviation of the mean for 240 repeated measurements (A)	0.02	1.0	0.02
Gravimetric measurements	Estimated (B)	0.01	1.0	0.01
Half life of barium-133 Half life of radium-226	Standard uncertainty of the half life (A)	1.24 [m] 0.44 [m]	0.004 [n] 0.004 [n]	0.00 0.00
Activity used to calibrate PIC A net response per Bq of barium-133 in solution	Standard uncertainty of the activity determined by $4\pi(e+X)$-γ-anticoincidence counting. (B)	0.22	1.0	0.22
Live-time [p]	Estimated (B)	0.10	1.0	0.10
PIC A charge collection	Estimated (B)	0.05	1.0	0.05
Source Positioning	Estimated (B)	0.05	1.0	0.05
Photon-emitting impurities	Limit of detection for Cs-134 (B) [q]	100.	0.00002	0.00
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.26
Coverage Factor, k				x 2
Relative Expanded Uncertainty of the Output Quantity, U/y, (%)				0.52

*Notes and references are on pages 5 and 6.

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NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	100	1.5	0.2

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] Estimated limits of detection for photon-emitting impurities are:
600 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 12 and 75 keV,
150 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 84 and 379 keV, and
3 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 387 and 2700 keV, provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of barium-133.

[f] The stated uncertainty is the standard uncertainty. See reference [5].

[g] Relative standard uncertainty of the input quantity x_i.

[h] The relative change in the output quantity y divided by the relative change in the input quantity x_i. If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y. If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y.

[i] Relative component of combined standard uncertainty of output quantity y, rounded to two decimal places. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

RC-S-035-002e

[j] The response of pressurized ionization chamber A (PIC A) is determined from measurement of the time required to collect a given amount of charge on a stable fixed capacitor. All of the response measurements in the NIST pressurized ionization chambers are made relative to the response of one or more artifact standards. These artifact standards consist of microgram quantities of aged radium-226 in small welded stainless-steel capsules. These capsules are encapsulated in plastic rods whose dimensions are similar to those of the standard NIST ampoule. The artifact standards are called **Radium Reference Sources** and are designated as RRSx, where x is the nominal mass (in micrograms) of radium-226 in the capsule.

[k] $|\partial y/\partial x_i| \cdot (x_i/y)$ = (average background response)/(average net sample response)

[m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$

[p] The live time is determined by counting the pulses from a gated oscillator.

[q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i$ = 100%. $|\partial y/\partial x_i| \cdot (x_i/y)$ = {(response per Bq of impurity)/(response per Bq of Ba-133)}·{(Bq of impurity)/(Bq of Ba-133)}. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] Evaluated Nuclear Structure Data File (ENSDF), April 1994.

RC-S-035-002f

Standard Traceability Log Rad

Source Material Info	
Parent Code:	0487
Prepared By:	Angela Johnson
Carrier Conc:	0.1 M HCL
Reference Date:	09/01/1993
Ampoule Mass (g):	5.054 g
Uncertainty:	+/- .26 %
LogBook No:	RC S 035 002

A Solution Material Info			
Isotope:	Barium-133		
Prepared By:	Angela Johnson		
Prep Date:	10/31/2002		
Verification Date:	10/10/2018		
Expiration Date:	10/10/2019		
Primary Code:	0487-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.7696 g		
Density(g/mL):	0.9984	Balance ID:	

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (100 mL) = 1395394.1760 dpm/mL
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (0.9984 g/mL) / (100 mL) = 1397609.3930 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
12/18/2015	Gregory Ramsay	15.0062	1000	0487-B	20972.806 dpm/mL	11/18/2016	11/18/2017
01/17/2017	Bethany Fiem	15.1795	1000	0487-C	21215.0117 dpm/mL	01/17/2017	01/17/2018
11/08/2017	Bethany Fiem	15.5573	1000	0487-D	21708.5658 dpm/mL	11/08/2017	11/08/2018

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ba-133 Standard 0487-D

v1.0.2

Instrument	BLUE
Analyst	BXF1
Verification Prep Date	11/8/2017

Standard Information	
Isotope	Ba-133
Serial Number	0487-D
Isotope Halflife	3.8410E+03 D
Reference Date	9/1/1993
Ref. Act. (DPM/mL)	21708.56581
Amount of Std. (mL)	1.0
Standard Prep Date	11/8/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	11/9/2017	90.10	3690.91	42.20
2	11/9/2017	91.20	3665.09	42.30
3	11/9/2017	91.10	3667.64	42.20

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	3648.71	0.818070	4460.15	4460.15
2	3622.89	0.818070	4428.58	4428.58
3	3625.44	0.818070	4431.70	4431.70

	dpm/mL
Mean Value =	4440.14
Stdev =	17.39253395
Certificate Value* =	**4407.7**
Two sigma =	34.785
10 % of Mean =	444.014
Rule A (Pass/Fail)	**Pass**
% Recovery	100.74%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**11/8/2018**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ba-133 source 0487-D by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCBLUE for Ba-133 source standard verification. The Ba-133 efficiency calibration which was used for verification calculations was performed on 11/8/2017 using Ba-133 source 1601-A.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,

B = BKG cpm,

C = System efficiency (cpm/dpm), and

D = volume used for standard verification.

RAD-M-001

11-13-17

11/14/17

National Institute of Standards & Technology

Certificate

Received 3-9-17

Standard Reference Material® 4339b

1810

Radium-228 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-228 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4339b consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-228** massic activity value, at a **Reference Time of 1200 EST, 07 October 2010**, is:

$$\mathbf{(195 \pm 14)\ Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, Becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4339b** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and Chemical Hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the Physical Measurement Laboratory, Radiation and Biomolecular Physics Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification and photon-emitting impurity analyses were provided by L. Pibida of the NIST Radioactivity Group, with production assistance by J. LaRosa, R. Collé, and L. Laureano-Pérez. Alpha-emitting impurity analyses were provided by J. LaRosa.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation and Biomolecular Physics Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 14 November 2012

Robert L. Watters, Jr., Director
Office of Reference Materials

CLCFD-707-103

Table 1. Certified Massic Activity of SRM 4339b

Radionuclide	**Radium-228[a]**
Reference time	**1200 EST, 07 October 2010**
Massic activity of the solution	**195 Bq g^{-1}**
Relative expanded uncertainty ($k = 2$)	**7.2 %[b]**

[a] The final ^{228}Ra purification from the ^{232}Th mother solution was performed on 02 September 2010 0920 EST.
[b] The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4,5]. The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain what is assumed to be an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4339b

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.3 mol L^{-1} HNO_3 with 19.8 µg g^{-1} Ba^{+2}
Solution density	(1.034 ± 0.002) g mL^{-1} at 20.8 °C[a]
Solution mass	(5.180 ± 0.003) g[a]
Photon-emitting impurities	^{226}Ra: < 0.5 Bq g^{-1}[b]
Alpha-emitting impurities	^{232}Th: < 0.08 Bq g^{-1}[c]
Half-lives used	^{228}Ra: (5.75 ± 0.04) a[d] [6] ^{228}Ac: (6.15 ± 0.02) h [7] ^{226}Ra: (1600 ± 7) a [8] ^{232}Th: (14.02 ± 0.06) x 10^9 a [9]
Calibration methods (and instruments)	The certified massic activity for ^{228}Ra was obtained by high-resolution gamma-ray spectrometry of three master solution ampoules (eleven separate determinations), as measured on three to five different spectrometers and geometries on each ampoule, and used assumed nuclear data for probabilities per decay for 16 gamma-ray transitions. Confirmatory measurements were performed by 2πα spectrometry of ingrown ^{228}Th with a planar, ion-implanted Si detector.

[a] The stated uncertainty is two times the standard uncertainty. See reference 5.
[b] Based on gamma-ray spectrometry of forced-fitted peak at 186.2 keV and assuming a probability per decay of 0.0355 [6].
[c] The maximum ^{232}Th activity concentration in ^{228}Ra.
[d] The stated uncertainty is the standard uncertainty. See reference 5.

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4339b

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{228}Ra (%)
1	Gamma-ray spectrometry precision; relative standard deviation of the grand mean on the average massic gamma-ray emission rates for 16 measured ^{228}Ac gamma-ray transitions. Each mean in the grand mean is based on 11 determinations with three sources in three to five different detectors. The uncertainty in the determination of the massic gamma-ray emission rate for any one transition in a given determination ranged from typically 0.5 % to 1.5 %. The relative standard deviation of the mean for the average of the 16 lines, for any one determination, was typically 1 %; whereas the relative standard deviation of the grand mean for the average of the 16 lines across all 11 determinations is 0.34 %[b]. Data passes normality test.	A	0.84
2	Uncertainty due to assumed gamma-ray probabilities per decay for the measured ^{228}Ac transitions [7]. The uncertainty on each transition has a shared (correlated) component of 2.5 % (see comments in [7]).	B	3.5
3	Detection efficiencies not embodied within component 1	B	0.4
4	Mass determinations for dilution factors and counting source preparations	B	0.1
5	Decay corrections for ^{228}Ra half-life uncertainty of 0.7 % [6]	B	0.003
6	Effect of ^{228}Ra and ^{228}Ac half-life uncertainties on secular equilibrium ratio	B	0.02
Relative combined standard uncertainty			**3.6**
Relative expanded uncertainty (k = 2)			**7.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.
[b] Average massic gamma-ray emission rates of 11 geometries (R_γ) for 16 measured ^{228}Ac gamma-ray transitions with their respective energy (E_γ); assumed gamma-ray probabilities per decay (I_γ) and standard deviation of the mean (S_m).

E_γ (keV)	Assumed I_γ (%) [1]	Mean R_γ (s^{-1} g^{-1})(i)	S_m (%)(ii)
129.065	2.50	1347	0.38
153.967	0.754	421.6	0.40
209.249	3.97	2264	0.55
270.245	3.55	2014	0.33
328.004	3.04	1822	0.43
338.32	11.4	6712	0.43
409.46	2.02	1185	0.29
463.002	4.45	2645	0.33
755.313	1.03	593.3	0.46
772.291	1.52	899.2	0.53
794.942	4.31	2588	0.35
835.704	1.7	995.3	0.42
911.196	26.2	15609	0.29
964.786	4.99	3007	0.35
968.96	15.9	9582	0.30
1588.2	3.06	1889	0.28

(i) Grand mean for n = 11 determinations with three sources in three to five different detectors.
(ii) Relative standard deviation of the grand mean on R_γ for n = 11.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to SDS for further information.

Storage: SRM 4339b should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Nov 2012). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (ISO GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/ (accessed Nov 2012).

[6] Luca, A.; June 2009, ^{228}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-228_tables.pdf (accessed Nov 2012).

[7] Pearce, A.; January 2010, ^{228}Ac. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ac-228_tables.pdf (accessed Nov 2012).

[8] Christé, V. and M.M. Bé; December 2006, ^{226}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Nov 2012).

[9] Arinc, A.; September 2008, ^{232}Th. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Th-232_tables.pdf (accessed Nov 2012).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1810
Prepared By:	Tim Chandler
Carrier Conc:	1.3M HNO3
Reference Date:	10/07/2010
Ampoule Mass (g):	5.18 g
Uncertainty:	+/- 3.6 %
LogBook No:	GL-CED-297-103

A Solution Material Info			
Isotope:	Radium-228 SPIKE		
Prepared By:	Bethany Fiem		
Prep Date:	05/23/2018		
Verification Date:	05/23/2018		
Expiration Date:	05/23/2019		
Primary Code:	1810-A		
Dilution(mL):	200 mL		
Mass of Parent(g):	5.1447 g		
Density(g/mL):	1.0178	Balance ID:	B733529066

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (200 mL) = 300.9650 dpm/mL
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (1.0178 g/mL) / (200 mL) = 295.7015 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-228 Standard 1810-A Jar

v1.1.2
BMF
5/23/2018

Isotope	Result
Ra-228	pCi/L
Ra-228 N1	29340
Ra-228 N2	28510
Ra-228 N3	29320

Mean Value (Counting) =	29056.67	pCi/L	**107.165**	**Fail**	*Exception taken due to the high uncertainty of the certified value
Stdev =	473.533	pCi/L		**Rule B (Pass/Fail)**	
Certificate Value =	27114.0	pCi/L			
Two sigma =	947.0656436				
10 % of Mean =	2905.666667				
Rule A (Pass/Fail)	**Pass**				

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
Rule B = The determined mean value shall be within 5% of the certificate value.

5-23-18

5/25/18

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 1811253**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
461244001	SAMPLE	JXC9	PIC5D	OCT-22-18 11:27:10	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204133162	MB	JXC9	PIC8C	OCT-22-18 11:36:24	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204133163	DUP	JXC9	PIC9A	OCT-22-18 11:36:36	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204133165	MSD	JXC9	PIC9C	OCT-22-18 11:36:49	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204133166	LCS	JXC9	PIC9D	OCT-22-18 11:36:54	DONE	CeF on 25mm Filter	01-JUN-17 00:00
461244002	SAMPLE	JXC9	PIC6B	OCT-22-18 11:36:58	DONE	CeF on 25mm Filter	01-JUN-17 00:00
461244003	SAMPLE	JXC9	PIC6C	OCT-22-18 11:37:07	DONE	CeF on 25mm Filter	01-JUN-17 00:00
461244004	SAMPLE	JXC9	PIC7A	OCT-22-18 11:37:15	DONE	CeF on 25mm Filter	01-JUN-17 00:00
461244005	SAMPLE	JXC9	PIC7B	OCT-22-18 11:37:20	DONE	CeF on 25mm Filter	01-JUN-17 00:00
461244006	SAMPLE	JXC9	PIC7C	OCT-22-18 11:37:25	DONE	CeF on 25mm Filter	01-JUN-17 00:00
461244007	SAMPLE	JXC9	PIC8B	OCT-22-18 11:37:30	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204133164	MS	JXC9	LB4100A1	OCT-22-18 13:19:35	DONE	CeF on 25mm Filter	01-JUN-17 00:00

Lucas Cell Raw Data

Batch 1810204 Check-list

This check-list was completed on 16-OCT-18 by Elizabeth Krouse

This batch was reviewed by Elizabeth Krouse on 16-OCT-18 and Gregory Ramsay on 16-OCT-18.

Batch ID:	**Product:**	**Description:** Lucas Cell Radium 226
1810204	LUC26RAL	GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?		No	
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?		No	
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Logbook

Radium-226 in Liquid

Batch ID: 1810204 **Due Dates for Lab: 23-OCT-2018 Hold: 30-MAR-2018 Package: 04-NOV-2018 SDG: 24-OCT-2018**

Analyst: Peter Wilber (PCW) **Lab SOP: GL-RAD-A-008 REV# 15**

Instrument: GFC-18150253 **Method: EPA 903.1 Modified**

#	Sample ID	Run Date	Min RDL (pCi/L)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Count Start time	Gross Counts
1	460242001 Licor 1 - Lic dissolvido	10/10/18	.999	100	10/10/18 11:00	105	10/16/18 06:06	0940	1305
2	460242002 Licor 2 - Filtrado	10/10/18	.999	100	10/10/18 11:00	202	10/16/18 06:06	0940	1999
3	460242003 Licor 3 - Lic Reduzido	10/10/18	.999	50	10/10/18 11:00	301	10/16/18 06:06	0940	745
4	460242004 Efluente 2	10/10/18	.999	50	10/10/18 11:00	407	10/16/18 06:06	0940	56
5	460242005 Sub Produto - D903	10/10/18	.999	50	10/10/18 11:00	505	10/16/18 06:06	0940	13
6	461244001 FB-20181004 Grab Water	10/10/18	1	500	10/10/18 11:00	606	10/16/18 06:06	0940	13
7	461244002 MW-4 Grab Groundwater	10/10/18	1	500	10/10/18 11:00	701	10/16/18 06:06	0940	20
8	461244003 MW-6 Grab Groundwater	10/10/18	1	500	10/10/18 11:00	806	10/16/18 06:06	0940	28
9	461244004 MW-5 Grab Groundwater	10/10/18	1	500	10/10/18 11:00	101	10/16/18 06:29	1015	28
10	461244005 MW-2 Grab Groundwater	10/10/18	1	500	10/10/18 11:00	207	10/16/18 06:29	1015	16
11	461244006 MW-3 Grab Groundwater	10/10/18	1	500	10/10/18 11:00	306	10/16/18 06:29	1015	29
12	461244007 MW-1 Grab Groundwater	10/10/18	1	500	10/10/18 11:00	408	10/16/18 06:29	1015	45
13	1204130926 MB	10/10/18	.999	500	10/10/18 11:00	507	10/16/18 06:29	1015	11
14	1204130927 DUP (461244002)	10/10/18	1	500	10/10/18 11:00	601	10/16/18 06:29	1015	19
15	1204130928 MS (461244002)	10/10/18	1	100	10/10/18 11:00	704	10/16/18 06:29	1015	901
16	1204132247 MSD (461244002)	10/10/18	1	100	10/10/18 11:00	805	10/16/18 06:29	1015	1047
17	1204130929 LCS	10/10/18	.999	500	10/10/18 11:00	107	10/16/18 07:00	1100	859

Type	Name	Serial Number	Spike Amount	Spike Units
SPIKE	Radium-226 SPIKE	1715-D	.1	mL

Spike Pipet ID: RAD-RA226-2766953

Count Start Date: 10/16/18

Other tests with the same prep information:

Radium-226 Liquid

Filename : RA226.XLS
File type : Excel
Version # : 1.3.2

Batch : 1810204
Analyst : PETE049
Prep Date : 10/10/2018
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	460242001.1	0.1000	1.1370E-05	10/1/2017 12:00	105	30	1305	43.500	2	0.067	30	2.0440
2	460242002.1	0.1000	1.1370E-05	10/1/2017 12:00	202	30	1999	66.633	6	0.200	30	1.8580
3	460242003.1	0.0500	7.8337E-06	10/1/2017 12:00	301	30	745	24.833	2	0.067	30	1.8290
4	460242004.1	0.0500	7.8337E-06	10/1/2017 12:00	407	30	56	1.867	2	0.067	30	1.7420
5	460242005.1	0.0500	7.8337E-06	10/1/2017 12:00	505	30	13	0.433	1	0.033	30	1.5140
6	461244001.1	0.5000	2.0256E-05	10/4/2018 12:00	606	30	13	0.433	3	0.100	30	1.9430
7	461244002.1	0.5000	2.0256E-05	10/4/2018 10:20	701	30	20	0.667	5	0.167	30	1.9520
8	461244003.1	0.5000	2.0256E-05	10/4/2018 10:20	806	30	28	0.933	8	0.267	30	1.9730
9	461244004.1	0.5000	2.0256E-05	10/4/2018 12:40	101	30	28	0.933	7	0.233	30	1.5100
10	461244005.1	0.5000	2.0256E-05	10/4/2018 11:45	207	30	16	0.533	2	0.067	30	1.9750
11	461244006.1	0.5000	2.0256E-05	10/4/2018 13:40	306	30	29	0.967	1	0.033	30	1.7820
12	461244007.1	0.5000	2.0256E-05	10/4/2018 14:25	408	30	45	1.500	1	0.033	30	1.8510
13	1204130926.1	0.5000	2.0256E-05	10/10/2018 0:00	507	30	11	0.367	4	0.133	30	1.9970
14	1204130927.1	0.5000	2.0256E-05	10/4/2018 10:20	601	30	19	0.633	7	0.233	30	1.9080
15	1204130928.1	0.1000	1.1370E-05	10/4/2018 10:20	704	30	901	30.033	5	0.167	30	2.0850
16	1204132247.1	0.1000	1.1370E-05	10/4/2018 10:20	805	30	1047	34.900	1	0.033	30	1.9810
17	1204130929.1	0.5000	2.0256E-05	10/10/2018 0:00	107	30	859	28.633	6	0.200	30	1.5510

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-026
Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			
						De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
9.300%	5/1/2018	4/30/2019	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
9.300%	8/1/2018	7/31/2019	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
8.200%	3/1/2018	2/28/2019	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
6.600%	3/1/2018	2/28/2019	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
4.000%	6/1/2018	5/31/2019	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
2.400%	7/1/2018	6/30/2019	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
1.900%	11/1/2017	10/31/2018	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
6.000%	3/1/2018	2/28/2019	10/10/2018 11:00	10/16/2018 6:06	10/16/2018 9:40	0.650	0.973	1.002	1.000
5.300%	5/1/2018	4/30/2019	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
2.100%	8/1/2018	7/31/2019	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
3.900%	3/1/2018	2/28/2019	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
7.000%	3/1/2018	2/28/2019	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
5.300%	6/1/2018	5/31/2019	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
8.500%	7/1/2018	6/30/2019	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
2.200%	11/1/2017	10/31/2018	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
3.100%	3/1/2018	2/28/2019	10/10/2018 11:00	10/16/2018 6:29	10/16/2018 10:15	0.651	0.972	1.002	1.000
9.300%	5/1/2018	4/30/2019	10/10/2018 11:00	10/16/2018 7:00	10/16/2018 11:00	0.653	0.970	1.002	1.000

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-D
Spike Exp Date : 12/19/2018
Spike Activity (dpm/ml): 288.43
Spike Volume Added: 0.10

LCS S/N : 1715-D
LCS Exp Date : 12/19/2018
LCS Activity (dpm/ml): 288.43
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.5420	0.3827	1	1.1143	**151.5594**	9.71%	43.4333	1.2051	8.2420	36.1908		SAMPLE				
2	1.0328	0.7292	1	1.8422	**255.0239**	9.57%	66.4333	1.4926	11.2302	60.3508		SAMPLE				
3	1.2115	0.8553	1	2.4906	**193.1632**	8.99%	24.7667	0.9110	13.9268	43.9913		SAMPLE				
4	1.2720	0.8980	1	2.6150	**14.7399**	15.57%	1.8000	0.2539	4.0745	4.9764		SAMPLE				
5	1.0349	0.7306	1	2.4035	**3.7688**	31.44%	0.4000	0.1247	2.3033	2.3850		SAMPLE				
6	0.1396	0.0986	1	0.2705	**0.2446**	40.07%	0.3333	0.1333	0.1918	0.1953		SAMPLE				
7	0.1794	0.1267	1	0.3264	**0.3652**	33.39%	0.5000	0.1667	0.2386	0.2448		SAMPLE				
8	0.2245	0.1585	1	0.3893	**0.4818**	30.59%	0.6667	0.2000	0.2833	0.2972		SAMPLE				
9	0.2744	0.1937	1	0.4819	**0.6610**	28.67%	0.7000	0.1972	0.3650	0.3834		SAMPLE				
10	0.1121	0.0792	1	0.2305	**0.3369**	30.38%	0.4667	0.1414	0.2001	0.2064		SAMPLE				
11	0.0879	0.0620	1	0.2041	**0.7468**	19.95%	0.9333	0.1826	0.2863	0.3112		SAMPLE				
12	0.0846	0.0597	1	0.1965	**1.1298**	16.93%	1.4667	0.2261	0.3413	0.4088		SAMPLE				
13	0.1568	0.1107	1	0.2929	**0.1666**	55.58%	0.2333	0.1291	0.1807	0.1831		MB				
14	0.2172	0.1533	1	0.3814	**0.2989**	43.33%	0.4000	0.1700	0.2489	0.2575	461244002.1	DUP	20.0%			
15	0.8398	0.5929	1	1.5277	**102.1205**	4.02%	29.8667	1.0033	6.7240	16.7900	461244002.1	MS			129.9230	78.3%
16	0.3953	0.2791	1	0.9180	**125.4753**	4.38%	34.8667	1.0791	7.6114	21.0740	461244002.1	MSD	20.5%		129.9230	96.3%
17	0.2472	0.1746	1	0.4410	**26.1298**	9.92%	28.4333	0.9804	1.7658	6.3270		LCS			25.9844	100.6%

Continuing Calibration Data

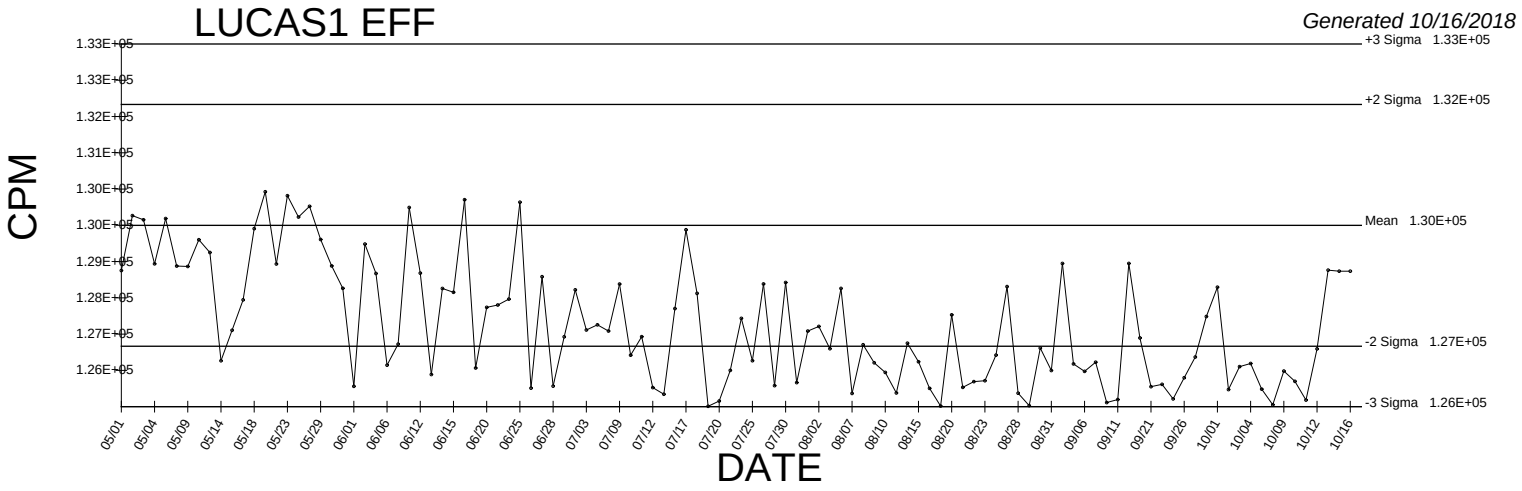
Ludlum Alpha Scintillation Counter Checks for 16-OCT-2018

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	04:10	1	1.29E+05	128576	-0.76		
LUCAS2	EFF	04:10	1	1.35E+05	135025	2.91		
LUCAS3	EFF	04:10	1	1.42E+05	141570	0.3		
LUCAS4	EFF	04:10	1	1.31E+05	131384	-0.27		
LUCAS5	EFF	04:10	1	1.36E+05	136081	1.58		
LUCAS6	EFF	04:10	1	1.32E+05	132396	-2.38		
LUCAS7	EFF	04:10	1	1.42E+05	142238	1.43		
LUCAS8	EFF	04:10	1	1.37E+05	137328	-0.6		

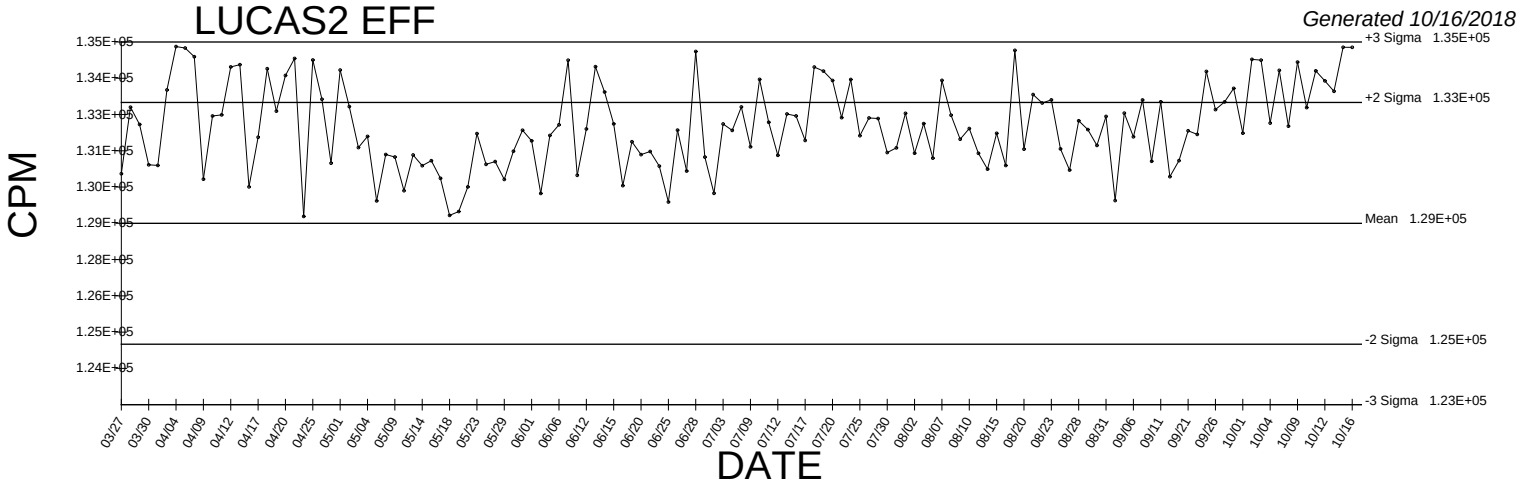
Reviewed by: Elizabeth Krouse **Date:** 16-OCT-18

GEL Laboratories LLC

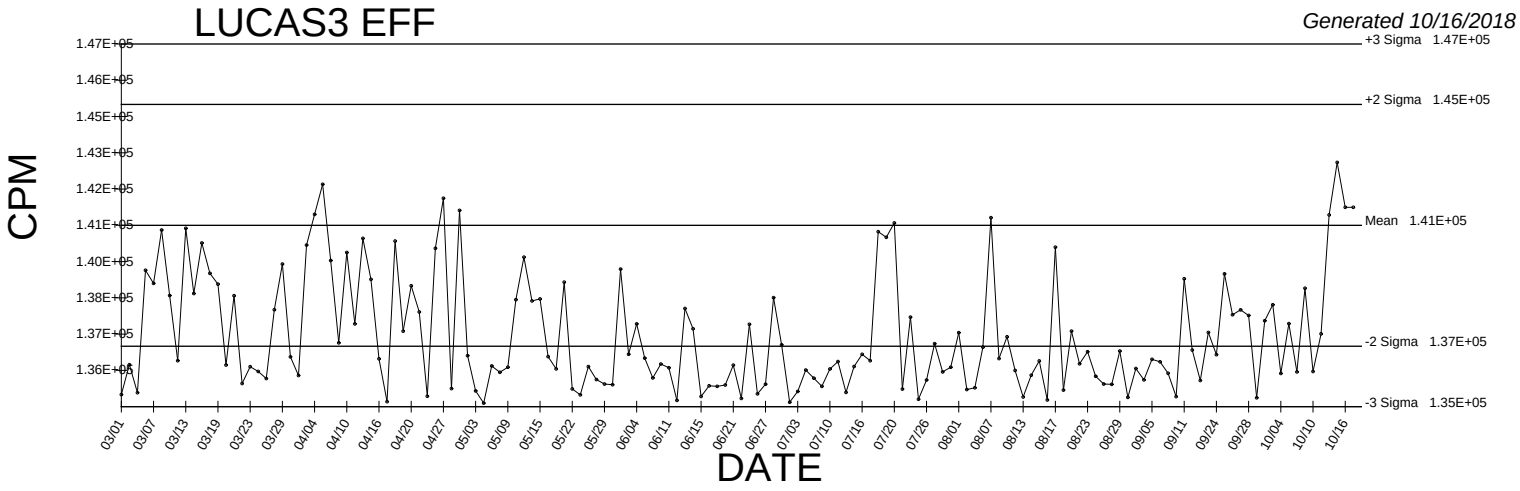
Efficiency Data



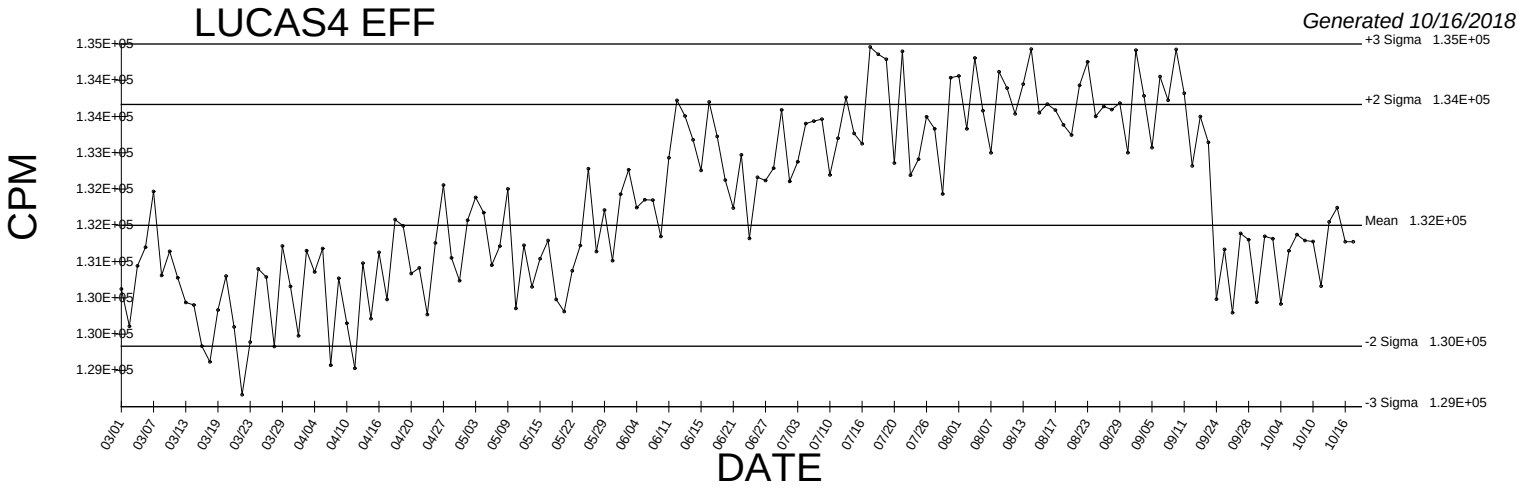
● Denotes Outlier



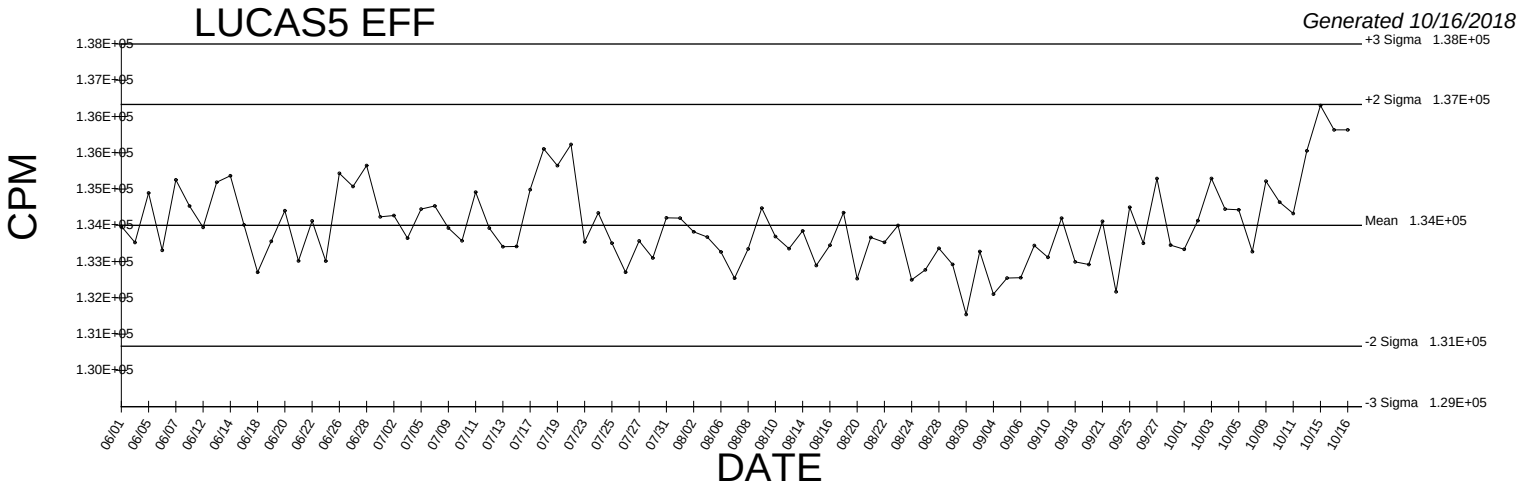
● Denotes Outlier



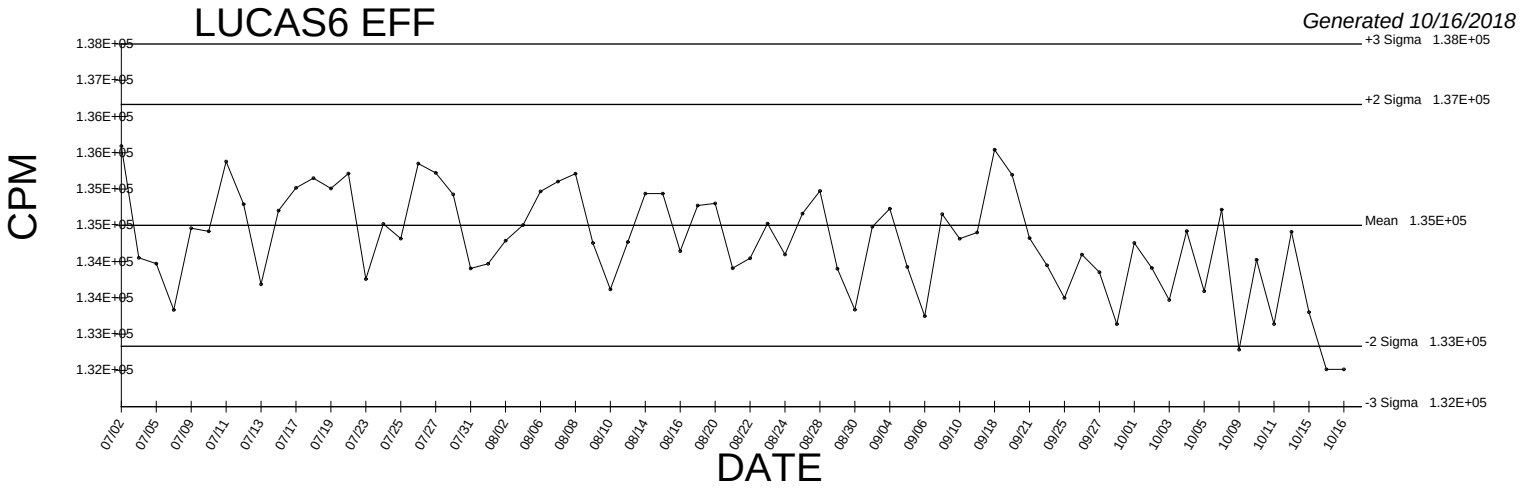
● Denotes Outlier



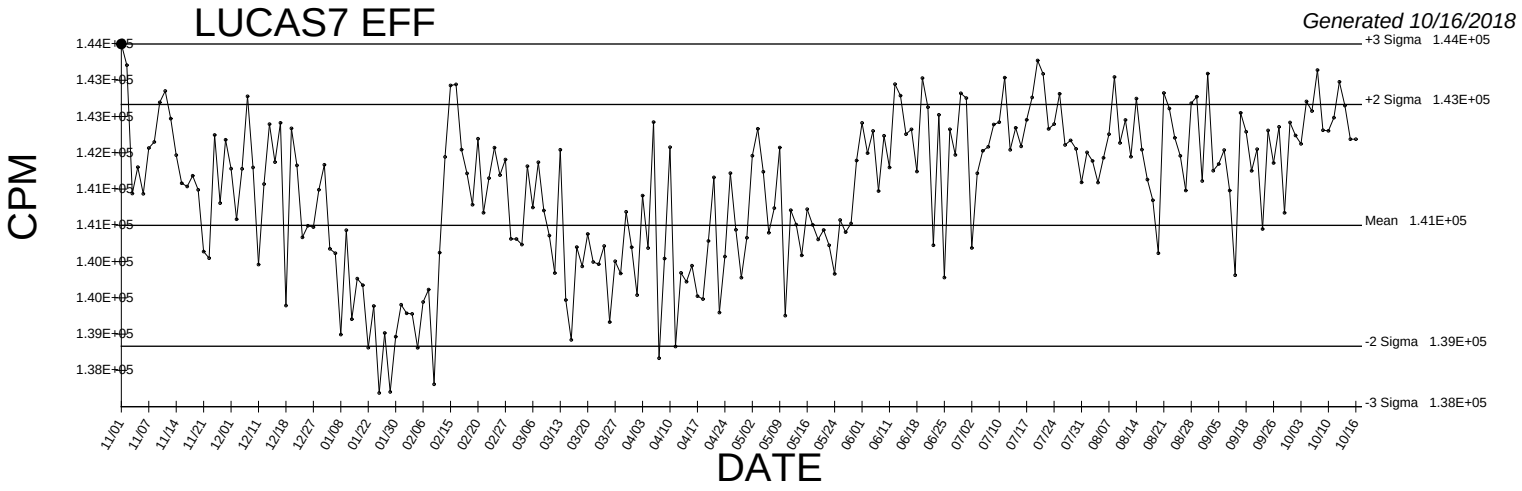
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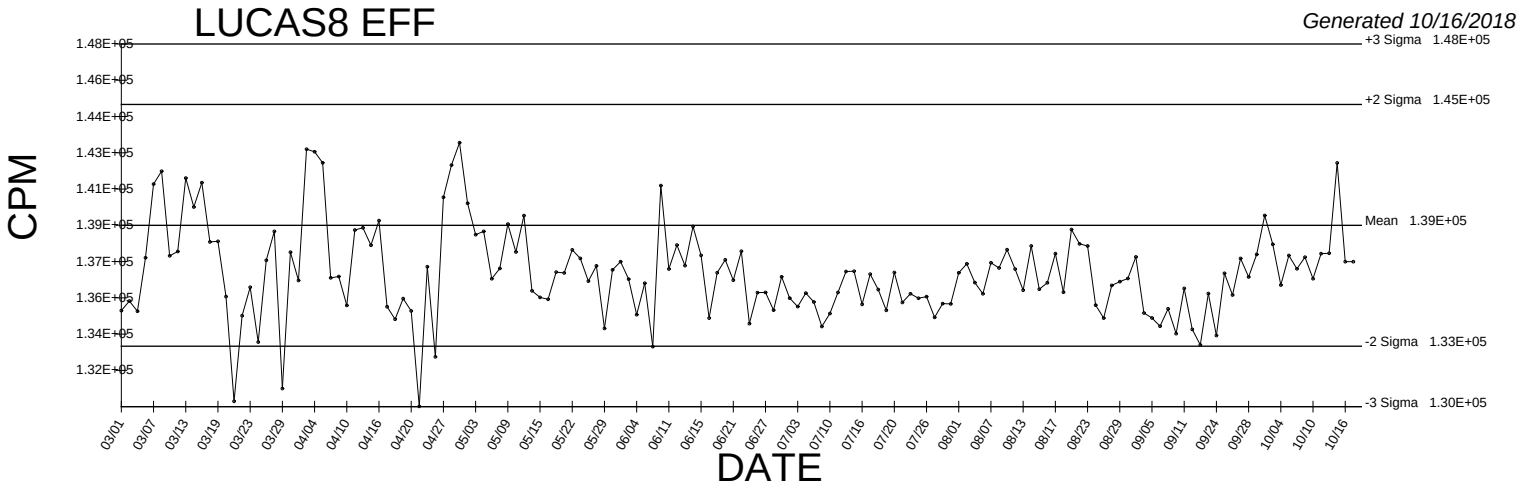
● Denotes Outlier



● Denotes Outlier



● Denotes Outlier



● Denotes Outlier

RAD Standards Traceability

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

1715

98367

Ra-226 5 mL Liquid in Flame Sealed Vial

Customer: GEL Laboratories, LLC
P.O. No.: GEL 1408580, Item 7 Product Code: 8226

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics, using a germanium gamma spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Ra-226	5.844E+05	3.676E+04	1.0	2.1	4.7	09/09/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities (other than decay products)<0.1%.
5.02193 g 0.1M HCl solution with approximately 30 µg/g Ba carrier.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QC Approved: L. Tk
L. Tkavadze, Nuclear Metrologist

Date: 9 Sep 14

RECEIVED 9/10/14

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1715
Prepared By:	Gregory Ramsay
Carrier Conc:	0.1M HCl
Reference Date:	09/09/2014
Ampoule Mass (g):	5.02193 g
Uncertainty:	+/- 2.35 %
LogBook No:	GL-CED-297-008

A Solution Material Info			
Isotope:	Radium-226		
Prepared By:	Gregory Ramsay		
Prep Date:	07/06/2016		
Verification Date:	02/08/2017		
Expiration Date:	02/08/2018		
Primary Code:	1715-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9865 g		
Density(g/mL):	0.9967	Balance ID:	C31514

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / (Ampoule Mass(g) *(Dilution Vol)) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / Density / (Ampoule Mass (g) * (Dilution Vol)) = Parent Activity (dpm/g)
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (5.02193 g * 100 mL) = 21900.3937 dpm/mL
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (0.9967 g/mL)/ (5.02193 g * 100 mL) = 21972.4854 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
07/06/2016	Gregory Ramsay	2.6261	200	1715-B	288.51 dpm/ml	01/25/2017	11/10/2018
02/08/2017	Gregory Ramsay	21.96	250	1715-C	1930.063 dpm/ml	02/08/2017	02/08/2018
12/19/2017	Gregory Ramsay	2.63	200	1715-D	288.938 dpm/ml	12/19/2017	12/19/2018

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-226 Standard 1715-D

v1.0.2

Instrument	Yellow
Analyst	GXR1
Verification Prep Date	12/19/2017

Standard Information	
Isotope	Ra-226
Serial Number	1715-D
Isotope Halflife	1.6000E+03 Y
Reference Date	9/9/2014
Ref. Act. (DPM/mL)	288.938
Amount of Std. (mL)	0.5
Standard Prep Date	12/19/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	12/20/2017	773.48	70.40	11.00
2	12/20/2017	774.10	70.70	11.00
3	12/20/2017	772.98	73.30	11.00

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	59.40	0.422157	281.41	140.71
2	59.70	0.422157	282.83	141.42
3	62.30	0.422157	295.15	147.58

	dpm/mL
Mean Value =	286.47
Stdev =	7.555402963
Certificate Value* =	**288.5**
Two sigma =	15.111
10 % of Mean =	28.647
Rule A (Pass/Fail)	**Pass**
% Recovery	99.29%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**12/19/2018**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-226 source 1715-D by transferring 0.5 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYellow for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 12/20/2017 using Ra-226 source 0299-H.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,
B = BKG cpm,
C = System efficiency (cpm/dpm), and
D = volume used for standard verification.

RAD-M-001

12/21/17

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 1810204**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
460242001	SAMPLE	PCW	LUCAS1	OCT-16-18 09:40:00	DONE	Lucas Cell	01-MAY-18 00:00
460242002	SAMPLE	PCW	LUCAS2	OCT-16-18 09:40:00	DONE	Lucas Cell	01-AUG-18 00:00
460242003	SAMPLE	PCW	LUCAS3	OCT-16-18 09:40:00	DONE	Lucas Cell	01-MAR-18 00:00
460242004	SAMPLE	PCW	LUCAS4	OCT-16-18 09:40:00	DONE	Lucas Cell	01-MAR-18 00:00
460242005	SAMPLE	PCW	LUCAS5	OCT-16-18 09:40:00	DONE	Lucas Cell	01-JUN-18 00:00
461244001	SAMPLE	PCW	LUCAS6	OCT-16-18 09:40:00	DONE	Lucas Cell	01-JUL-18 00:00
461244002	SAMPLE	PCW	LUCAS7	OCT-16-18 09:40:00	DONE	Lucas Cell	01-NOV-17 00:00
461244003	SAMPLE	PCW	LUCAS8	OCT-16-18 09:40:00	DONE	Lucas Cell	01-MAR-18 00:00
461244004	SAMPLE	PCW	LUCAS1	OCT-16-18 10:15:00	DONE	Lucas Cell	01-MAY-18 00:00
461244005	SAMPLE	PCW	LUCAS2	OCT-16-18 10:15:00	DONE	Lucas Cell	01-AUG-18 00:00
461244006	SAMPLE	PCW	LUCAS3	OCT-16-18 10:15:00	DONE	Lucas Cell	01-MAR-18 00:00
461244007	SAMPLE	PCW	LUCAS4	OCT-16-18 10:15:00	DONE	Lucas Cell	01-MAR-18 00:00
1204130926	MB	PCW	LUCAS5	OCT-16-18 10:15:00	DONE	Lucas Cell	01-JUN-18 00:00
1204130927	DUP	PCW	LUCAS6	OCT-16-18 10:15:00	DONE	Lucas Cell	01-JUL-18 00:00
1204130928	MS	PCW	LUCAS7	OCT-16-18 10:15:00	DONE	Lucas Cell	01-NOV-17 00:00
1204132247	MSD	PCW	LUCAS8	OCT-16-18 10:15:00	DONE	Lucas Cell	01-MAR-18 00:00
1204130929	LCS	PCW	LUCAS1	OCT-16-18 11:00:00	DONE	Lucas Cell	01-MAY-18 00:00

eurofins | Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 | 717-656-2300 | Fax: 717-656-2681 | www.LancasterLabs.com

Type III Data Package

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Project: PSEG Mercer
Groundwater and Water Samples
Collected on 10/29/18

SDG# GEJ59

GROUP	SAMPLE NUMBERS
2003763	9874902-9874908

PA Cert. # 36-00037
NY Cert. # 10670
NJ Cert. # PA011
NC Cert. # 521
TX Cert. # T104704194-18-27
AZ Cert. # AZ0780

Through our technical processes and second person review of data, we have established that our data/deliverables are in compliance with the methods and project requirements unless otherwise noted or previously resolved with the client.

Authorized by: Dana M Kauffman **Date: 11/20/2018**

Dana M. Kauffman
Manager

Any questions or concerns you might have regarding this data package should be directed to your client representative, Kerri Sachtleben at (717)-556-7376.

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Sample Reference List for SDG Number GEJ59
with a Data Package Type of III

07701 - GEI Consultants, Inc.
Project: PSEG Mercer

Lab Sample Number	Client Sample ID	Collection Date	Date Received
9874902	MW-1	10/29/2018 11:30	10/30/2018 16:45
9874903	MW-2	10/29/2018 11:10	10/30/2018 16:45
9874904	MW-3	10/29/2018 15:00	10/30/2018 16:45
9874905	MW-4	10/29/2018 13:00	10/30/2018 16:45
9874906	MW-5	10/29/2018 13:10	10/30/2018 16:45
9874907	MW-6	10/29/2018 15:00	10/30/2018 16:45
9874908	FB-20181029	10/29/2018 11:00	10/30/2018 16:45

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Sample pH Log

SDG: GEJ59

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9874902	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:15:37PM	1532
9874902	015A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:02:55PM	12665
9874902	055A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:06:24PM	1532
9874902	055B	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:07:19PM	1532
9874902	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:11:46PM	1532
9874902	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/31/2018 5:43:59PM	12665
9874902	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:15:37PM	1532
9874902	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:11:46PM	1532
9874903	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:16:04PM	1532
9874903	015A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:03:53PM	12665
9874903	055A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:06:55PM	1532
9874903	055B	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:06:12PM	1532
9874903	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:12:11PM	1532
9874903	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/31/2018 5:47:54PM	12665
9874903	148A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:29:31PM	12665
9874903	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:16:04PM	1532
9874903	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:12:11PM	1532
9874904	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:16:33PM	1532
9874904	015A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:04:14PM	12665
9874904	055A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:07:06PM	1532
9874904	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:06:36PM	1532
9874904	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:12:37PM	1532
9874904	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/31/2018 5:50:16PM	12665
9874904	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:16:33PM	1532
9874904	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:12:37PM	1532
9874905	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:17:19PM	1532
9874905	015A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:04:39PM	12665
9874905	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:07:39PM	1532
9874905	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:06:01PM	1532
9874905	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:13:03PM	1532
9874905	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/31/2018 5:39:08PM	12665
9874905	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:17:19PM	1532
9874905	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:13:03PM	1532
9874906	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:15:10PM	1532
9874906	015A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:05:04PM	12665
9874906	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:09:03PM	1532
9874906	055B	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:08:52PM	1532
9874906	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:09:37PM	1532

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9874906	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/31/2018 5:41:56PM	12665
9874906	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:15:10PM	1532
9874906	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:09:37PM	1532
9874907	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:14:41PM	1532
9874907	015A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:06:10PM	12665
9874907	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:08:40PM	1532
9874907	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:08:26PM	1532
9874907	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:10:42PM	1532
9874907	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/31/2018 5:30:58PM	12665
9874907	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:14:41PM	1532
9874907	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:10:42PM	1532
9874908	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:14:09PM	1532
9874908	015A	6	5-7	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:05:36PM	12665
9874908	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:07:53PM	1532
9874908	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:08:06PM	1532
9874908	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:11:08PM	1532
9874908	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/31/2018 5:37:01PM	12665
9874908	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:14:09PM	1532
9874908	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	10/30/2018 9:11:08PM	1532

***pH Check Code Key**
PK = Original container checked - pH is within the correct range. (No preservative was added)
PA = Original container checked - pH adjusted to correct range. (Preservative was added)
PV = Volatile container checked
PC = pH checked (unpreserved container)
SPK = Subsampled from an original container. Original container checked - pH is within correct range
SPA = Subsampled from an original container. Subsample container checked - pH adjusted to correct range.
SPC = Subsampled from an original container. pH checked (unpreserved container).
SUP = Subsampled from original container. Unable to be preserved due to the matrix of the sample.
UP = Unable to preserve due to matrix of the sample.
NA = Not applicable

****Chlorine Present Code Key**
NA = Chlorine Not Checked
Y = Chlorine Present
N = Chlorine Not Present

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00259 Mercury

The solution resulting from the mercury digestion is analyzed by Cold Vapor AA.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

14044 ICP-WW, 3005A (tot rec) - U5

The sample is digested with nitric acid and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3005A, July 1992

14047 ICPMS - Water, 3020A - U5

The sample is digested with nitric and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3020A, July 1992

05713 WW SW846 Hg Digest

The sample is heated at 95 c with nitric acid, sulfuric acid, potassium persulfate, and potassium permanganate. Excess potassium permanganate is reduced with sodium chloride/hydroxylamine hydrochloride. Mercuric ions are reduced to mercury metal using stannous chloride.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

07046 Barium
08014 Boron
01750 Calcium
07051 Chromium
07052 Cobalt
01756 Lithium
07036 Selenium
07022 Thallium

The solution resulting from the metals digestion is analyzed by Trace ICP.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6010D, Rev. 4, July 2014.

06024 Antimony
06025 Arsenic
06027 Beryllium
06028 Cadmium
06035 Lead
06038 Molybdenum

The solution resulting from the metals digestion is analyzed by ICP/MS.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6020B, Rev.2, July 2014.

00224 Chloride
01504 Fluoride
00228 Sulfate

A small volume of sample is introduced into an ion chromatograph. The anions are then separated and measured by a system consisting of a guard column, separator column, suppressor, and conductivity detector.

Reference: Method 300.0, Revision 2.1 (1993), Methods for Chemical Analysis of Water and Wastes USEPA 600.

12152 pH

The activity of hydrogen ions in the sample is measured using a glass electrode and a reference electrode.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 4500-H+ B-2011

00212 Total Dissolved Solids

A well-mixed sample is filtered through a glass fiber filter. The filtrate is collected in a tared beaker, evaporated in a steam bath and dried in an oven at 180C +/- 2C to a constant weight. The increase in weight is the total dissolved solids.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2540 C-2011

12151 Temperature of pH

The temperature of the sample measured during the pH analysis.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2550 B-2010

Analysis Reports / Field Chain of Custody

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Report Date: November 07, 2018 09:39

Project: PSEG Mercer

Account #: 07701
Group Number: 2003763
SDG: GEJ59
PO Number: 1504710
State of Sample Origin: NJ

Electronic Copy To	GEI Consultants, Inc.	Attn: Jason Kohl
Electronic Copy To	GEI Consultants, Inc.	Attn: Data Group

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-1 Grab Groundwater	10/29/2018 11:30	9874902
MW-2 Grab Groundwater	10/29/2018 11:10	9874903
MW-3 Grab Groundwater	10/29/2018 15:00	9874904
MW-4 Grab Groundwater	10/29/2018 13:00	9874905
MW-5 Grab Groundwater	10/29/2018 13:10	9874906
MW-6 Grab Groundwater	10/29/2018 15:00	9874907
FB-20181029 Grab Water	10/29/2018 11:00	9874908

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: GEI Consultants, Inc.
Project: PSEG Mercer
Sampling Date(s): 10/29/18
Laboratory Sample ID(s): 9874902-9874908
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	No
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality."
***The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.**

Dorothy M Love

Dorothy M. Love
Director

11/07/2018



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Project Name: PSEG Mercer
ELLE Group #: 2003763

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 9874902, 9874903, 9874904, 9874905, 9874906, 9874907, 9874908

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium

Batch #: 183051404402 (Sample number(s): 9874902-9874908 UNSPK: 9874907 BKG: 9874907)

The recovery(ies) for the following analyte(s) in the MS and/or MSD exceeded the acceptance window indicating a positive bias: Calcium

Sample Description: **MW-1 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:30
SDG#: GEJ59-01

GEI Consultants, Inc.
ELLE Sample #: GW 9874902
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.186	0.0010	0.0050	1
08014	Boron	7440-42-8	1.17	0.0120	0.0500	1
01750	Calcium	7440-70-2	210	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0305 J	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0037	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	159	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	280	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,120	160	480	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.7	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:30
SDG#: GEJ59-01

GEI Consultants, Inc.
ELLE Sample #: GW 9874902
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:02	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:45	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:02	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:02	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:02	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:02	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:02	Jonathan J Allen	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:02	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:31	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:31	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:31	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:31	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:31	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183051404702C	11/06/2018 11:31	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183050571302	11/02/2018 18:44	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	183051404402	11/02/2018 07:05	Denise L Trimby	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	183051404702	11/02/2018 07:05	Denise L Trimby	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183050571302	11/01/2018 16:20	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18304520106A	10/31/2018 22:51	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18304520106A	10/31/2018 22:32	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:30
SDG#: GEJ59-01

GEI Consultants, Inc.
ELLE Sample #: GW 9874902
ELLE Group #: 2003763
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18304520106A	10/31/2018 22:51	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18304921202B	10/31/2018 11:31	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	18304004101A	10/31/2018 22:15	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18304004101A	10/31/2018 22:15	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:10
SDG#: GEJ59-02

GEI Consultants, Inc.
ELLE Sample #: GW 9874903
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0179	0.0010	0.0050	1
08014	Boron	7440-42-8	0.0358 J	0.0120	0.0500	1
01750	Calcium	7440-70-2	24.2	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	0.00046 J	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0031	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0036	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	1.7 J	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	6.4	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	103	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.5	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:10
SDG#: GEJ59-02

GEI Consultants, Inc.
ELLE Sample #: GW 9874903
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.9	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:05	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:53	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:05	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:05	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:05	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:05	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:05	Jonathan J Allen	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:05	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:33	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:33	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:33	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:33	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:33	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183051404702C	11/06/2018 11:33	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183050571302	11/02/2018 18:46	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	183051404402	11/02/2018 07:05	Denise L Trimby	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	183051404702	11/02/2018 07:05	Denise L Trimby	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183050571302	11/01/2018 16:20	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18304520106A	10/31/2018 23:09	Ashlynn M Cornelius	5
01504	Fluoride	EPA 300.0	1	18304520106A	10/31/2018 23:09	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:10
SDG#: GEJ59-02

GEI Consultants, Inc.
ELLE Sample #: GW 9874903
ELLE Group #: 2003763
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18304520106A	10/31/2018 23:09	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18304921202A	10/31/2018 11:31	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	18304004101A	10/31/2018 21:47	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18304004101A	10/31/2018 21:47	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 15:00
SDG#: GEJ59-03

GEI Consultants, Inc.
ELLE Sample #: GW 9874904
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.248	0.0010	0.0050	1
08014	Boron	7440-42-8	0.267	0.0120	0.0500	1
01750	Calcium	7440-70-2	58.4	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0025 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0340 J	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0072	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0179	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	257	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	18.2	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	614	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.8	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 15:00
SDG#: GEJ59-03

GEI Consultants, Inc.
ELLE Sample #: GW 9874904
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:13	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:55	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:13	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:13	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:13	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:13	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:13	Jonathan J Allen	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:13	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:46	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:46	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:46	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:46	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:46	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183051404702C	11/06/2018 11:46	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183050571302	11/02/2018 18:32	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	183051404402	11/02/2018 07:05	Denise L Trimby	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	183051404702	11/02/2018 07:05	Denise L Trimby	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183050571302	11/01/2018 16:20	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18304520106B	11/01/2018 01:35	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18304520106B	11/01/2018 01:17	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 15:00
SDG#: GEJ59-03

GEI Consultants, Inc.
ELLE Sample #: GW 9874904
ELLE Group #: 2003763
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18304520106B	11/01/2018 01:17	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18304921202A	10/31/2018 11:31	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	18304004101A	10/31/2018 22:24	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18304004101A	10/31/2018 22:24	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 13:00
SDG#: GEJ59-04

GEI Consultants, Inc.
ELLE Sample #: GW 9874905
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0119	0.0010	0.0050	1
08014	Boron	7440-42-8	0.0241 J	0.0120	0.0500	1
01750	Calcium	7440-70-2	4.52	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0020 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	0.00022 J	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0015 J	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	2.1	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	3.4 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	38.5 J	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.6	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 13:00
SDG#: GEJ59-04

GEI Consultants, Inc.
ELLE Sample #: GW 9874905
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.7	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:15	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:58	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:15	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:15	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:15	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:15	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:15	Jonathan J Allen	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:15	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:48	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:48	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:48	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:48	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:48	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183051404702C	11/06/2018 11:48	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183050571302	11/02/2018 18:48	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	183051404402	11/02/2018 07:05	Denise L Trimby	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	183051404702	11/02/2018 07:05	Denise L Trimby	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183050571302	11/01/2018 16:20	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18304520106B	11/01/2018 01:53	Ashlynn M Cornelius	5
01504	Fluoride	EPA 300.0	1	18304520106B	11/01/2018 01:53	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 13:00
SDG#: GEJ59-04

GEI Consultants, Inc.
ELLE Sample #: GW 9874905
ELLE Group #: 2003763
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18304520106B	11/01/2018 01:53	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18304921202A	10/31/2018 11:32	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	18304004101B	10/31/2018 21:56	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18304004101B	10/31/2018 21:56	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 13:10
SDG#: GEJ59-05

GEI Consultants, Inc.
ELLE Sample #: GW 9874906
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.197	0.0010	0.0050	1
08014	Boron	7440-42-8	0.410	0.0120	0.0500	1
01750	Calcium	7440-70-2	96.3	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0184	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	105	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	104	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	656	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.7	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 13:10
SDG#: GEJ59-05

GEI Consultants, Inc.
ELLE Sample #: GW 9874906
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:18	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 20:00	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:18	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:18	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:18	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:18	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:18	Jonathan J Allen	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:18	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:51	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:51	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:51	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:51	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:51	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183051404702C	11/06/2018 11:51	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183050571302	11/02/2018 18:51	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	183051404402	11/02/2018 07:05	Denise L Trimby	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	183051404702	11/02/2018 07:05	Denise L Trimby	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183050571302	11/01/2018 16:20	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18304520106B	11/05/2018 19:18	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18304520106B	11/01/2018 02:30	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 13:10
SDG#: GEJ59-05

GEI Consultants, Inc.
ELLE Sample #: GW 9874906
ELLE Group #: 2003763
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18304520106B	11/05/2018 19:18	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18304921202A	10/31/2018 11:32	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	18304004101A	10/31/2018 22:33	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18304004101A	10/31/2018 22:33	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 15:00
SDG#: GEJ59-06

GEI Consultants, Inc.
ELLE Sample #: GW 9874907
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.254	0.0010	0.0050	1
08014	Boron	7440-42-8	0.157	0.0120	0.0500	1
01750	Calcium	7440-70-2	40.5	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0027	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	246	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	6.4	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	465	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.8	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 15:00
SDG#: GEJ59-06

GEI Consultants, Inc.
ELLE Sample #: GW 9874907
ELLE Group #: 2003763
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	2	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	2	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	2	183051404402	11/05/2018 19:29	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:53	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:53	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:53	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:53	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:53	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183051404702C	11/06/2018 11:53	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183050571302	11/02/2018 18:53	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	183051404402	11/02/2018 07:05	Denise L Trimby	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	183051404702	11/02/2018 07:05	Denise L Trimby	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183050571302	11/01/2018 16:20	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18304520106B	11/01/2018 03:06	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	18304520106B	11/01/2018 02:48	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 15:00
SDG#: GEJ59-06

GEI Consultants, Inc.
ELLE Sample #: GW 9874907
ELLE Group #: 2003763
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18304520106B	11/01/2018 02:48	Ashlynn M Cornelius	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18304921202A	10/31/2018 11:32	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	18304004101A	10/31/2018 22:20	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18304004101A	10/31/2018 22:20	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181029 Grab Water**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:00
SDG#: GEJ59-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9874908
ELLE Group #: 2003763
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D.	0.0010	0.0050	1
08014	Boron	7440-42-8	N.D.	0.0120	0.0500	1
01750	Calcium	7440-70-2	0.0696 J	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported. The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.7	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181029 Grab Water**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:00
SDG#: GEJ59-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9874908
ELLE Group #: 2003763
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:21	Jonathan J Allen	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183051404402	11/05/2018 20:03	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:21	Jonathan J Allen	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:21	Jonathan J Allen	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:21	Jonathan J Allen	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:21	Jonathan J Allen	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:21	Jonathan J Allen	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183051404402	11/04/2018 11:21	Jonathan J Allen	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:59	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:59	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:59	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:59	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183051404702A	11/06/2018 11:59	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183051404702C	11/06/2018 11:59	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183050571302	11/02/2018 18:55	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U5	SW-846 3005A	1	183051404402	11/02/2018 07:05	Denise L Trimby	1
14047	ICPMS - Water, 3020A - U5	SW-846 3020A	1	183051404702	11/02/2018 07:05	Denise L Trimby	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183050571302	11/01/2018 16:20	JoElla L Rice	1
00224	Chloride	EPA 300.0	1	18304520106B	11/01/2018 04:01	Ashlynn M Cornelius	1
01504	Fluoride	EPA 300.0	1	18304520106B	11/01/2018 04:01	Ashlynn M Cornelius	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181029 Grab Water**
1504710 / PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 10/30/2018 16:45
Collection Date/Time: 10/29/2018 11:00
SDG#: GEJ59-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9874908
ELLE Group #: 2003763
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00228	Sulfate	EPA 300.0	1	18304520106B	11/01/2018 04:01	Ashlynn M Cornelius	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	18304921202A	10/31/2018 11:32	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	18304004101A	10/31/2018 22:10	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18304004101A	10/31/2018 22:10	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2003763
Reported: 11/07/2018 09:39

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 183050571302	Sample number(s): 9874902-9874908		
Mercury	N.D.	0.000050	0.00020
Batch number: 183051404402	Sample number(s): 9874902-9874908		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	0.0581 J	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	N.D.	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 183051404702A	Sample number(s): 9874902-9874908		
Antimony	0.00047 J	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	0.00011 J	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Batch number: 183051404702C	Sample number(s): 9874902-9874908		
Molybdenum	0.00053 J	0.00031	0.0020
Batch number: 18304520106A	Sample number(s): 9874902-9874903		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 18304520106B	Sample number(s): 9874904-9874908		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 18304921202A	Sample number(s): 9874903-9874908		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 18304921202B	Sample number(s): 9874902		
Total Dissolved Solids	N.D.	20.0	60.0

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2003763
Reported: 11/07/2018 09:39

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 183050571302	Sample number(s): 9874902-9874908								
Mercury	0.00100	0.000900			90		80-120		
Batch number: 183051404402	Sample number(s): 9874902-9874908								
Barium	2.00	1.89			95		80-120		
Boron	2.00	1.84			92		80-120		
Calcium	4.00	3.89			97		80-120		
Chromium	0.200	0.198			99		80-120		
Cobalt	0.500	0.493			99		80-120		
Lithium	1.00	0.986			99		80-120		
Selenium	0.150	0.146			97		80-120		
Thallium	0.150	0.151			100		80-120		
Batch number: 183051404702A	Sample number(s): 9874902-9874908								
Antimony	0.00600	0.00603			100		80-120		
Arsenic	0.0100	0.0109			109		80-120		
Beryllium	0.00400	0.00436			109		80-120		
Cadmium	0.00500	0.00532			106		80-120		
Lead	0.0150	0.0154			102		80-120		
Batch number: 183051404702C	Sample number(s): 9874902-9874908								
Molybdenum	0.0500	0.0516			103		80-120		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18304520106A	Sample number(s): 9874902-9874903								
Chloride	3.00	2.99			100		90-110		
Fluoride	0.750	0.730			97		90-110		
Sulfate	7.50	7.56			101		90-110		
Batch number: 18304520106B	Sample number(s): 9874904-9874908								
Chloride	3.00	2.99			100		90-110		
Fluoride	0.750	0.730			97		90-110		
Sulfate	7.50	7.56			101		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18304921202A	Sample number(s): 9874903-9874908								
Total Dissolved Solids	200	208			104		62-127		
Batch number: 18304921202B	Sample number(s): 9874902								
Total Dissolved Solids	200	208			104		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 18304004101A	Sample number(s): 9874902-9874904,9874906-9874908								
pH	7.00	6.99			100		95-105		
Batch number: 18304004101B	Sample number(s): 9874905								

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2003763
Reported: 11/07/2018 09:39

LCS/LCSD (continued)

Analysis Name	LCS Spike Added Std. Units	LCS Conc Std. Units	LCSD Spike Added Std. Units	LCSD Conc Std. Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
pH	7.00	6.99			100		95-105		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 183050571302	Sample number(s): 9874902-9874908 UNSPK: 9874904									
Mercury	N.D.	0.00100	0.000879	0.00100	0.000883	88	88	75-125	0	20
Batch number: 183051404402	Sample number(s): 9874902-9874908 UNSPK: 9874907									
Barium	0.254	2.00	2.33	2.00	2.36	104	105	75-125	1	20
Boron	0.157	2.00	2.06	2.00	2.10	95	97	75-125	2	20
Calcium	40.47	4.00	46.12	4.00	45.66	141 (2)	130 (2)	75-125	1	20
Chromium	N.D.	0.200	0.205	0.200	0.208	102	104	75-125	2	20
Cobalt	N.D.	0.500	0.490	0.500	0.502	98	100	75-125	2	20
Lithium	N.D.	1.00	0.964	1.00	0.975	96	98	75-125	1	20
Selenium	N.D.	0.150	0.147	0.150	0.154	98	103	75-125	5	20
Thallium	N.D.	0.150	0.157	0.150	0.160	105	107	75-125	2	20
	mg/l	mg/l	mg/l	mg/l	mg/l					
Batch number: 18304921202A	Sample number(s): 9874903-9874908 UNSPK: 9874904									
Total Dissolved Solids	614	800	1414			100		62-127		
Batch number: 18304921202B	Sample number(s): 9874902 UNSPK: 9874904									
Total Dissolved Solids	614	800	1414			100		62-127		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc mg/l	DUP Conc mg/l	DUP RPD	DUP RPD Max
Batch number: 183050571302	Sample number(s): 9874902-9874908 BKG: 9874904			
Mercury	N.D.	N.D.	0 (1)	20
Batch number: 183051404402	Sample number(s): 9874902-9874908 BKG: 9874907			
Barium	0.254	0.252	1	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2003763
Reported: 11/07/2018 09:39

Laboratory Duplicate (continued)

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Boron	0.157	0.151	3 (1)	20
Calcium	40.47	40.37	0	20
Chromium	N.D.	N.D.	0 (1)	20
Cobalt	N.D.	N.D.	0 (1)	20
Lithium	N.D.	N.D.	0 (1)	20
Selenium	N.D.	N.D.	0 (1)	20
Thallium	N.D.	N.D.	0 (1)	20
	Degrees C	Degrees C		
Batch number: 18304004101A	Sample number(s): 9874902-9874904,9874906-9874908 BKG: 9874903			
Temperature of pH	22.49	22.52	0	5
Batch number: 18304004101B	Sample number(s): 9874905 BKG: 9874905			
Temperature of pH	22.64	23.07	2	5
	mg/l	mg/l		
Batch number: 18304921202A	Sample number(s): 9874903-9874908 BKG: 9874904			
Total Dissolved Solids	614	618	1 (1)	5
Batch number: 18304921202B	Sample number(s): 9874902 BKG: 9874902			
Total Dissolved Solids	1124	1132	1 (1)	5
	Std. Units	Std. Units		
Batch number: 18304004101A	Sample number(s): 9874902-9874904,9874906-9874908 BKG: 9874903			
pH	7.85	7.89	1	4
Batch number: 18304004101B	Sample number(s): 9874905 BKG: 9874905			
pH	6.65	6.63	0	4

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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For Eurofins Lancaster Laboratories Environmental use only
Acct. # 7701 Group # 2w3763 Sample # A874902-08

COC # 523020

Client Information

Client: GEI Consultants, Inc.
Acct. #:
Project Name/#: 1504710 / PSEG Mercer
PWSID #:
Project Manager: Jason Kohl
P.O. #:
Sampler: Casey Vincent / Anthony Shields
Quote #:
State where samples were collected: NJ
For Compliance: Yes ☒ No ☐

Matrix

Soil ☐ Sediment ☐ Tissue ☐ | Water: Potable ☐ Ground ☒ NPDES ☐ Surface ☐ | Other: Aqueous

Analysis Requested

Preservation Codes

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Site List of Metals	Mercury	Chloride	Fluoride	Sulfate	pH	TDS	Ra 226 + 228	Metals QC
MW-1	10/29/18	1130	X		7	X	X	X	X	X	X	X	X	
MW-2	10/29/18	1110	X		8	X	X	X	X	X	X	X	X	X
MW-3	10/29/18	1500	X		7	X	X	X	X	X	X	X	X	
MW-4	10/29/18	1300	X		7	X	X	X	X	X	X	X	X	
MW-5	10/29/18	1310	X		7	X	X	X	X	X	X	X	X	
MW-6	10/29/18	1500	X		7	X	X	X	X	X	X	X	X	
FB-20181029	10/29/18	1100	X		7	X	X	X	X	X	X	X	X	

For Lab Use Only
FSC:
SCR#:

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

Remarks

Turnaround Time (TAT) Requested (please circle)
Standard Rush
(Rush TAT is subject to laboratory approval and surcharge.)

Date results are needed:
E-mail address: jkohl@geiconsultants.com

Data Package Options (circle if required)
Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only)
Type III (Reduced non-CLP) NJ DKQP TX TRRP-13
NYSDEC Category A or B MA MCP CT RCP

Relinquished by	Date	Time	Received by	Date	Time
	10/30/18	14:20		10/30/18	14:20
	10/30/18	16:45		Date	Time
	Date	Time		Date	Time
	Date	Time		Date	Time
	Date	Time		Date 10-30-18	Time 1645

EDD Required? Yes No
If yes, format:
Site-Specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:
UPS FedEx Other
Temperature upon receipt 1.1-1.9 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 231540

Group Number(s): 2003763

Client: GEI Consultants, Inc

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	10/30/2018 16:45
Number of Packages:	2	Number of Projects:	1
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	No	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	No	Sample Date/Times match COC:	Yes
Samples Chilled:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	0
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Cory Jeremiah (10469) at 18:14 on 10/30/2018

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-03	1.1	DT	Wet	Y	Bagged	N
2	DT42-03	1.9	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17601-2425
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Metals in Liquid Data

Case Narrative/Conformance Summary

Metals in Liquid

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

ICP Metals

Fraction: Metals in Liquid

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9874902	MW-1	X		1	
9874903	MW-2	X		1	
9874904	MW-3	X		1	
9874905	MW-4	X		1	
9874906	MW-5	X		1	
9874907	MW-6	X		1	
9874908	FB-20181029	X		1	Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

Method Blank

For noncompliant preparation/method blanks, corrective action is not required if the sample is ND or > 10 times the blank concentration, unless otherwise specified in the method or by the client.

MS/MSD

Method defined actions are taken for any failed matrix QC.

Batch#: 183051404402 (Sample number(s): 9874902-9874908, UNSPK: 9874907, BKG: 9874907)

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

ICP Metals

Fraction: Metals in Liquid

The recovery(ies) for the following analyte(s) in the MS and MSD exceeded the acceptance window indicating a positive bias: Calcium

SAMPLE ANALYSIS:

The instrument detection limits (IDLs) are used for determining the U flags on the initial and continuing calibration blanks. The highest IDL is selected when multiple instruments are used for an analysis. The method detection limits (MDLs) are used for determining all other U flags.

(Sample number(s): 9874902-9874908: Analysis: 07036)
The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The following were evaluated using the MDL: Selenium, Thallium

No other problems were encountered with the analysis of the samples.

Abbreviation Key

BKG – Background	AF - Cold Vapor Atomic Fluorescence
DUP – Duplicate	U - Below MDL
MS - Matrix Spike	B - Below LOQ
MSD - Matrix Spike Dup	N - Matrix Spike out of specifications
B – Blank	* - Duplicate out of specifications
Q - Laboratory Control Sample	E - Matrix Effects exist as proven by Serial Dilution or Spiked Dilution
Y - Laboratory Control Sample Duplicate	A - Post Digestion Spike
P - ICP Atomic Emission Spectrometer	L - Serial Dilution
MS - ICP Mass Spectrometry	R - Internal Standard Relative Intensity OOS
CV - Cold Vapor	NR - Not Required

Sample Data

Metals in Liquid

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9874902 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/30/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	186			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	1170			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	210000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	30.5	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	3.7			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9874903 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/30/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.46	B		MS
7440-38-2	Arsenic	3.1			MS
7440-39-3	Barium	17.9			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	35.8	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	24200			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	3.6			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9874904, 9874904BKG % Solids: 0.0
Concentration Units: UG/L Date Received: 10/30/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	7.2			MS
7440-39-3	Barium	248			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	267			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	58400			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	2.5	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	34.0	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	17.9			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9874905 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/30/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	11.9			P
7440-41-7	Beryllium	0.22	B		MS
7440-42-8	Boron	24.1	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	4520			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	2.0	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	1.5	B		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9874906 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/30/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	197			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	410			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	96300			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	18.4			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9874907, 9874907BKG % Solids: 0.0
Concentration Units: UG/L Date Received: 10/30/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	254			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	157			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	40500			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	2.7			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9874908 % Solids: 0.0
Concentration Units: UG/L Date Received: 10/30/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	12.0	U		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	69.6	B		P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	0.31	U		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

Quality Control and Calibration Summary Forms

Metals in Liquid

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ59
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Barium	183051404402	9874902
Boron		9874903
Calcium		9874904
Chromium		9874905
Cobalt		9874906
Lithium		9874907BKG
Selenium		9874907MS
Thallium		9874907MSD
		9874907DUP
		9874908
		P30504BB
		P30504BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ59
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Antimony	183051404702	*73117BKG
Arsenic		9874902
Beryllium		9874903
Cadmium		9874904
Lead		9874905
Molybdenum		9874906
		9874907
		9874908
		P30504BB
		P30504BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ59
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Mercury	183050571302	9874902
		9874903
		9874904BKG
		9874904MS
		9874904MSD
		9874904DUP
		9874905
		9874906
		9874907
		9874908
		P30571BB
		P30571BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: P
Run Name: 1830801T71
Calibration Date(s): 11/04/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium		600.0	594.49	99.1	500.0	493.73	98.7	500.0	481.28	96.3
Boron										
Calcium		30000.0	29539.62	98.5	25000.0	24493.95	98.0	25000.0	24382.05	97.5
Chromium		600.0	592.74	98.8	500.0	496.85	99.4	500.0	492.07	98.4
Cobalt		600.0	589.04	98.2	500.0	482.90	96.6	500.0	487.45	97.5
Lithium		600.0	601.49	100.2	500.0	505.34	101.1	500.0	506.44	101.3
Selenium		600.0	586.26	97.7	500.0	477.91	95.6	500.0	477.07	95.4
Thallium		600.0	606.06	101.0	500.0	488.59	97.7	500.0	497.78	99.6

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: P
Run Name: 1830801T71
Calibration Date(s): 11/04/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	479.31	95.9	500.0	477.49	95.5
Boron										
Calcium					25000.0	24291.95	97.2	25000.0	24198.03	96.8
Chromium					500.0	494.95	99.0	500.0	501.26	100.3
Cobalt					500.0	485.73	97.1	500.0	483.37	96.7
Lithium					500.0	501.40	100.3	500.0	503.98	100.8
Selenium					500.0	490.37	98.1	500.0	501.51	100.3
Thallium					500.0	501.56	100.3	500.0	500.71	100.1

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: P
Run Name: 1830904T71
Calibration Date(s): 11/05/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Barium		600.0	598.91	99.8	500.0	489.61	97.9	500.0	504.62	100.9
Boron		600.0	590.66	98.4	500.0	468.35	93.7	500.0	471.11	94.2
Calcium		30000.0	29780.34	99.3	25000.0	24558.64	98.2	25000.0	24523.80	98.1
Chromium		600.0	606.74	101.1	500.0	498.43	99.7	500.0	501.92	100.4
Cobalt		600.0	586.03	97.7	500.0	485.46	97.1	500.0	481.85	96.4
Lithium		600.0	590.38	98.4	500.0	488.35	97.7	500.0	483.65	96.7
Selenium		600.0	572.05	95.3	500.0	458.85	91.8	500.0	475.14	95.0
Thallium		600.0	608.43	101.4	500.0	495.00	99.0	500.0	499.37	99.9

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: P
Run Name: 1830904T71
Calibration Date(s): 11/05/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	507.37	101.5			
Boron					500.0	473.28	94.7	500.0	475.58	95.1
Calcium					25000.0	24606.77	98.4			
Chromium					500.0	500.43	100.1			
Cobalt					500.0	480.12	96.0			
Lithium					500.0	483.57	96.7			
Selenium					500.0	472.41	94.5			
Thallium					500.0	492.75	98.6			

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: MS
Run Name: 1831007E07
Calibration Date(s): 11/06/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Antimony	121	50.0	52.54	105.1	25.0	25.72	102.9	25.0	25.66	102.6
Arsenic	75	500.0	520.67	104.1	250.0	254.84	101.9	250.0	250.30	100.1
Beryllium	9	50.0	51.33	102.7	25.0	25.51	102.0	25.0	25.36	101.4
Cadmium	111	50.0	51.74	103.5	25.0	26.13	104.5	25.0	25.93	103.7
Lead	208	50.0	51.32	102.6	25.0	25.63	102.5	25.0	25.59	102.4
Molybdenum	98	50.0	51.77	103.5	25.0	25.09	100.4	25.0	25.44	101.8

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: MS
Run Name: 1831007E07
Calibration Date(s): 11/06/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121				25.0	25.74	103.0	25.0	25.21	100.8
Arsenic	75				250.0	248.81	99.5	250.0	247.96	99.2
Beryllium	9				25.0	25.39	101.6	25.0	25.55	102.2
Cadmium	111				25.0	25.97	103.9	25.0	25.44	101.8
Lead	208				25.0	25.62	102.5	25.0	25.85	103.4
Molybdenum	98				25.0	25.10	100.4	25.0	25.17	100.7

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

		Initial Calibration			Continuing Calibration					
Analyte	Mass	True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Mercury		2.5	2.51	100.4	1.0	0.98	98.0	1.0	1.02	102.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	1.02	102.0	1.0	1.02	102.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	1.01	101.0	1.0	1.01	101.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.98	98.0	1.0	0.98	98.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.98	98.0	1.0	0.99	99.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.97	97.0	1.0	0.99	99.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.98	98.0	1.0	0.97	97.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1830801T71
Calibration Date(s): 11/04/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium		5.0	5.10	102.0		
Boron						
Calcium		500.0	486.40	97.3		
Chromium		15.0	14.40	96.0		
Cobalt		5.0	4.85	97.0		
Lithium		50.0	52.35	104.7		
Selenium		50.0	48.69	97.4		
Thallium		30.0	33.36	111.2		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1830904T71
Calibration Date(s): 11/05/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium		5.0	5.32	106.4		
Boron		50.0	47.90	95.8		
Calcium		500.0	517.88	103.6		
Chromium		15.0	15.65	104.3		
Cobalt		5.0	5.89	117.8		
Lithium		50.0	50.25	100.5		
Selenium		50.0	52.87	105.7		
Thallium		30.0	30.71	102.4		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2B
LOW LEVEL CHECK STANDARD
SDG No.: GEJ59

Method: MS
Run Name: 1831007E07
Calibration Date(s): 11/06/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony	121	2.0	2.29	114.5		
Arsenic	75	2.0	2.08	104.0		
Beryllium	9	0.5	0.58	116.0		
Cadmium	111	1.0	1.01	101.0		
Lead	208	3.0	3.04	101.3		
Molybdenum	98	2.0	2.14	107.0		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Concentration Units: UG/L

			Initial		Final	
Analyte	Mass	True	Found	%R	Found	%R
Mercury		0.2	0.20	100.0	0.21	105.0

Control limits: 50% - 150%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1830801T71
Calibration Date(s): 11/04/2018
Preparation Blank Matrix: WATER

Analyte	Mass	Initial Calibration Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank (UG/L) Mass		C	Batch Number
Barium		0.64	U	0.64	U	0.64	U	0.64	U		1.000	U	183051404402
Boron													
Calcium		33.4	U	33.4	U	33.4	U	33.4	U		58.090	B	183051404402
Chromium		1.2	U	1.2	U	1.2	U	-1.3	B		5.300	U	183051404402
Cobalt		0.76	U	0.76	U	0.76	U	0.76	U		1.500	U	183051404402
Lithium		4.0	U	4.0	U	4.0	U	4.0	U		11.000	U	183051404402
Selenium		5.6	U	9.7	B	5.6	U	5.6	U		21.000	U	183051404402
Thallium		7.3	U	7.3	U	7.3	U	7.3	U		14.000	U	183051404402

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: P
Run Name: 1830801T71
Calibration Date(s): 11/04/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium				0.64	U								
Boron													
Calcium				33.4	U								
Chromium				1.2	U								
Cobalt				0.76	U								
Lithium				4.0	U								
Selenium				5.6	U								
Thallium				7.3	U								

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: P
Run Name: 1830904T71
Calibration Date(s): 11/05/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)								Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium		0.64	U	0.64	U	0.64	U	0.64	U				
Boron		8.4	U	8.4	U	8.4	U	8.4	U		12.000	U	183051404402
Calcium		33.4	U	34.1	B	42.5	B	33.4	U				
Chromium		1.2	U	1.2	U	1.3	B	1.2	U				
Cobalt		0.85	B	0.76	U	0.94	B	0.89	B				
Lithium		4.0	U	4.0	U	4.0	U	4.0	U				
Selenium		5.6	U	5.6	U	5.6	U	5.6	U				
Thallium		7.3	U	7.3	U	7.3	U	7.3	U				

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: P
Run Name: 1830904T71
Calibration Date(s): 11/05/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium													
Boron				8.4	U								
Calcium													
Chromium													
Cobalt													
Lithium													
Selenium													
Thallium													

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: MS
Run Name: 1831007E07
Calibration Date(s): 11/06/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121	0.69	B	0.90	B	0.46	B	0.41	B	121	0.473	B	183051404702A
Arsenic	75	0.50	U	0.50	U	0.50	U	0.50	U	75	0.680	U	183051404702A
Beryllium	9	0.073	U	0.073	U	0.12	B	0.11	B	9	0.109	B	183051404702A
Cadmium	111	0.18	U	0.18	U	0.18	U	0.18	U	111	0.150	U	183051404702A
Lead	208	0.14	U	0.16	B	0.14	U	0.14	U	208	1.100	U	183051404702A
Molybdenum	98	0.30	U	0.48	B	0.30	U	0.30	U	98	0.527	B	183051404702A

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: MS
Run Name: 1831007E07
Calibration Date(s): 11/06/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121			0.32	B								
Arsenic	75			0.50	U								
Beryllium	9			0.073	U								
Cadmium	111			0.18	U								
Lead	208			0.14	U								
Molybdenum	98			0.30	U								

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury		0.050	U	0.050	U	0.050	U	0.050	U		0.050	U	183050571302

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U	0.050	U				

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U	0.050	U				

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U	0.050	U				

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ59

Method: CV
Run Name: 1830601M07
Calibration Date(s): 11/02/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U						

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ59

Instrument ID: 16315
Run Name: 1830801T71
Concentration Units: ug/L

Analyte	True		Initial Found				Final Found			
	Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R	Sol. A	%R	Sol. AB	%R
Aluminum	500000		491099	98.2						
Barium	0		1							
Boron										
Calcium	500000		501816	100.4						
Chromium	0		-8							
Cobalt	0		-2							
Iron	200000		198108	99.1						
Lithium	0		53							
Magnesium	500000		483266	96.7						
Selenium	0		22							
Thallium	0		5							

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ59

Instrument ID: 16315
Run Name: 1830904T71
Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found %R	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found %R	Final Found Sol. AB	Final Found %R
Aluminum	500000		508096	101.6						
Barium	0		1							
Boron	0		13							
Calcium	500000		517216	103.4						
Chromium	0		-6							
Cobalt	0		-2							
Iron	200000		201937	101.0						
Lithium	0		52							
Magnesium	500000		497447	99.5						
Selenium	0		7							
Thallium	0		8							

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ59

Instrument ID: 27813
Run Name: 1831007E07
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		101560	101.6		
Antimony	121	0		1			
Arsenic	75	0		1			
Beryllium	9	0		0			
Cadmium	111	0		0			
Calcium	44	300000		300562	100.2		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		247298	98.9		
Lead	208	0		1			
Magnesium	24	100000		99675	99.7		
Molybdenum	98	2000		2129	106.5		
Phosphorus	31	10000		NA			
Potassium	39	100000		99068	99.1		
Sodium	23	250000		252970	101.2		
Sulfur	34	10000		NA			
Titanium	47	2000		2012	100.6		

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 5A(MS/MSD)
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9874904BKG Matrix Spike Lab Sample ID: 9874904MS Matrix Spike Duplicate Lab Sample ID: 9874904MSD
Batch Number(s): 183050571302

		BKG Sample		MS Sample		MSD Sample		MS Spike	MSD Spike		MS		MSD				Control Limit		
Analyte	Mass	Result	C	Result	C	Result	C	Added	Added	Units	%R	Q	%R	Q	RPD	Q	%R	RPD	M
Mercury		0.0500	U	0.8792		0.8827		1.0000	1.0000	UG/L	88		88		0		75 - 125	20	CV

Note: Results shown are reported on an as-received basis.
If Matrix Spike/ Matrix Spike Duplicate were out of specification, see Post Digestion Spike form.

METHODS:
P = ICP Atomic Emission Spectrometer CV = Cold Vapor
MS = ICP Mass Spectrometry AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL, B= Below LOQ
FLAGS:
N = Matrix Spike OOS, * = Duplicate OOS

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QUALITY ASSURANCE SUMMARY
FORM 5A(MS/MSD)
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9874907BKG Matrix Spike Lab Sample ID: 9874907MS Matrix Spike Duplicate Lab Sample ID: 9874907MSD
Batch Number(s): 183051404402

		BKG Sample		MS Sample		MSD Sample		MS Spike	MSD Spike		MS		MSD				Control Limit		
Analyte	Mass	Result	C	Result	C	Result	C	Added	Added	Units	%R	Q	%R	Q	RPD	Q	%R	RPD	M
Barium		254.4200		2333.2200		2362.2300		2000.0000	2000.0000	UG/L	104		105		1		75 - 125	20	P
Boron		156.6900		2055.1400		2097.7500		2000.0000	2000.0000	UG/L	95		97		2		75 - 125	20	P
Calcium		40467.6100		46118.2300		45656.4300		4000.0000	4000.0000	UG/L	141		130		1			20	P
Chromium		5.3000	U	204.7100		208.1700		200.0000	200.0000	UG/L	102		104		2		75 - 125	20	P
Cobalt		1.5000	U	489.8400		501.6600		500.0000	500.0000	UG/L	98		100		2		75 - 125	20	P
Lithium		11.0000	U	963.5300		975.2500		1000.0000	1000.0000	UG/L	96		98		1		75 - 125	20	P
Selenium		21.0000	U	146.9000		154.1400		150.0000	150.0000	UG/L	98		103		5		75 - 125	20	P
Thallium		14.0000	U	157.1200		160.3000		150.0000	150.0000	UG/L	105		107		2		75 - 125	20	P

Note: Results shown are reported on an as-received basis.
If Matrix Spike/ Matrix Spike Duplicate were out of specification, see Post Digestion Spike form.

METHODS:
P = ICP Atomic Emission Spectrometer CV = Cold Vapor
MS = ICP Mass Spectrometry AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL, B= Below LOQ
FLAGS:
N = Matrix Spike OOS, * = Duplicate OOS

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QUALITY ASSURANCE SUMMARY
FORM 6
DUPLICATES
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9874904BKG Duplicate Lab Sample ID: 9874904DUP
Batch Number(s): 183050571302
Concentration Units: UG/L

Analyte	Mass	Control Limit	Samples (S)	C	Duplicate (D)	C	RPD	Q	M
Mercury			0.0500	U	0.0500	U			CV

NOTE: An asterisk (*) in column "Q" indicates poor duplicate precision (RPD > 20% OR |(S) - (D)| > LOQ for values < 5x LOQ).
The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample.

Note: Results shown are reported on an as-received basis.

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	FLAGS:
AF = Cold Vapor Atomic Fluorescence	*= Duplicate Out of Spec

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QUALITY ASSURANCE SUMMARY
FORM 6
DUPLICATES
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9874907BKG Duplicate Lab Sample ID: 9874907DUP
Batch Number(s): 183051404402
Concentration Units: UG/L

Analyte	Mass	Control Limit	Samples (S)	C	Duplicate (D)	C	RPD	Q	M
Barium			254.4200		252.2300		1		P
Boron		50.0	156.6900		151.3900		3		P
Calcium			40467.6100		40365.3400		0		P
Chromium			5.3000	U	5.3000	U			P
Cobalt			1.5000	U	1.5000	U			P
Lithium			11.0000	U	11.0000	U			P
Selenium			21.0000	U	21.0000	U			P
Thallium			14.0000	U	14.0000	U			P

NOTE: An asterisk (*) in column "Q" indicates poor duplicate precision (RPD > 20% OR |(S) - (D)| > LOQ for values < 5x LOQ).
The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample.

Note: Results shown are reported on an as-received basis.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
* = Duplicate Out of Spec

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QUALITY ASSURANCE SUMMARY
FORM 7
LABORATORY CONTROL SAMPLE
SDG No.: GEJ59
Matrix: WATER

Analyte	Mass	Batch Number	Units	True	Found	C	Control Limits (%)	%R	M	In Spec
Antimony	121	183051404702	UG/L	6.000	6.027		80 - 120	100	MS	Yes
Arsenic	75	183051404702	UG/L	10.000	10.941		80 - 120	109	MS	Yes
Barium		183051404402	UG/L	2000.000	1891.860		80 - 120	95	P	Yes
Beryllium	9	183051404702	UG/L	4.000	4.359		80 - 120	109	MS	Yes
Boron		183051404402	UG/L	2000.000	1841.210		80 - 120	92	P	Yes
Cadmium	111	183051404702	UG/L	5.000	5.322		80 - 120	106	MS	Yes
Calcium		183051404402	UG/L	4000.000	3887.000		80 - 120	97	P	Yes
Chromium		183051404402	UG/L	200.000	197.940		80 - 120	99	P	Yes
Cobalt		183051404402	UG/L	500.000	492.550		80 - 120	99	P	Yes
Lead	208	183051404702	UG/L	15.000	15.362		80 - 120	102	MS	Yes
Lithium		183051404402	UG/L	1000.000	985.810		80 - 120	99	P	Yes
Mercury		183050571302	UG/L	1.000	0.900		80 - 120	90	CV	Yes
Molybdenum	98	183051404702	UG/L	50.000	51.647		80 - 120	103	MS	Yes
Selenium		183051404402	UG/L	150.000	145.590		80 - 120	97	P	Yes
Thallium		183051404402	UG/L	150.000	150.640		80 - 120	100	P	Yes

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: *73117BKG Serial Dilution Lab Sample ID: *73117L
Batch Number(s): 183051404702
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Antimony	121	0.7271	B	2.0300	U	100		MS
Arsenic	75	0.9608	B	3.4000	U	100		MS
Beryllium	9	0.1278	B	0.4550	U	100		MS
Cadmium	111	0.1510	U	0.7550	U			MS
Lead	208	1.0700	U	5.3500	U			MS
Molybdenum	98	0.5102	B	1.5450	U	100		MS

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ59
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9874907DUP Serial Dilution Lab Sample ID: 9874907DL
Batch Number(s): 183051404402
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Barium		252.2300		250.1500		1		P
Boron		151.3900		183.9500	B	22		P
Calcium		40365.3400		40521.1500		0		P
Chromium		5.3000	U	26.5000	U			P
Cobalt		1.5000	U	7.5000	U			P
Lithium		11.0000	U	55.0000	U			P
Selenium		21.0000	U	105.0000	U			P
Thallium		14.0000	U	70.0000	U			P

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

QUALITY ASSURANCE SUMMARY
FORM 10
INSTRUMENT DETECTION LIMITS (QUARTERLY)
SDG No.: GEJ59

Method: P
Instrument ID: 16315
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium	455.40		0.64
Boron	249.67		8.4
Calcium	317.93		33.4
Chromium	267.72		1.2
Cobalt	228.62		0.76
Lithium	670.78		4.0
Selenium	196.09		5.6
Thallium	190.86		7.3

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Instrument ID: 27813
Date: 09/2018

Analyte	MASS (amu)	Background	IDL (UG/L)
Antimony	121		0.29
Arsenic	75		0.50
Beryllium	9		0.073
Cadmium	111		0.18
Lead	208		0.14
Molybdenum	98		0.30

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Instrument ID: 17384
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Mercury	254.00		0.050

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ59
Matrix: WATER

Method: P
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium	455.40		5.0	1.0
Boron	249.67		50.0	12.0
Calcium	317.93		500	33.0
Chromium				
Cobalt	228.62		5.0	1.5
Lithium	670.78		50.0	11.0
Selenium				
Thallium				

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ59
Matrix: WATER

Method: P
Date: 09/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium				
Boron				
Calcium				
Chromium	267.72		15.0	5.3
Cobalt				
Lithium				
Selenium	196.09		50.0	21.0
Thallium	190.86		30.0	14.0

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ59
Matrix: WATER

Method: MS
Date: 09/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony	121		2.0	0.41
Arsenic	75		2.0	0.68
Beryllium	9		0.50	0.091
Cadmium	111		1.0	0.15
Lead	208		3.0	1.1
Molybdenum	98		2.0	0.31

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ59
Matrix: WATER

Method: CV
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Mercury	254.00		0.20	0.050

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

US EPA Tune Check Report

Operator Name	US19_USR_INS27814
Acq/Data Batch	D:\Agilent\ICPMH\1\DATA\EPA_Tune.b
Acq. Date-Time	2018-11-05 17:40:56
Report Comment	---
Instrument Name	G8403A SG18254097

[No Gas]

Sensitivity

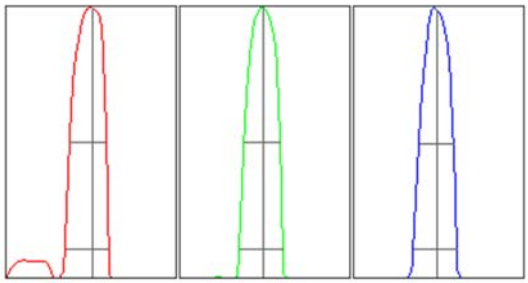
Mass	Conc. [ug/l]	Count	CPS	Resp (Required) [cps/ug/l]	Resp (Flag)	RSD%	RSD% (Required)
7	10.00	1227	12265.29			1.547	5.000
89	10.00	8418	84183.04			0.486	5.000
205	10.00	3773	37729.40			1.248	5.000

Mass	RSD% (Flag)
7	
89	
205	

Mass	Rep#1 Count	Rep#2 Count	Rep#3 Count	Rep#4 Count	Rep#5 Count
7	1254	1226	1209	1235	1210
89	8485	8389	8382	8426	8410
205	3800	3698	3754	3810	3803

Integration Time [sec] 0.1

Resolution/Axis



Mass	Peak Height	Axis	Axis (Required)	Axis (Flag)
7	1930.59	7.05	6.90 - 7.10	
89	13717.99	89.00	88.90 - 89.10	
205	6389.82	205.00	204.90 - 205.10	

Mass	W-50%	W-10%	W-10% (Required)	W-10% (Flag)
7	0.66	0.774	0.800	
89	0.65	0.772	0.800	
205	0.62	0.771	0.800	

Integration Time [sec] 0.1

Acquisition Time [sec] 113.7

Y Axis Linear

US EPA Tune Check Report

Tune Parameters

Plasma Parameters

Plasma Mode	---	Nebulizer Gas	0.65 L/min	Dilution Gas	0.45 L/min
RF Power	1550 W	Option Gas	---	Auxiliary Gas	0.90 L/min
RF Matching	1.10 V	Nebulizer Pump	0.10 rps	Plasma Gas	15.0 L/min
Sample Depth	10.0 mm	S/C Temp	2 °C		

Lens Parameters

Extract 1	0.0 V	Omega Lens	11.6 V	Deflect	17.0 V
Extract 2	-170.0 V	Cell Entrance	-40 V	Plate Bias	-50 V
Omega Bias	-70 V	Cell Exit	-60 V		

Cell Parameters

Use Gas	No	3rd Gas Flow	---	Energy Discrimination	5.0 V
He Flow	0.0 mL/min	OctP Bias	-8.0 V		
H2 Flow	0.0 mL/min	OctP RF	190 V		

QP Parameters

Mass Gain	124	Axis Gain	0.9995	QP Bias	-3.0 V
Mass Offset	124	Axis Offset	0.03		

Hardware Settings

Torch

Torch H	0.2 mm	Torch V	-0.1 mm		

EM

Discriminator	3.9 mV	Analog HV	2142 V	Pulse HV	1608 V

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ59

Instrument ID: 27813
Run Name: 1831007E07

Start Date: 11/06/2018
End Date: 11/06/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-3-209	PB	IN-3-115	AS,CD,MO,SB
SC-1-45	BE		

Lab Sample ID	Time	Internal Standards %RI For: Element SC-1-45	Q	Element IN-3-115	Q	Element BI-3-209	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	10:35	100		100		100									
S	10:38	103		100		102									
ICV	10:40	97		96		98									
ICB	10:42	94		93		95									
LLC	10:44	89		93		96									
ICSA	10:47	89		87		90									
LRS2	10:49	100		91		96									
LRS3	10:51	97		91		94									
CCS	10:53	93		90		94									
CCS	10:55	93		94		98									
CCV	10:57	96		95		99									
CCB	10:59	90		93		97									
P30504BB	11:01	83		89		93									
P30504BQ	11:04	91		91		95									
*73117BKG	11:06	94		93		97									
ZZZZZZ	11:08														
ZZZZZZ	11:10														
ZZZZZZ	11:12														
ZZZZZZ	11:14														
*73117L	11:16	97		97		101									
ZZZZZZ	11:18														
CCV	11:21	94		93		97									
CCB	11:23	90		95		95									
ZZZZZZ	11:25														
ZZZZZZ	11:27														
ZZZZZZ	11:29														
9874902	11:31	98		98		101									
9874903	11:33	100		98		102									
ZZZZZZ	11:36														
ZZZZZZ	11:38														
ZZZZZZ	11:40														
CCV	11:42	95		97		101									

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ59

Instrument ID: 27813 Start Date: 11/06/2018
Run Name: 1831007E07 End Date: 11/06/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-3-209	PB	IN-3-115	AS,CD,MO,SB
SC-1-45	BE		

Lab Sample ID	Time	Internal Standards %RI For:													
		Element SC-1-45	Q	Element IN-3-115	Q	Element BI-3-209	Q	Element	Q	Element	Q	Element	Q	Element	Q
CCB	11:44	94		95		97									
9874904	11:46	91		93		95									
9874905	11:48	93		91		95									
9874906	11:51	93		93		95									
9874907	11:53	93		95		98									
ZZZZZZ	11:55														
ZZZZZZ	11:57														
9874908	11:59	89		91		94									
CCV	12:01	93		98		100									
CCB	12:03	92		95		99									

LEGEND:
BKG = Background MS = Matrix Spike
DUP = Duplicate MSD = Matrix Spike Duplicate
L = Serial Dilution A = Post Digest Spike
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium LI = Lithium
BI = Bismuth SC = Scandium
GE = Germanium TB = Terbium
HO = Holmium Y = Yttrium
IN = Indium

Preparation and Run Logs

Metals in Liquid

Method: P
Batch Number: 183051404402

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9874902	11/02/2018	50.00	50
9874903	11/02/2018	50.00	50
9874904	11/02/2018	50.00	50
9874905	11/02/2018	50.00	50
9874906	11/02/2018	50.00	50
9874908	11/02/2018	50.00	50
9874907BKG	11/02/2018	25.00	25
9874907DUP	11/02/2018	25.00	25
9874907MSD	11/02/2018	25.00	25
9874907MS	11/02/2018	25.00	25
P30504BB	11/02/2018	50.00	50
P30504BQ	11/02/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: MS
Batch Number: 183051404702

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9874902	11/02/2018	50.00	50
9874903	11/02/2018	50.00	50
9874904	11/02/2018	50.00	50
9874905	11/02/2018	50.00	50
9874906	11/02/2018	50.00	50
9874907	11/02/2018	50.00	50
9874908	11/02/2018	50.00	50
*73117BKG	11/02/2018	25.00	25
P30504BB	11/02/2018	50.00	50
P30504BQ	11/02/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: CV
Batch Number: 183050571302

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9874902	11/01/2018	40.00	40
9874903	11/01/2018	40.00	40
9874905	11/01/2018	40.00	40
9874906	11/01/2018	40.00	40
9874907	11/01/2018	40.00	40
9874908	11/01/2018	40.00	40
9874904BKG	11/01/2018	40.00	40
9874904DUP	11/01/2018	40.00	40
9874904MSD	11/01/2018	40.00	40
9874904MS	11/01/2018	40.00	40
P30571BB	11/01/2018	40.00	40
P30571BQ	11/01/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: P
Instrument ID: 16315
Run Name: 1830801T71

Run Start Date: 11/04/2018
Run End Date: 11/04/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: P
Instrument ID: 16315
Run Name: 1830904T71

Run Start Date: 11/05/2018
Run End Date: 11/05/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: MS
Instrument ID: 27813
Run Name: 1831007E07

Run Start Date: 11/06/2018
Run End Date: 11/06/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: MS
Instrument ID: 27813
Run Name: 1831007E07

Run Start Date: 11/06/2018
Run End Date: 11/06/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
ZZZZZZ	1.00	11:57																																							
9874908	1.00	11:59	X	X		X		X				X			X																										
CCV	1.00	12:01	X	X		X		X				X			X																										
CCB	1.00	12:03	X	X		X		X				X			X																										

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: CV
Instrument ID: 17384
Run Name: 1830601M07

Run Start Date: 11/02/2018
Run End Date: 11/02/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
S0	1.00	13:47												X																											
S0.2	1.00	13:49												X																											
S0.5	1.00	13:51												X																											
S1.0	1.00	13:53												X																											
S2.5	1.00	13:55												X																											
S5.0	1.00	13:57												X																											
ICV	1.00	13:59												X																											
ICB	1.00	14:01												X																											
CRA	1.00	14:03												X																											
CCV	1.00	14:05												X																											
CCB	1.00	14:07												X																											
ZZZZZZ	1.00	14:09																																							
ZZZZZZ	1.00	14:11																																							
ZZZZZZ	1.00	14:13																																							
ZZZZZZ	1.00	14:15																																							
ZZZZZZ	1.00	14:17																																							
ZZZZZZ	1.00	14:19																																							
ZZZZZZ	1.00	14:21																																							
ZZZZZZ	1.00	14:23																																							
ZZZZZZ	1.00	14:25																																							
ZZZZZZ	1.00	14:27																																							
CCV	1.00	14:29												X																											
CCB	1.00	14:31												X																											
ZZZZZZ	1.00	14:33																																							
ZZZZZZ	1.00	14:35																																							
ZZZZZZ	1.00	14:37																																							
ZZZZZZ	1.00	14:39																																							
ZZZZZZ	1.00	14:41																																							
ZZZZZZ	1.00	14:43																																							
ZZZZZZ	1.00	14:45																																							
ZZZZZZ	2.00	14:47																																							
ZZZZZZ	1.00	14:50																																							
ZZZZZZ	1.00	14:52																																							
CCV	1.00	14:54												X																											
CCB	1.00	14:56												X																											
ZZZZZZ	1.00	14:58																																							
ZZZZZZ	1.00	15:00																																							
ZZZZZZ	1.00	15:02																																							

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: CV
Instrument ID: 17384
Run Name: 1830601M07

Run Start Date: 11/02/2018
Run End Date: 11/02/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
ZZZZZZ	1.00	15:04																																							
ZZZZZZ	1.00	15:06																																							
ZZZZZZ	1.00	15:08																																							
ZZZZZZ	1.00	15:10																																							
ZZZZZZ	1.00	15:12																																							
ZZZZZZ	1.00	15:14																																							
ZZZZZZ	1.00	15:16																																							
CCV	1.00	15:18												X																											
CCB	1.00	15:20												X																											
ZZZZZZ	1.00	15:22																																							
ZZZZZZ	1.00	15:24																																							
ZZZZZZ	1.00	15:26																																							
ZZZZZZ	1.00	15:28																																							
ZZZZZZ	1.00	15:30																																							
ZZZZZZ	1.00	15:32																																							
ZZZZZZ	1.00	15:34																																							
ZZZZZZ	1.00	15:36																																							
ZZZZZZ	1.00	15:38																																							
ZZZZZZ	1.00	15:40																																							
CCV	1.00	15:42												X																											
CCB	1.00	15:44												X																											
ZZZZZZ	1.00	15:46																																							
ZZZZZZ	1.00	15:48																																							
ZZZZZZ	1.00	15:50																																							
ZZZZZZ	1.00	15:53																																							
ZZZZZZ	1.00	15:55																																							
ZZZZZZ	1.00	15:57																																							
ZZZZZZ	1.00	15:59																																							
ZZZZZZ	1.00	16:01																																							
ZZZZZZ	1.00	16:03																																							
ZZZZZZ	1.00	16:05																																							
CCV	1.00	16:07												X																											
CCB	1.00	16:09												X																											
ZZZZZZ	1.00	16:11																																							
ZZZZZZ	1.00	16:13																																							
ZZZZZZ	1.00	16:15																																							
ZZZZZZ	1.00	16:17																																							
ZZZZZZ	1.00	16:19																																							

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: CV
Instrument ID: 17384
Run Name: 1830601M07

Run Start Date: 11/02/2018
Run End Date: 11/02/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
ZZZZZZ	1.00	16:21																																							
ZZZZZZ	1.00	16:23																																							
ZZZZZZ	1.00	16:25																																							
ZZZZZZ	1.00	16:27																																							
ZZZZZZ	1.00	16:29																																							
CCV	1.00	16:32												X																											
CCB	1.00	16:34												X																											
ZZZZZZ	1.00	16:36																																							
ZZZZZZ	1.00	16:38																																							
ZZZZZZ	1.00	16:40																																							
ZZZZZZ	1.00	16:42																																							
ZZZZZZ	1.00	16:44																																							
ZZZZZZ	1.00	16:46																																							
ZZZZZZ	1.00	16:48																																							
ZZZZZZ	1.00	16:50																																							
ZZZZZZ	1.00	16:52																																							
ZZZZZZ	1.00	16:54																																							
CCV	1.00	16:56												X																											
CCB	1.00	16:58												X																											
ZZZZZZ	1.00	17:01																																							
ZZZZZZ	1.00	17:03																																							
ZZZZZZ	1.00	17:05																																							
ZZZZZZ	1.00	17:07																																							
ZZZZZZ	1.00	17:09																																							
ZZZZZZ	1.00	17:11																																							
ZZZZZZ	1.00	17:13																																							
ZZZZZZ	1.00	17:15																																							
ZZZZZZ	1.00	17:17																																							
ZZZZZZ	1.00	17:19																																							
CCV	1.00	17:21												X																											
CCB	1.00	17:23												X																											
ZZZZZZ	1.00	17:25																																							
ZZZZZZ	1.00	17:27																																							
ZZZZZZ	1.00	17:29																																							
ZZZZZZ	1.00	17:31																																							
ZZZZZZ	1.00	17:33																																							
ZZZZZZ	1.00	17:35																																							
ZZZZZZ	1.00	17:37																																							

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: CV
Instrument ID: 17384
Run Name: 1830601M07

Run Start Date: 11/02/2018
Run End Date: 11/02/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
ZZZZZZ	1.00	17:39																																							
ZZZZZZ	1.00	17:41																																							
ZZZZZZ	1.00	17:43																																							
CCV	1.00	17:45												X																											
CCB	1.00	17:47												X																											
ZZZZZZ	1.00	17:49																																							
ZZZZZZ	1.00	17:51																																							
ZZZZZZ	1.00	17:53																																							
ZZZZZZ	1.00	17:55																																							
ZZZZZZ	1.00	17:57																																							
ZZZZZZ	1.00	17:59																																							
ZZZZZZ	1.00	18:02																																							
ZZZZZZ	1.00	18:04																																							
ZZZZZZ	1.00	18:06																																							
ZZZZZZ	1.00	18:08																																							
CCV	1.00	18:10												X																											
CCB	1.00	18:12												X																											
ZZZZZZ	1.00	18:14																																							
ZZZZZZ	1.00	18:16																																							
ZZZZZZ	1.00	18:18																																							
ZZZZZZ	1.00	18:20																																							
ZZZZZZ	1.00	18:22																																							
ZZZZZZ	1.00	18:24																																							
ZZZZZZ	1.00	18:26																																							
P30571BB	1.00	18:28												X																											
P30571BQ	1.00	18:30												X																											
9874904BKG	1.00	18:32												X																											
CCV	1.00	18:34												X																											
CCB	1.00	18:36												X																											
9874904DUP	1.00	18:38												X																											
9874904MS	1.00	18:40												X																											
9874904MSD	1.00	18:42												X																											
9874902	1.00	18:44												X																											
9874903	1.00	18:46												X																											
9874905	1.00	18:48												X																											
9874906	1.00	18:51												X																											
9874907	1.00	18:53												X																											
9874908	1.00	18:55												X																											

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ59

Method: CV
Instrument ID: 17384
Run Name: 1830601M07

Run Start Date: 11/02/2018
Run End Date: 11/02/2018

Lab Sample ID	D/F	Time	Analytes																																		
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																					
ZZZZZZ	1.00	18:57																																				
CCV	1.00	18:59												X																								
CCB	1.00	19:01												X																								
CRA	1.00	19:03												X																								
CCV	1.00	19:05												X																								
CCB	1.00	19:07												X																								

METHODS:	LEGEND:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	BKG = Background DUP = Duplicate MS = Matrix Spike MSD = Matrix Spike Duplicate A = Post Digest Spike L = Serial Dilution B = Blank Q = Laboratory Control Sample Y = Laboratory Control Sample Duplicate

Instrumental Wet Chemistry Data

Case Narrative/Conformance Summary

Instrumental Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

Sample #	Client ID	Matrix Liquid	Solid	Comments
9874902	MW-1	X		
9874903	MW-2	X		
9874904	MW-3	X		
9874905	MW-4	X		
9874906	MW-5	X		
9874907	MW-6	X		
9874908	FB-20181029	X		Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

SAMPLE ANALYSIS:

Samples	Chloride	Fluoride	Sulfate
9874902	DF50	DF5	DF50
9874903	DF5	DF5	DF5
9874904	DF50	DF5	DF5
9874905	DF5	DF5	DF5
9874906	DF50	DF5	DF50
9874907	DF50	DF5	DF5
9874908	DF1	DF1	DF1

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

Quality Control and Calibration Summary Forms

Instrumental Wet Chemistry

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Quality Control Reference List
Instrumental Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

Fraction: Instrumental Wet Chemistry

Batch Number	Sample Number	Analysis Date	Chloride	Fluoride	Sulfate
18304520106A	9874902	10/31/2018 22:32:00		X	
	9874902	10/31/2018 22:51:00	X		X
	9874903	10/31/2018 23:09:00	X	X	X
	P30420FB	10/31/2018 17:22:00	X	X	X
	P30420FQ	10/31/2018 17:04:00	X	X	X
18304520106B	9874904	11/01/2018 01:17:00		X	X
	9874904	11/01/2018 01:35:00	X		
	9874905	11/01/2018 01:53:00	X	X	X
	9874906	11/01/2018 02:30:00		X	
	9874906	11/05/2018 19:18:00	X		X
	9874907	11/01/2018 02:48:00		X	X
	9874907	11/01/2018 03:06:00	X		
	9874908	11/01/2018 04:01:00	X	X	X

Quality Control Summary
Method Blank
Instrumental Water Quality
SDG: GEJ59
Matrix: LIQUID

Fraction: Instrumental Wet Chemistry

18304520106A / P30420FB Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Chloride	IC	10/31/18	N.D.	mg/l	0.20	0.40
Fluoride	IC	10/31/18	N.D.	mg/l	0.050	0.10
Sulfate	IC	10/31/18	N.D.	mg/l	0.30	1.0

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Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ59
Matrix: LIQUID

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

LCS: P30420FQ	Batch: **18304520106A** (Sample number(s): 9874902-9874903) Batch: **18304520106B** (Sample number(s): 9874904-9874908)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	3.00	2.99	NA	100	NA	90-110	NA	NA
Fluoride	IC	0.750	0.730	NA	97	NA	90-110	NA	NA
Sulfate	IC	7.50	7.56	NA	101	NA	90-110	NA	NA

Instrument ID: 17694
Calibration Date: 10/16/2018

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	0.412143	0.803750	2.060875	4.169802	6.257034	0.9999	0.9999
Sulfate	0.280005	0.561948	1.465270	2.996852	4.544105	1.0000	1.0000

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18304520106B
Run Start Dates: 11/05/2018
Run Names: 1830901D09

	Chloride			Sulfate		
Sample	True	Result	%Rec	True	Result	%Rec
ICV	3	3.2355	108	7.5	7.9089	105
ICB	0	ND	NA	0	ND	NA
CCV2	3	3.1634	105	7.5	7.7933	104
CCB	0	ND	NA	0	ND	NA
CCV2	3	3.1386	105	7.5	7.8363	104
CCB	0	ND	NA	0	ND	NA

* = Out of Specifications

Instrument ID: 10913
Calibration Date: 10/19/2018

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	0.497489	0.996617	2.345320	4.756166	7.018871	0.9997	0.9998
Fluoride	0.121234	0.385025	0.973416	2.065283	3.275179	0.9995	0.9997
Sulfate	0.322734	0.652928	1.727408	3.663232	5.670423	0.9993	0.9996

Concentration units: mg/L

Batch Numbers: 18304520106A, 18304520106B
Run Start Dates: 10/31/2018
Run Names: 1830401D06

	Chloride			Sulfate			Fluoride		
Sample	True	Result	%Rec	True	Result	%Rec	True	Result	%Rec
ICV	3	2.9792	99	7.5	7.5877	101	0.75	0.8152	109
ICB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7720	92	7.5	7.2094	96	0.75	0.6752	90
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7780	93	7.5	7.1491	95	0.75	0.7103	95
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7838	93	7.5	7.2575	97	0.75	0.6907	92
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7854	93	7.5	7.1891	96	0.75	0.6971	93
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.7753	93	7.5	7.2999	97	0.75	0.6853	91
CCB	0	ND	NA	0	ND	NA	0	ND	NA

* = Out of Specifications

Fraction: Instrumental Wet Chemistry

00224: Chloride Analyte Name	Default MDL	Default LOQ	Units
Chloride	0.20	0.40	mg/l

01504: Fluoride Analyte Name	Default MDL	Default LOQ	Units
Fluoride	0.050	0.10	mg/l

00228: Sulfate Analyte Name	Default MDL	Default LOQ	Units
Sulfate	0.30	1.0	mg/l

Wet Chemistry Data

Case Narrative/Conformance Summary

Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

Water Quality

Fraction: Wet Chemistry

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9874902	MW-1	X		1	
9874903	MW-2	X		1	
9874904	MW-3	X		1	
9874905	MW-4	X		1	
9874906	MW-5	X		1	
9874907	MW-6	X		1	
9874908	FB-20181029	X		1	Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

All QC is within specification.

SAMPLE ANALYSIS:

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

Water Quality

Fraction: Wet Chemistry

BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

QC Summary

Wet Chemistry

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

Fraction: Wet Chemistry

Analysis	Batch Number	Sample Number	Analysis Date
Total Dissolved Solids	18304921202A	B304872B	10/31/2018 11:32
		L304872Q	10/31/2018 11:32
		9874903	10/31/2018 11:31
		9874904 UNSPK/BKG	10/31/2018 11:31
		9874904 MS,DUP	10/31/2018 13:15
		9874905	10/31/2018 11:32
		9874906	10/31/2018 11:32
		9874907	10/31/2018 11:32
		9874908	10/31/2018 11:32
Total Dissolved Solids	18304921202B	9874902 BKG	10/31/2018 11:31
		9874902 DUP	10/31/2018 13:15

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ59

Fraction: Wet Chemistry

Batch Number	Sample Number	Analysis Date	pH	Temperature of pH
18304004101A	9874902	10/31/2018 22:15:00	X	X
	9874903 BKG	10/31/2018 21:47:00	X	X
	9874903 DUP	10/31/2018 21:52:00	X	X
	9874904	10/31/2018 22:24:00	X	X
	9874906	10/31/2018 22:33:00	X	X
	9874907	10/31/2018 22:20:00	X	X
	9874908	10/31/2018 22:10:00	X	X
	P004101Q	10/31/2018 21:43:00	X	
18304004101B	9874905 BKG	10/31/2018 21:56:00	X	X
	9874905 DUP	10/31/2018 22:01:00	X	X

Quality Control Summary
Method Blank
Water Quality
SDG: GEJ59
Matrix: LIQUID

Fraction: Wet Chemistry

18304921202A / B304872B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	10/31/18	N.D.	mg/l	20.0	60.0

Water Quality
Fraction: Wet Chemistry

UNSPK: 9874904 MS: 9874904	Batch: **18304921202A** (Sample number(s): 9874903-9874908) Batch: **18304921202B** (Sample number(s): 9874902)									
Parameter	**ME**	**Spike Added mg/l**	**Unspiked Conc mg/l**	**MS Conc mg/l**	**MSD Conc mg/l**	**MS %Rec**	**MSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	800	614.	1414.	NA	100	NA	62-127	NA	NA

Comments:
(2) The unspiked sample result is greater than four times the spike added.
* = Out of Specification

Results are being reported on an as received basis.

Water Quality
Fraction: Wet Chemistry

BKG: 9874903 DUP: 9874903	Batch: **18304004101A** (Sample number(s): 9874902-9874904, 9874906-9874908)				
Parameter	**ME**	**Unspiked Conc Std. Units**	**DUP Conc Std. Units**	**%RPD**	**%RPD Limits**
pH	MTR	7.85	7.89	1	4

BKG: 9874903 DUP: 9874903	Batch: **18304004101A** (Sample number(s): 9874902-9874904, 9874906-9874908)				
Parameter	**ME**	**Unspiked Conc Degrees C**	**DUP Conc Degrees C**	**%RPD**	**%RPD Limits**
Temperature of pH	MTR	22.49	22.52	0	5

BKG: 9874905 DUP: 9874905	Batch: **18304004101B** (Sample number(s): 9874905)				
Parameter	**ME**	**Unspiked Conc Std. Units**	**DUP Conc Std. Units**	**%RPD**	**%RPD Limits**
pH	MTR	6.65	6.63	0	4

BKG: 9874905 DUP: 9874905	Batch: **18304004101B** (Sample number(s): 9874905)				
Parameter	**ME**	**Unspiked Conc Degrees C**	**DUP Conc Degrees C**	**%RPD**	**%RPD Limits**
Temperature of pH	MTR	22.64	23.07	2	5

BKG: 9874904 DUP: 9874904	Batch: **18304921202A** (Sample number(s): 9874903-9874908)				
Parameter	**ME**	**Unspiked Conc mg/l**	**DUP Conc mg/l**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	614.	618.	1 (1)	5

BKG: 9874902 DUP: 9874902	Batch: **18304921202B** (Sample number(s): 9874902)				
Parameter	**ME**	**Unspiked Conc mg/l**	**DUP Conc mg/l**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	1124.	1132.	1 (1)	5

Comments:
(1) The sample and/or duplicate result is less than five times the LOQ.
* = Out of Specification

Results are being reported on an as received basis.

Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ59
Matrix: LIQUID

Water Quality
Fraction: Wet Chemistry

LCS: P004101Q	Batch: **18304004101A** (Sample number(s): 9874902-9874904, 9874906-9874908) Batch: **18304004101B** (Sample number(s): 9874905)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	6.99	NA	100	NA	95-105	NA	NA

LCS: L304872Q	Batch: **18304921202A** (Sample number(s): 9874903-9874908) Batch: **18304921202B** (Sample number(s): 9874902)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	208	NA	104	NA	62-127	NA	NA

Fraction: Wet Chemistry

12152: pH Analyte Name	Default MDL	Default LOQ	Units
pH	0.010	0.010	Std. Units

12151: Temperature of pH Analyte Name	Default MDL	Default LOQ	Units
Temperature of pH	0.010	0.010	Degrees C

00212: Total Dissolved Solids Analyte Name	Default MDL	Default LOQ	Units
Total Dissolved Solids	20.0	60.0	mg/l

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

November 26, 2018

Ms. Hannah Cottman
Eurofins Lancaster Laboratories
2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994

Re: NJ Radiochemistry Analyses
Work Order: 463203

Dear Ms. Cottman:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 01, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Julie Robinson

Julie Robinson
Project Manager

Chain of Custody: 2003764
Enclosures

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Case Narrative

Receipt Narrative
for
Eurofins Lancaster Laboratories
SDG: 463203

November 26, 2018

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on November 01, 2018 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
463203001	MW-1
463203002	MW-2
463203003	MW-3
463203004	MW-4
463203005	MW-5
463203006	MW-6
463203007	FB-20181029

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Julie Robinson
Project Manager

Chain of Custody and Supporting Documentation

403203

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # _____ Group # 2003764 Sample #

Subcontractor:	GEL		
Project Name/#:	2003764	Site ID #:	
Requestor	Hannah Cottman	P.O. #:	NA
Sampler:		PWSID #:	
Phone #:	717-656-2300 Ext 1896	Quote #:	
State where samples were collected:	NJ	For Compliance: Yes ☑ No ☐	

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil	Sediment	Tissue	Water: Potable	Ground	Surface	NPDES	Other:	Total # of Containers	Analyses Requested: Radium-226 (EPA 903.1)	Radium-228 (EPA 904.0 mod)	Remarks
													Preservation and Filtration Codes: None	None		
MW-1	10/29/2018	1130	X					X					2	X	X	9874909
MW-2	10/29/2018	1110	X					X					2	X	X	9874910
MW-3	10/29/2018	1500	X					X					2	X	X	9874911
MW-4	10/29/2018	1300	X					X					2	X	X	9874912
MW-5	10/29/2018	1310	X					X					2	X	X	9874913
MW-6	10/29/2018	1500	X					X					2	X	X	9874914
FB-20181029	10/29/2018	1100	X					X					2	X	X	9874915

For Lab Use Only

SF #: _____

SCR #: _____

Preservation Codes

H = HCl T = Thiosulfate

N = HNO_3 B = NaOH

S = H_2SO_4 P = H_3PO_4

F = Field Filtered O = Other

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed: ~~Preservation Needed~~ ③ HLC 20181031 10-31-18

Rush results requested by (please check): E-Mail ☐ Phone ☐

E-mail Address: ENVsubcontracting@EurofinsUS.com

Phone: 717-656-2300 Ext 1896

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type VI (Raw Data Only) ☐ TX TRRP-13 ☐

NJ DKQP ☑ NYSDEC Category ☐ A or ☐ B

Level IV DOD ☐

EDD Required? Yes ☑ No ☐ If yes, format: NJ HazSite EDD

Relinquished by:	Date	Time	Received by:	Date	Time
Hannah Cottman	10-31-18	1650	Kestone	11/1/18	855
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Relinquished by Commercial Carrier:

UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: UANC	**SDG/AR/COC/Work Order:** 403203
Received By: ZKW KS	**Date Received:** 11/1/18
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 5035 4245 3957

Suspected Hazard Information	**Yes**	**No**	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 **CPM / mR/Hr** **Classified as: Rad 1 Rad 2 Rad 3**
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	**Yes**	**NA**	**No**	**Comments/Qualifiers (Required for Non-Conforming Items)**
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: Wet Ice Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius **TEMP:** 1°C
4	Daily check performed and passed on IR temperature gun?	✓			**Temperature Device Serial #:** IR3-18 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	✓			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes___ No___ N/A___ (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KG Date 11/02/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

Laboratory Certifications

List of current GEL Certifications as of 26 November 2018

State	Certification
Alaska	17−018
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−27
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Eurofins Lancaster Laboratories (LANC)
SDG #: 463203

Product: **GFPC, Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 2
Analytical Batch: 1819110

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
463203001	MW-1
463203002	MW-2
463203003	MW-3
463203004	MW-4
463203005	MW-5
463203006	MW-6
463203007	FB-20181029
1204151331	Method Blank (MB)
1204151332	463203004(MW-4) Sample Duplicate (DUP)
1204151333	463203004(MW-4) Matrix Spike (MS)
1204151334	463203004(MW-4) Matrix Spike Duplicate (MSD)
1204151335	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204151333 (MW-4MS) and 1204151334 (MW-4MSD), aliquots were reduced to conserve sample volume.

Product: **Lucas Cell, Ra226, liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 1818524

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
463203001	MW-1

463203002	MW-2
463203003	MW-3
463203004	MW-4
463203005	MW-5
463203006	MW-6
463203007	FB-20181029
1204150011	Method Blank (MB)
1204150012	463221005(NonSDG) Sample Duplicate (DUP)
1204150013	463221005(NonSDG) Matrix Spike (MS)
1204150014	463221005(NonSDG) Matrix Spike Duplicate (MSD)
1204150015	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Samples 1204150011 (MB) and 1204150015 (LCS) were degassed and recounted to verify sample results. The second counts are reported.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204150013 (Non SDG 463221005MS) and 1204150014 (Non SDG 463221005MSD), aliquots were reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report
for

LANC006 Eurofins Lancaster Laboratories

Client SDG: 463203 GEL Work Order: 463203

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria
** Analyte is a Tracer compound
U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Heather McCarty **Name: Heather McCarty**

Date: 24 NOV 2018 **Title: Analyst II**

Sample Data Summary

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 24, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-1
Sample ID: 463203001
Matrix: Water
Collect Date: 29-OCT-18
Receive Date: 01-NOV-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	1.26	+/-1.27	2.11	+/-1.32	3.00	pCi/L			JXC9	11/19/18	1045	1819110	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.196	+/-0.317	0.565	+/-0.320	1.00	pCi/L			PCW	11/12/18	0855	1818524	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1819110	76	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 24, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-2
Sample ID: 463203002
Matrix: Water
Collect Date: 29-OCT-18
Receive Date: 01-NOV-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	1.11	+/-1.04	1.71	+/-1.08	3.00	pCi/L			JXC9	11/19/18	1045	1819110	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	-0.0999	+/-0.235	0.538	+/-0.235	1.00	pCi/L			PCW	11/12/18	0855	1818524	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1819110	90.4	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 24, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-3
Sample ID: 463203003
Matrix: Water
Collect Date: 29-OCT-18
Receive Date: 01-NOV-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.346	+/-0.670	1.19	+/-0.677	3.00	pCi/L			JXC9	11/19/18	1045	1819110	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		1.15	+/-0.454	0.392	+/-0.487	1.00	pCi/L			PCW	11/12/18	0855	1818524	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1819110	92	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 24, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-4
Sample ID: 463203004
Matrix: Water
Collect Date: 29-OCT-18
Receive Date: 01-NOV-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.287	+/-0.683	1.23	+/-0.687	3.00	pCi/L			JXC9	11/19/18	1045	1819110	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.0912	+/-0.198	0.374	+/-0.198	1.00	pCi/L			PCW	11/12/18	0855	1818524	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1819110	94.2	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 24, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-5
Sample ID: 463203005
Matrix: Water
Collect Date: 29-OCT-18
Receive Date: 01-NOV-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.095	+/-0.797	1.50	+/-0.798	3.00	pCi/L			JXC9	11/19/18	1045	1819110	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.261	+/-0.261	0.418	+/-0.264	1.00	pCi/L			PCW	11/12/18	0855	1818524	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1819110	80.8	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: November 24, 2018
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-6
Sample ID: 463203006
Matrix: Water
Collect Date: 29-OCT-18
Receive Date: 01-NOV-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	1.03	+/-0.983	1.61	+/-1.02	3.00	pCi/L			JXC9	11/19/18	1045	1819110	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.580	+/-0.267	0.222	+/-0.280	1.00	pCi/L			PCW	11/12/18	0855	1818524	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1819110	85.5	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike

Lancaster, Pennsylvania 17601-5994

Report Date: November 24, 2018

Contact: Ms. Hannah Cottman

Project: NJ Radiochemistry Analyses

Client Sample ID: FB-20181029
Sample ID: 463203007
Matrix: Water
Collect Date: 29-OCT-18
Receive Date: 01-NOV-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.350	+/-0.771	1.38	+/-0.777	3.00	pCi/L			JXC9	11/19/18	1046	1819110	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.166	+/-0.234	0.408	+/-0.236	1.00	pCi/L			PCW	11/12/18	0855	1818524	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1819110	94.9	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

Quality Control Summary

QC Summary

Client : **Eurofins Lancaster Laboratories**
2425 New Holland Pike

Lancaster, Pennsylvania

Contact: **Ms. Hannah Cottman**

Workorder: **463203**

Report Date: November 24, 2018

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 1819110										
QC1204151332 463203004 DUP										
Radium-228	U	0.287	U	0.518	pCi/L	0		N/A	JXC9	11/19/1810:44
	Uncert:	+/-0.683		+/-0.636						
	TPU:	+/-0.687		+/-0.651						
QC1204151335 LCS										
Radium-228	17.0			16.7	pCi/L		98	(75%-125%)	JXC9	11/19/1810:45
	Uncert:			+/-2.06						
	TPU:			+/-4.98						
QC1204151331 MB										
Radium-228			U	0.787	pCi/L				JXC9	11/19/1810:44
	Uncert:			+/-0.754						
	TPU:			+/-0.783						
QC1204151333 463203004 MS										
Radium-228	51.3 U	0.287		44.5	pCi/L		86.7	(75%-125%)	JXC9	11/19/1810:45
	Uncert:	+/-0.683		+/-5.30						
	TPU:	+/-0.687		+/-13.2						
QC1204151334 463203004 MSD										
Radium-228	51.3 U	0.287		40.9	pCi/L	8.37	79.8	(0%-20%)	JXC9	11/19/1810:45
	Uncert:	+/-0.683		+/-5.39						
	TPU:	+/-0.687		+/-12.3						
Rad Ra-226										
Batch 1818524										
QC1204150012 463221005 DUP										
Radium-226		2.26		2.00	pCi/L	12.1		(0%-20%)	PCW	11/12/1810:00
	Uncert:	+/-0.548		+/-0.618						
	TPU:	+/-0.665		+/-0.700						
QC1204150015 LCS										
Radium-226	26.0			21.9	pCi/L		84.5	(75%-125%)	PCW	11/15/1808:15
	Uncert:			+/-2.05						
	TPU:			+/-3.93						
QC1204150011 MB										
Radium-226			U	0.304	pCi/L				PCW	11/15/1808:15
	Uncert:			+/-0.314						
	TPU:			+/-0.318						
QC1204150013 463221005 MS										
Radium-226	130	2.26		116	pCi/L		87.8	(75%-125%)	PCW	11/12/1810:00
	Uncert:	+/-0.548		+/-8.31						
	TPU:	+/-0.665		+/-28.0						
QC1204150014 463221005 MSD										
Radium-226	130	2.26		109	pCi/L	6.35	82.3	(0%-20%)	PCW	11/12/1810:00
	Uncert:	+/-0.548		+/-8.17						

QC Summary

Workorder: **463203**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Ra-226										
Batch 1818524										
				TPU:	+/-0.665		+/-22.8			

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 1819110 Check-list

This check-list was completed on 19-NOV-18 by Kenshalla Oston

This batch was reviewed by Kenshalla Oston on 19-NOV-18 and Angela Johnson on 20-NOV-18.

Batch ID:	**Product:**	**Description:** Gas Flow Radium 228
1819110	GFC28RAL	GL-RAD-A-009

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **1819110**
Analyst: Jasmine Conley (JXC9)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 2
Instrument: GFC−51204863

Due Dates for Lab: 26−NOV−2018 **Package: 28−NOV−2018** **SDG: 30−NOV−2018**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204151335	Radium−228 SPIKE	1810−A	.1	mL
MS	1204151333	Radium−228 SPIKE	1810−A	.1	mL
MSD	1204151334	Radium−228 SPIKE	1810−A	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Ac−228 Ingrow (date)	Ac−228 Separation (date)
1	463203001	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
2	463203002	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
3	463203003	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
4	463203004	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
5	463203005	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
6	463203006	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
7	463203007	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
8	463826001	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
9	463826002	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
10	463826003	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
11	1204151331 MB	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
12	1204151332 DUP (463203004)	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04
13	1204151333 MS (463203004)	14−NOV−2018	3	100	11/15/18 12:54	11/19/18 09:04
14	1204151334 MSD (463203004)	14−NOV−2018	3	100	11/15/18 12:54	11/19/18 09:04
15	1204151335 LCS	14−NOV−2018	3	300	11/15/18 12:54	11/19/18 09:04

Reagent/Solvent Lot ID	Description	Amount
REGNT 2571685.11	2mL Cartridges	2 mL
REGNT 2662327.1	cerium 500 mg/L in 2%HCI	.2 mL
REGNT 2672182	RGF−1.5 Ammonium Sulfate	10 mL
REGNT 2766682.3	RGF−Nitric Acid	5 mL
REGNT 2832194.1	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 2832313.1	Hydrofluoric Acid Poly Bottle	3 mL
REGNT 2838193	RGF−50% Potassium Carbonate	2 mL
REGNT 2840709	RGF−16mg/mL Barium Chloride	1 mL
REGNT 2843889	RGF−1M Citric Acid	5 mL
REGNT 2849126	RGF−7M Nitric Acid	25 mL
REGNT 2851710	2M HCl	20 mL
WORK 0487−D	Barium−133 TRACER	.1 mL

Comments:

Pipet Id: RAD−GFC−1795419
Data Entry Date2: 14−NOV−2018 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 0487-D
Tracer Exp Date : 10/10/2019
Tracer Volume Added: 0.10

Batch : 1819110
Analyst : JAS02031
Prep Date : 11/14/2018
Ra-228 Method Uncertainty : 0.1268

Geometry: CeF on 25mm Filter

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 3 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	463203001.1	0.3000	1.8459E-05	10/29/2018 11:30	172.1	7.62%	130.8	8.74%	0.1	0.000200
2	463203002.1	0.3000	1.8459E-05	10/29/2018 11:10	172.1	7.62%	155.5	8.02%	0.1	0.000200
3	463203003.1	0.3000	1.8459E-05	10/29/2018 15:00	172.1	7.62%	158.4	7.95%	0.1	0.000200
4	463203004.1	0.3000	1.8459E-05	10/29/2018 13:00	172.1	7.62%	162.1	7.86%	0.1	0.000200
5	463203005.1	0.3000	1.8459E-05	10/29/2018 13:10	172.1	7.62%	139.0	8.48%	0.1	0.000200
6	463203006.1	0.3000	1.8459E-05	10/29/2018 15:00	172.1	7.62%	147.0	8.25%	0.1	0.000200
7	463203007.1	0.3000	1.8459E-05	10/29/2018 11:00	172.1	7.62%	163.2	7.83%	0.1	0.000200
8	463826001.1	0.3000	1.8459E-05	11/6/2018 9:50	172.1	7.62%	120.2	9.12%	0.1	0.000200
9	463826002.1	0.3000	1.8459E-05	11/6/2018 11:25	172.1	7.62%	161.8	7.86%	0.1	0.000200
10	463826003.1	0.3000	1.8459E-05	11/6/2018 13:52	172.1	7.62%	148.3	8.21%	0.1	0.000200
11	1204151331.1	0.3000	1.8459E-05	11/14/2018 0:00	172.1	7.62%	159.6	7.92%	0.1	0.000200
12	1204151332.1	0.3000	1.8459E-05	10/29/2018 13:00	172.1	7.62%	163.9	7.81%	0.1	0.000200
13	1204151333.1	0.1000	1.1370E-05	10/29/2018 13:00	172.1	7.62%	165.2	7.78%	0.1	0.000200
14	1204151334.1	0.1000	1.1370E-05	10/29/2018 13:00	172.1	7.62%	169.3	7.68%	0.1	0.000200
15	1204151335.1	0.3000	1.8459E-05	11/14/2018 0:00	172.1	7.62%	155.6	8.02%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-063
Instrument SOP: GL-RAD-I-016

Count raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	1B	60	10	91	1.517	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.827	1.000	1.057	76.0%	5.80%
2	1D	60	10	86	1.433	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.826	1.000	1.057	90.4%	5.54%
3	2A	60	8	36	0.600	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.826	1.000	1.057	92.0%	5.51%
4	2B	60	7	39	0.650	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.826	1.000	1.057	94.2%	5.48%
5	2C	60	9	38	0.633	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.826	1.000	1.057	80.8%	5.71%
6	2D	60	6	64	1.067	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.826	1.000	1.057	85.5%	5.62%
7	3B	60	8	48	0.800	11/19/2018 10:46	11/15/2018 12:54	11/19/2018 9:04	0.993	0.826	1.000	1.057	94.9%	5.47%
8	3C	60	19	64	1.067	11/19/2018 10:46	11/15/2018 12:54	11/19/2018 9:04	0.996	0.825	1.000	1.057	69.9%	5.95%
9	3D	60	7	40	0.667	11/19/2018 10:46	11/15/2018 12:54	11/19/2018 9:04	0.996	0.825	1.000	1.057	94.0%	5.48%
10	4A	60	4	49	0.817	11/19/2018 10:46	11/15/2018 12:54	11/19/2018 9:04	0.996	0.825	1.000	1.057	86.2%	5.61%
11	4B	60	1	47	0.783	11/19/2018 10:44	11/15/2018 12:54	11/19/2018 9:04	0.998	0.828	1.000	1.057	92.7%	5.50%
12	4C	60	6	37	0.617	11/19/2018 10:44	11/15/2018 12:54	11/19/2018 9:04	0.993	0.827	1.000	1.057	95.3%	5.46%
13	5A	60	15	327	5.450	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.827	1.000	1.057	96.0%	5.45%
14	5C	60	13	345	5.750	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.993	0.827	1.000	1.057	98.4%	5.42%
15	5D	60	17	383	6.383	11/19/2018 10:45	11/15/2018 12:54	11/19/2018 9:04	0.998	0.827	1.000	1.057	90.4%	5.54%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2017	5/31/2019	0.6519	0.00711	1.194	11/16/2018 18:13	500
2	PIC	6/1/2017	5/31/2019	0.6504	0.00692	1.096	11/16/2018 18:13	500
3	PIC	6/1/2017	5/31/2019	0.6444	0.01914	0.494	11/16/2018 18:13	500
4	PIC	6/1/2017	5/31/2019	0.6448	0.02111	0.560	11/16/2018 18:14	500
5	PIC	6/1/2017	5/31/2019	0.6389	0.01274	0.608	11/16/2018 18:14	500
6	PIC	6/1/2017	5/31/2019	0.6283	0.00745	0.782	11/17/2018 16:00	500
7	PIC	6/1/2017	5/31/2019	0.6291	0.01614	0.692	11/16/2018 18:14	500
8	PIC	6/1/2017	5/31/2019	0.6374	0.00988	0.856	11/16/2018 18:14	500
9	PIC	6/1/2017	5/31/2019	0.6255	0.02297	0.520	11/16/2018 18:14	500
10	PIC	6/1/2017	5/31/2019	0.6420	0.01123	0.628	11/17/2018 16:00	500
11	PIC	6/1/2017	5/31/2019	0.6410	0.01519	0.540	11/16/2018 18:14	500
12	PIC	6/1/2017	5/31/2019	0.6608	0.00889	0.448	11/16/2018 18:14	500
13	PIC	6/1/2017	5/31/2019	0.6766	0.00851	0.464	11/16/2018 18:14	500
14	PIC	6/1/2017	5/31/2019	0.6704	0.00657	1.094	11/16/2018 18:14	500
15	PIC	6/1/2017	5/31/2019	0.6669	0.00925	1.156	11/16/2018 18:15	500

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

* - RPD changed to 0% due to sample & dup activity below MDA

Spike S/N : 1810-A
Spike Exp Date : 5/23/2019
Spike Activity (dpm/ml): 113.30
Spike Volume Added: 0.10

LCS S/N : 1810-A
LCS Exp Date : 5/23/2019
LCS Activity (dpm/ml): 113.30
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type		RPD	RER	Nominal pCi/L	Recovery
1	1.3572	0.9582	3	2.1115	**1.2590**	51.88%	0.3227	0.1663	1.2720	1.3178		SAMPLE					
2	1.0971	0.7746	3	1.7137	**1.1105**	48.20%	0.3373	0.1615	1.0420	1.0848		SAMPLE					
3	0.7300	0.5154	3	1.1939	**0.3458**	99.06%	0.1060	0.1048	0.6703	0.6770		SAMPLE					
4	0.7593	0.5360	3	1.2314	**0.2868**	121.62%	0.0900	0.1093	0.6830	0.6875		SAMPLE					
5	0.9309	0.6572	3	1.5019	**0.0950**	428.32%	0.0253	0.1085	0.7975	0.7979		SAMPLE					
6	1.0152	0.7167	3	1.6137	**1.0266**	49.18%	0.2847	0.1391	0.9830	1.0219		SAMPLE					
7	0.8592	0.6066	3	1.3755	**0.3504**	112.47%	0.1080	0.1213	0.7715	0.7774		SAMPLE					
8	1.2777	0.9021	3	2.0211	**0.9139**	66.54%	0.2107	0.1396	1.1871	1.2134		SAMPLE					
9	0.7544	0.5326	3	1.2296	**0.4820**	75.39%	0.1467	0.1102	0.7100	0.7223		SAMPLE					
10	0.8816	0.6224	3	1.4195	**0.6593**	64.88%	0.1887	0.1219	0.8351	0.8542		SAMPLE					
11	0.7564	0.5340	3	1.2298	**0.7868**	49.19%	0.2433	0.1189	0.7535	0.7834		MB					
12	0.6540	0.4617	3	1.0769	**0.5177**	62.92%	0.1687	0.1057	0.6359	0.6512	463203004.1	DUP	*	0.0%			
13	1.9353	1.3664	3	3.1789	**44.4996**	8.21%	4.9860	0.3029	5.2990	13.1740	463203004.1	MS				51.2989	86.7%
14	2.9268	2.0663	3	4.5721	**40.9262**	8.66%	4.6560	0.3131	5.3939	12.3170	463203004.1	MSD		8.4%		51.2989	79.8%
15	1.0922	0.7711	3	1.7018	**16.6807**	8.44%	5.2273	0.3297	2.0621	4.9808		LCS				17.0126	98.0%

ASSAY 16-Nov-18 12:11:54

Protocol	id	8	Ba-133
Time	limit		
Count	limit		
Isotope	Ba-133		
Protocol	date	11/16/2018	
Run	id.	2195	

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
1	78	1	180.04	601.6	172.06	7.62		12:11:54
2	78	2	180.04	477.9	130.84	8.74	76.04	12:15:08
3	78	3	180.03	551.77	155.47	8.02	90.36	12:18:22
4	78	4	180.03	560.48	158.37	7.95	92.04	12:21:36
5	78	5	180.04	571.56	162.05	7.86	94.18	12:24:50
1	84	1	180.04	502.43	139.01	8.48	80.79	12:28:25
2	84	2	180.06	526.56	147.04	8.25	85.46	12:31:39
3	84	3	180.04	575.13	163.24	7.83	94.87	12:34:53
4	84	4	180.04	446.02	120.21	9.12	69.87	12:38:07
5	84	5	180.03	570.65	161.76	7.86	94.01	12:41:21
1	53	1	180.05	530.17	148.25	8.21	86.16	12:45:04
2	53	2	180.06	564.11	159.55	7.92	92.73	12:48:18
3	53	3	180.02	577.14	163.93	7.81	95.27	12:51:32
4	53	4	180.04	581.02	165.21	7.78	96.02	12:54:46
5	53	5	180.03	593.36	169.34	7.68	98.42	12:58:00
1	70	1	180.04	552.05	155.55	8.02	90.40	01:01:44

END OF ASSAY

1819110.xls

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
463203001	1B	60	10	91	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
463203002	1D	60	10	86	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
463203003	2A	60	8	36	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
463203004	2B	60	7	39	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
463203005	2C	60	9	38	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
463203006	2D	60	6	64	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
463203007	3B	60	8	48	11/19/2018 10:46	11/19/2018 11:46	PIC	1819110
463826001	3C	60	19	64	11/19/2018 10:46	11/19/2018 11:46	PIC	1819110
463826002	3D	60	7	40	11/19/2018 10:46	11/19/2018 11:46	PIC	1819110
463826003	4A	60	4	49	11/19/2018 10:46	11/19/2018 11:46	PIC	1819110
1204151331	4B	60	1	47	11/19/2018 10:44	11/19/2018 11:44	PIC	1819110
1204151332	4C	60	6	37	11/19/2018 10:44	11/19/2018 11:44	PIC	1819110
1204151333	5A	60	15	327	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
1204151334	5C	60	13	345	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110
1204151335	5D	60	17	383	11/19/2018 10:45	11/19/2018 11:45	PIC	1819110

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 19-Nov-2018

Detectors LB4100 A1 through J4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100A3	Below	Alpha eff	19-Nov 08:19	5	8228	8529	10140	-4.12
LB4100A3	Above	Alpha XTalk	19-Nov 08:19	5	0.277	0.206	0.263	+4.56
LB4100A3	Below	Beta eff	19-Nov 08:54	5	19482	19560	22600	-3.15
LB4100B2	need 2nd	Alpha bkg	19-Nov 06:40	60	0.267	-4.24E-2	0.351	+1.72
LB4100B2	Below	Alpha eff	19-Nov 08:19	5	7980	8083	10940	-3.22
LB4100C1	Above	Beta bkg	19-Nov 06:39	60	2.083	1.035	1.925	+4.07
LB4100C4	Above	Beta bkg	19-Nov 06:39	60	3.933	0.686	2.113	+10.65
LB4100E2	Above	Beta bkg	19-Nov 06:36	60	2.233	0.261	3.241	+0.97
LB4100E3	Above	Beta bkg	19-Nov 06:36	60	2.767	0.473	2.078	+5.57
LB4100F4	need 2nd	Alpha XTalk	19-Nov 08:01	5	0.548	0.260	0.585	+2.31
LB4100G1	Above	Beta bkg	19-Nov 06:38	60	711	0.338	1.748	+3,019.82
LB4100H2	Above	Beta bkg	19-Nov 06:36	60	3.600	-1.72E+0	4.379	+2.23
LB4100J2	Above	Alpha bkg	19-Nov 06:37	60	0.500	-2.63E-2	0.301	+6.64
LB4100J2	Above	Beta bkg	19-Nov 06:37	60	1.617	0.276	1.460	+3.79
LB4100J2	need 2nd	Beta eff	19-Nov 08:19	5	15076	15040	16580	-2.86
LB4100J4	Above	Alpha bkg	19-Nov 06:37	60	0.317	-3.59E-3	0.337	+2.64
LB4100J4	need 2nd	Beta eff	19-Nov 08:19	5	28772	28680	34680	-2.91
PIC1A	Above	Alpha bkg	19-Nov 07:35	60	0.417	-4.72E-2	0.399	+3.24
PIC4D	Below	Alpha XTalk	19-Nov 07:37	5	0.242	0.251	0.277	-5.15
PIC12D	Above	Alpha XTalk	19-Nov 04:48	5	0.418	0.320	0.405	+3.86
PIC12D	need 2nd	Beta eff	19-Nov 07:38	5	38279	38040	40620	-2.44
PIC13D	Above	Beta bkg	19-Nov 06:29	60	2.150	-2.54E-1	1.788	+4.06

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100B3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

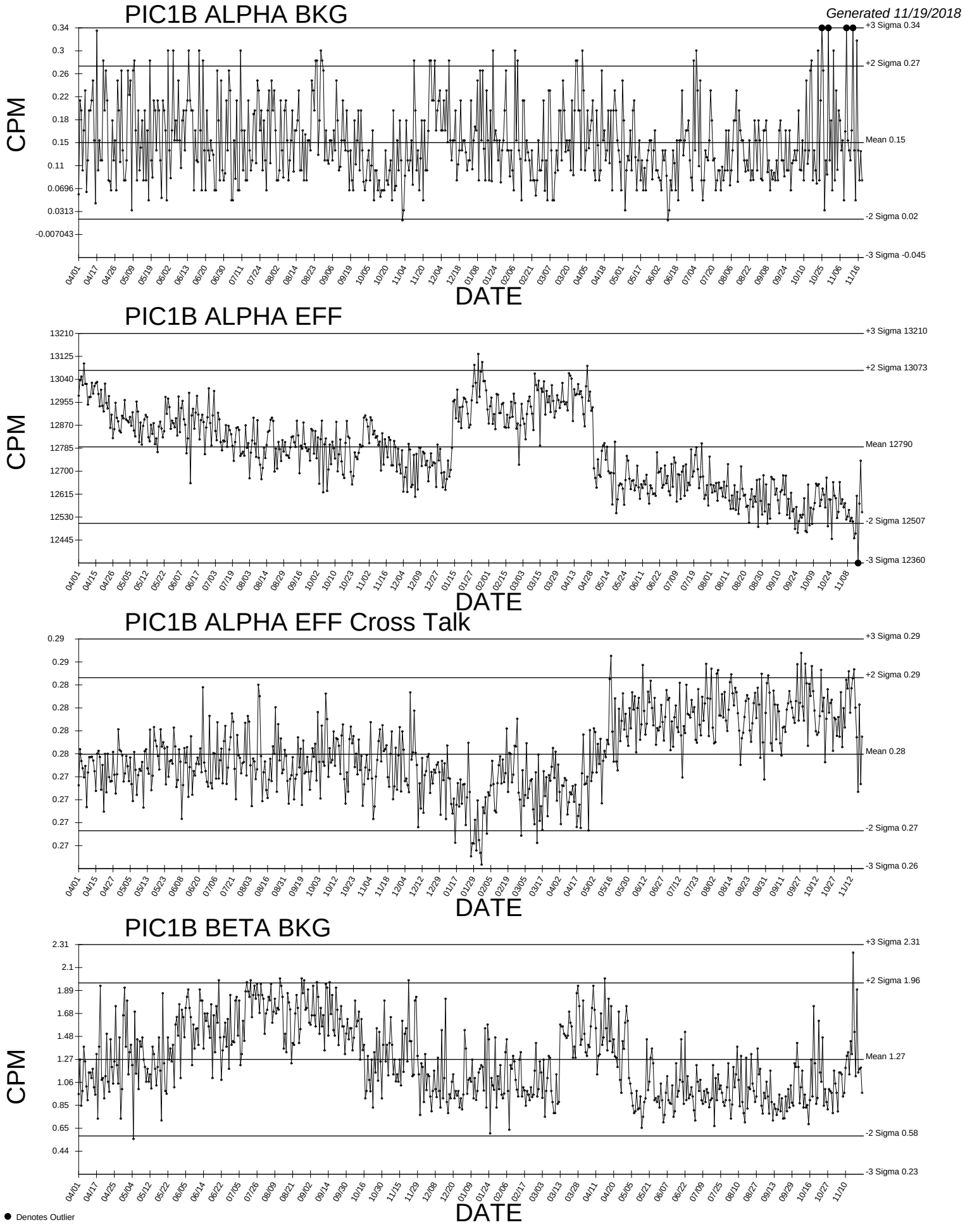
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC3A	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

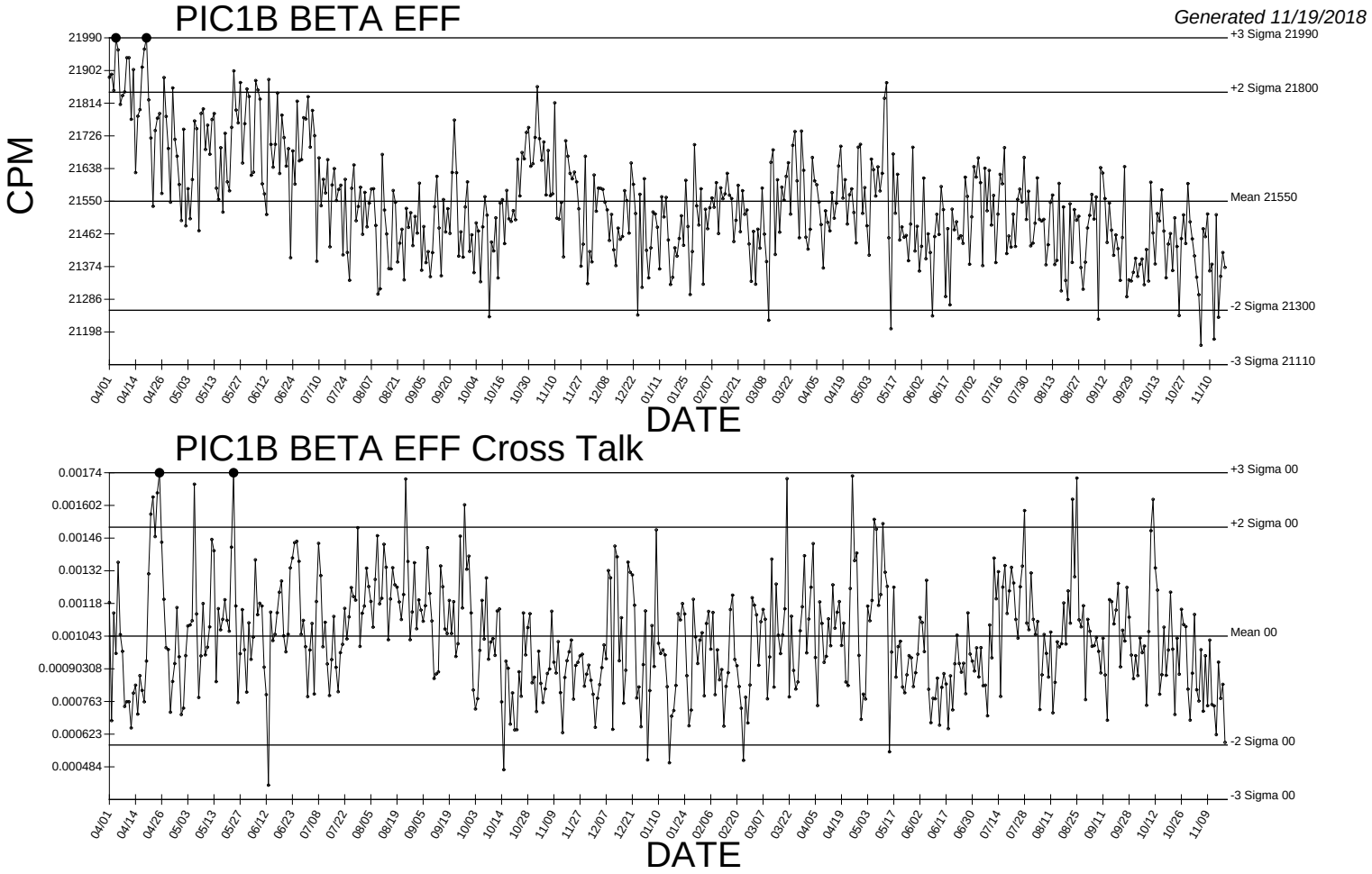
Reviewed by _____

Date 11/19/18

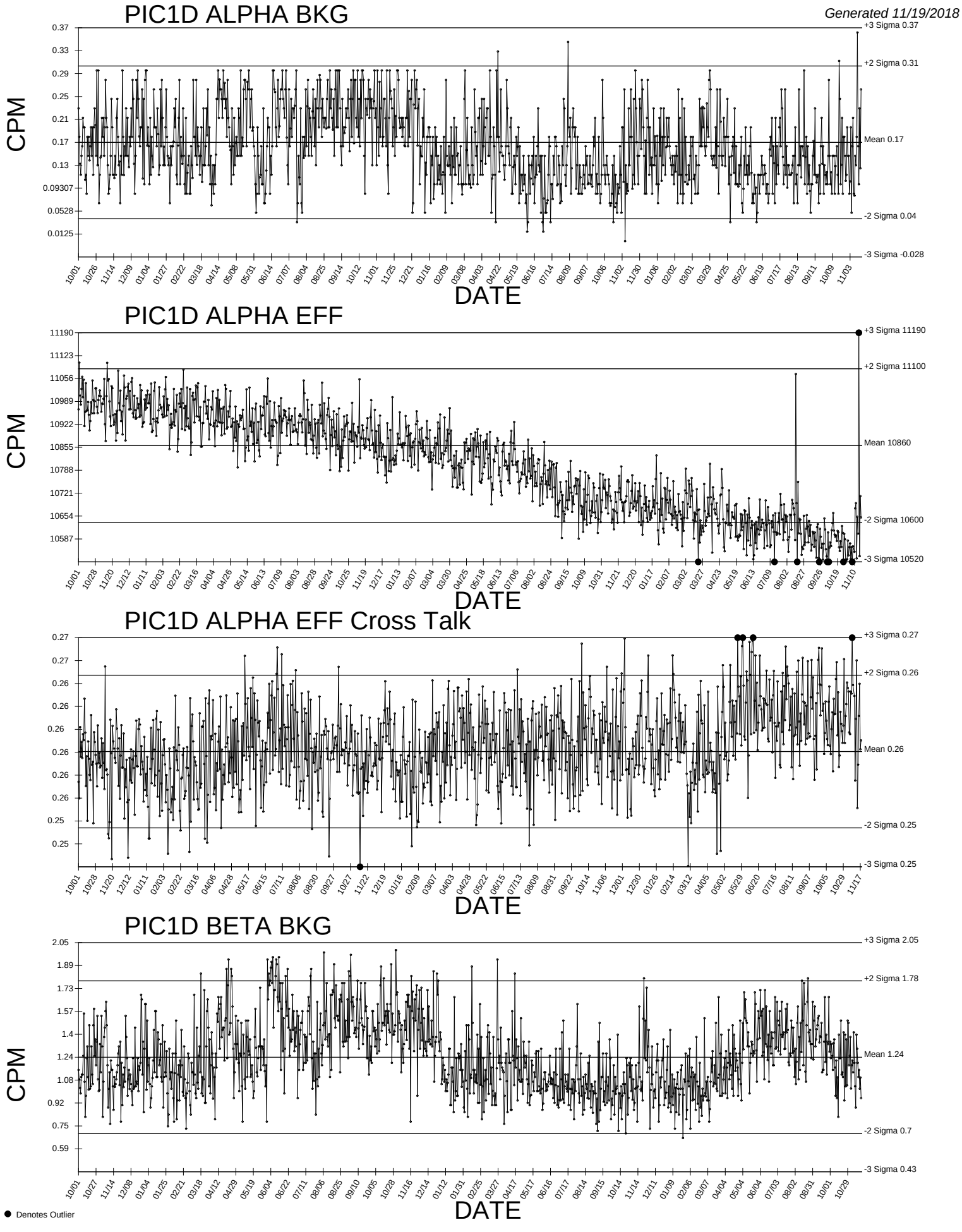
GEL Laboratories LLC

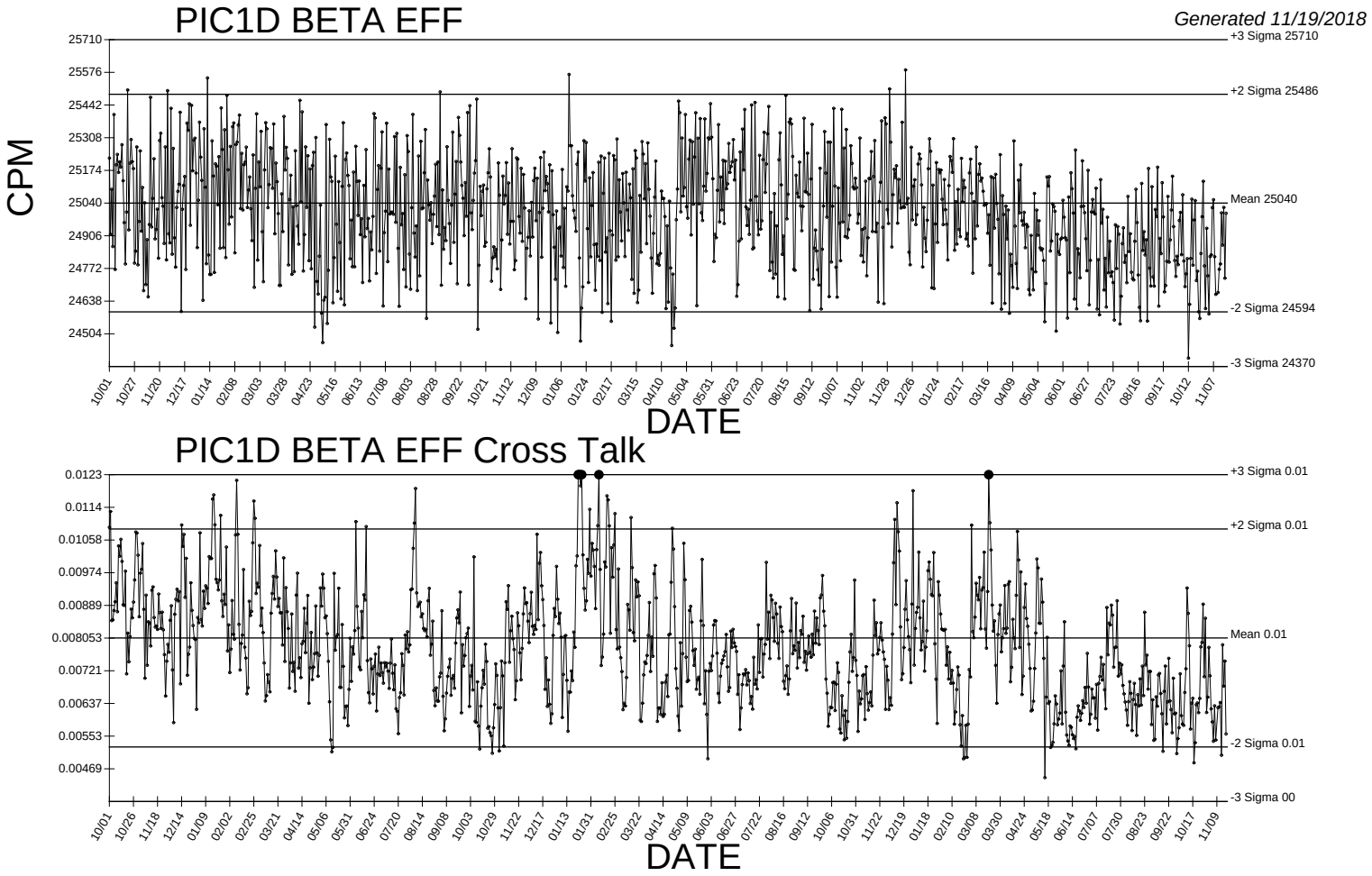
Background and Efficiency Data


PIC1B ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.34
+2 Sigma 0.27
Mean 0.15
-2 Sigma 0.02
-3 Sigma -0.045
PIC1B ALPHA EFF
+3 Sigma 13210
+2 Sigma 13073
Mean 12790
-2 Sigma 12507
-3 Sigma 12360
PIC1B ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.29
Mean 0.28
-2 Sigma 0.27
-3 Sigma 0.26
PIC1B BETA BKG
+3 Sigma 2.31
+2 Sigma 1.96
Mean 1.27
-2 Sigma 0.58
-3 Sigma 0.23
● Denotes Outlier

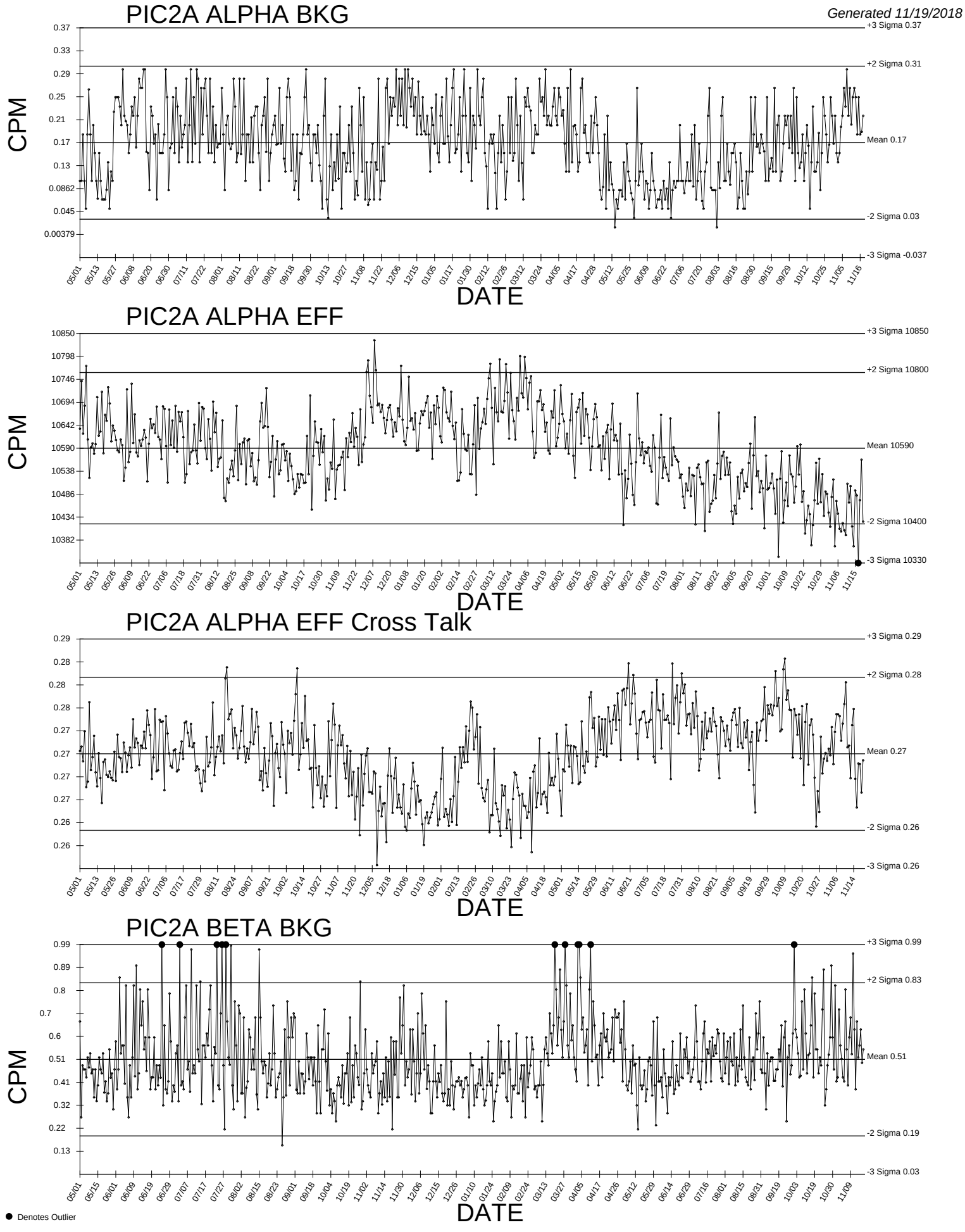


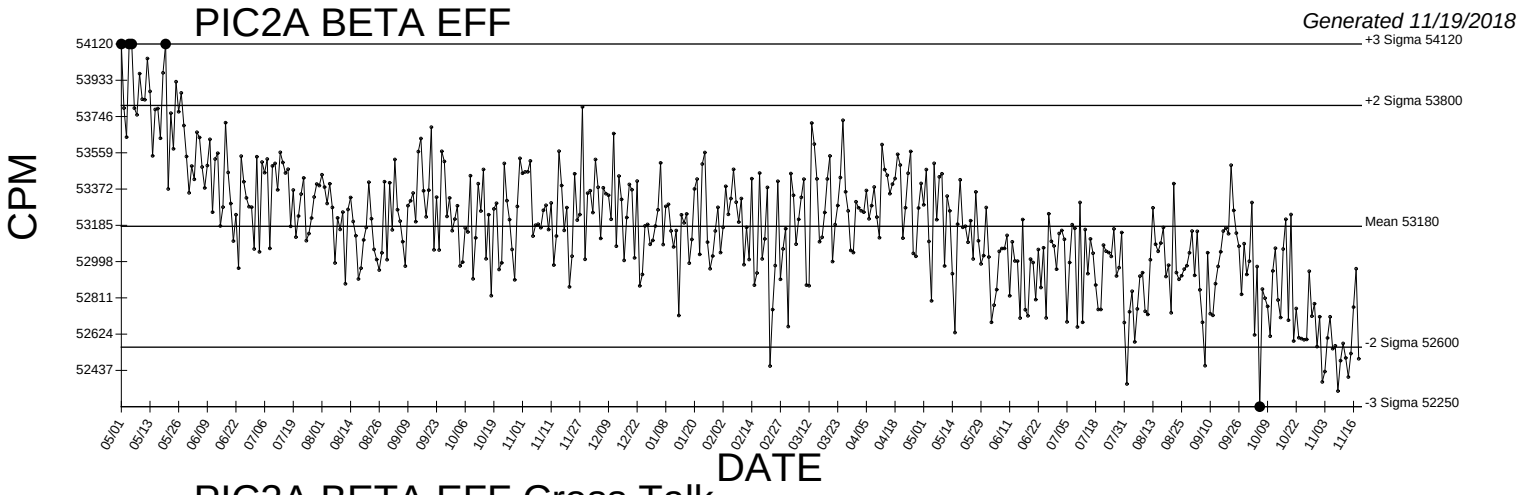
● Denotes Outlier

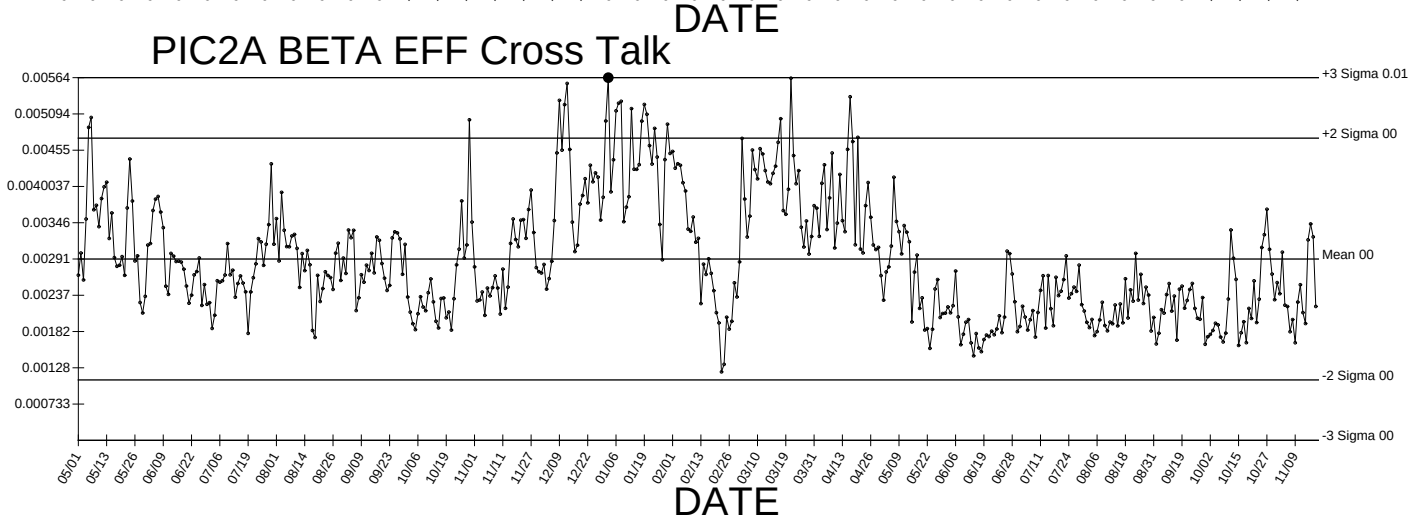

PIC1D ALPHA BKG
Generated 11/19/2018
CPM
+3 Sigma 0.37
+2 Sigma 0.31
Mean 0.17
-2 Sigma 0.04
-3 Sigma -0.028
DATE
PIC1D ALPHA EFF
CPM
+3 Sigma 11190
+2 Sigma 11100
Mean 10860
-2 Sigma 10600
-3 Sigma 10520
DATE
PIC1D ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.26
Mean 0.26
-2 Sigma 0.25
-3 Sigma 0.25
DATE
PIC1D BETA BKG
CPM
+3 Sigma 2.05
+2 Sigma 1.78
Mean 1.24
-2 Sigma 0.7
-3 Sigma 0.43
DATE
Denotes Outlier



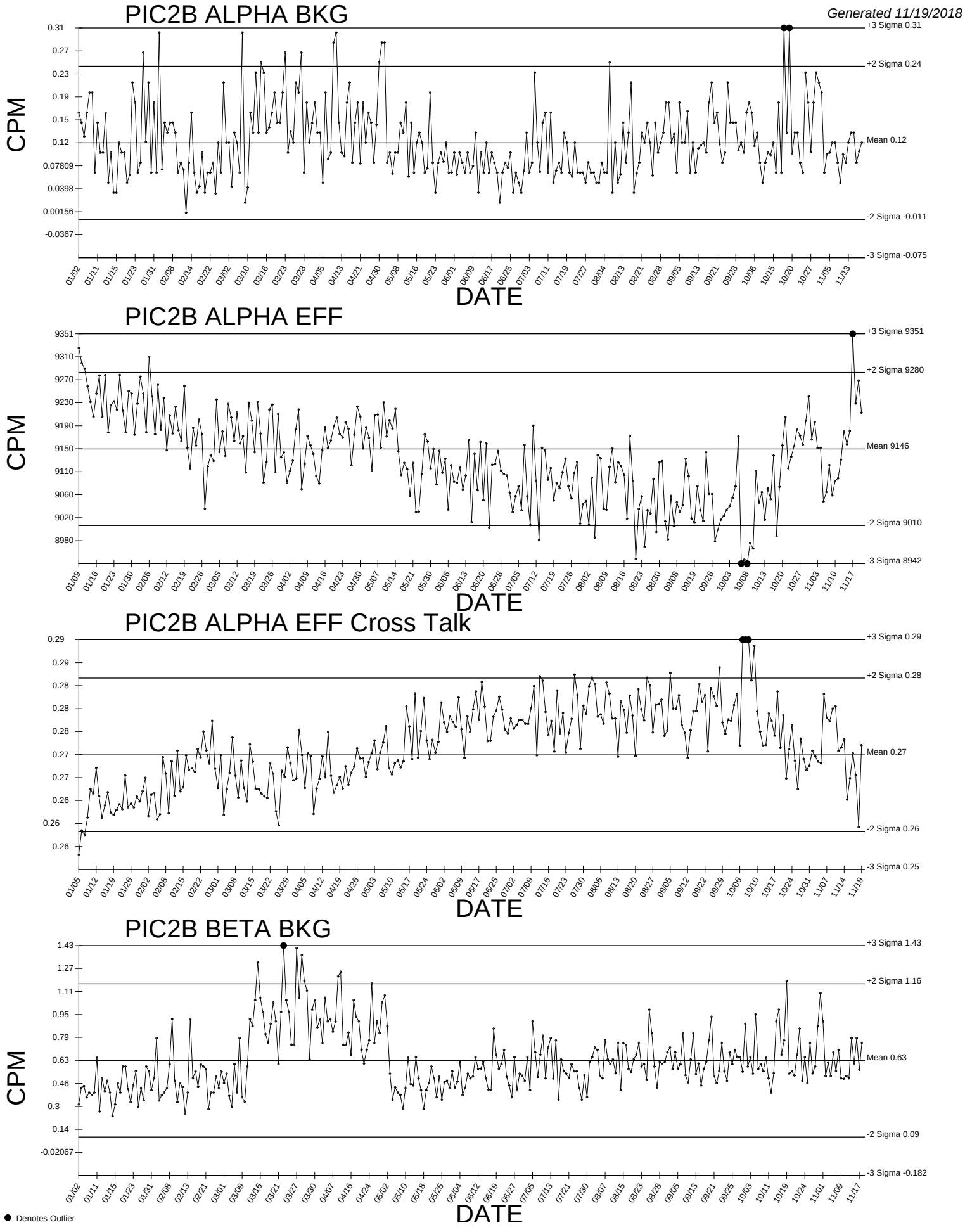
● Denotes Outlier

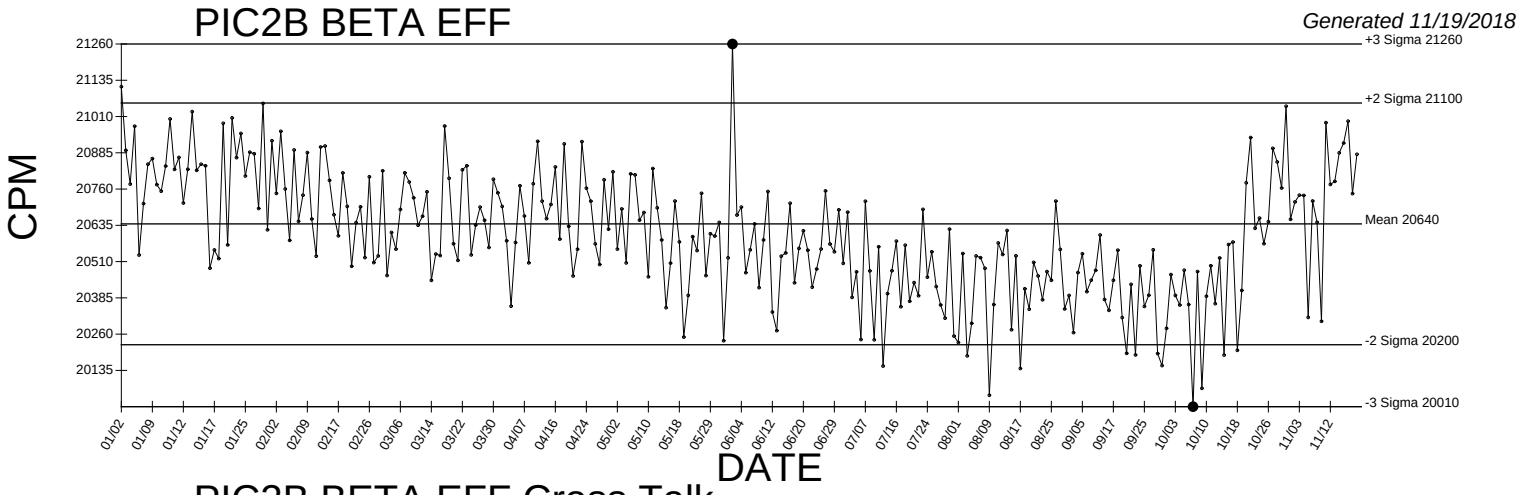

PIC2A ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.37
+2 Sigma 0.31
Mean 0.17
-2 Sigma 0.03
-3 Sigma -0.037
PIC2A ALPHA EFF
+3 Sigma 10850
+2 Sigma 10800
Mean 10590
-2 Sigma 10400
-3 Sigma 10330
PIC2A ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.26
PIC2A BETA BKG
+3 Sigma 0.99
+2 Sigma 0.83
Mean 0.51
-2 Sigma 0.19
-3 Sigma 0.03
Denotes Outlier

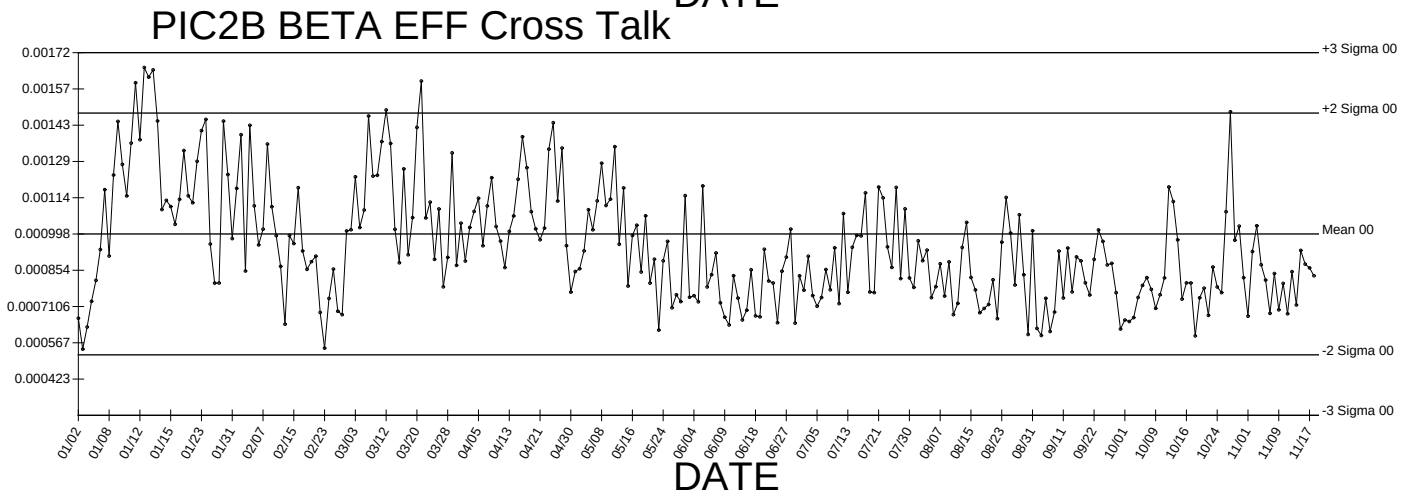




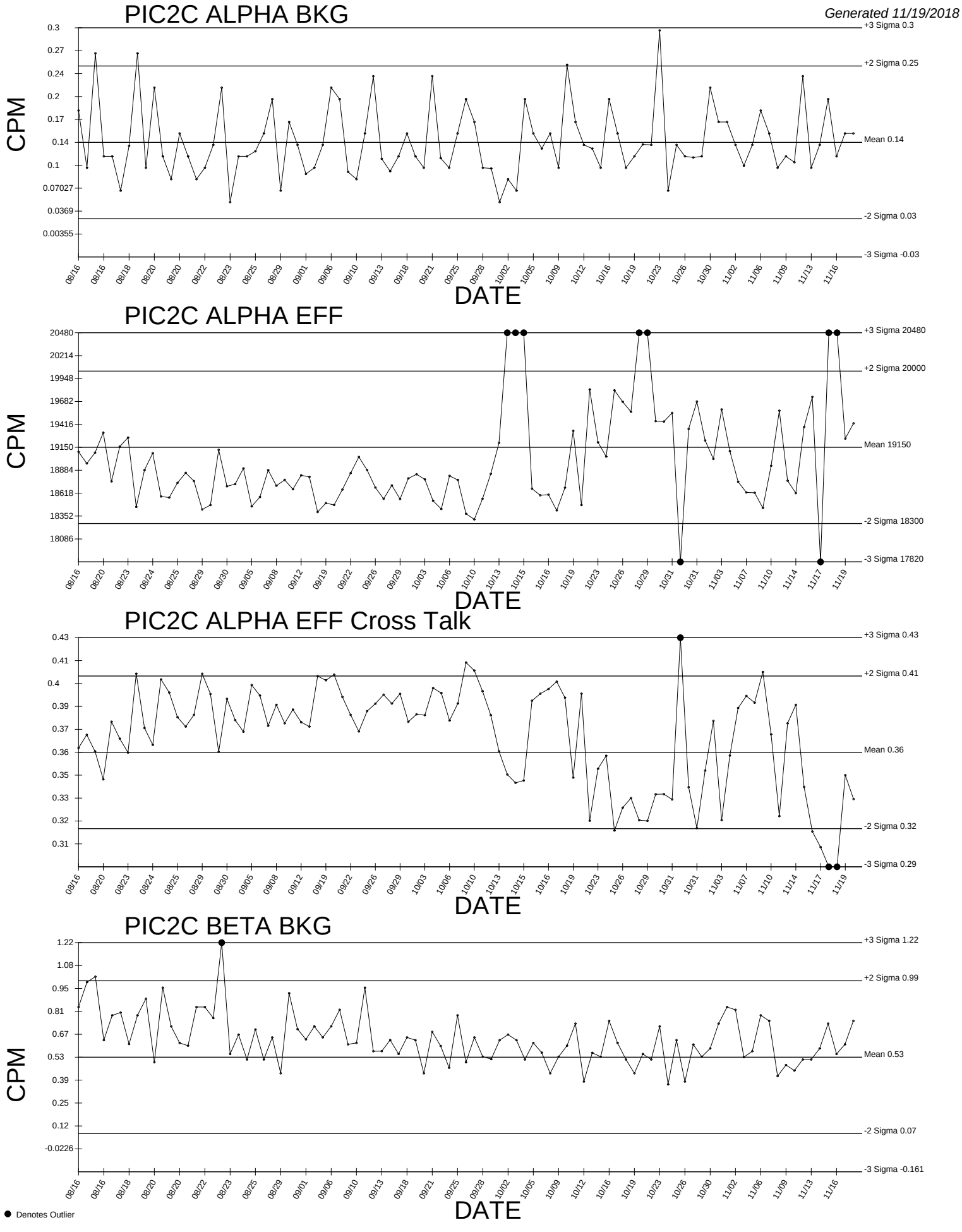
● Denotes Outlier

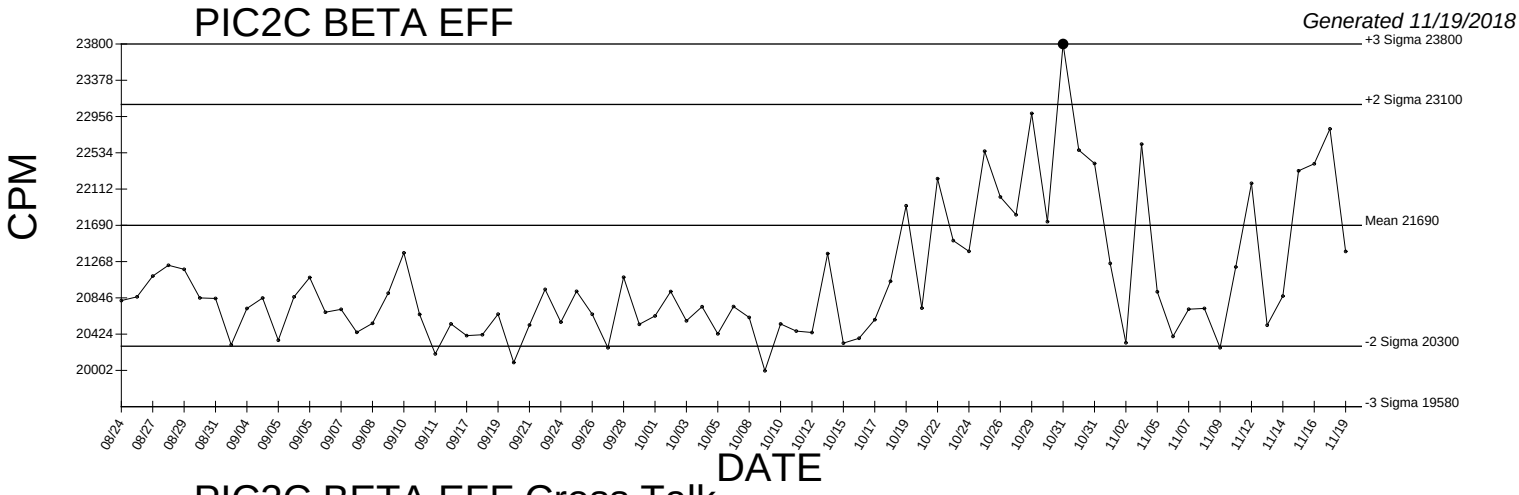

PIC2B ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.31
+2 Sigma 0.24
Mean 0.12
-2 Sigma -0.011
-3 Sigma -0.075
PIC2B ALPHA EFF
+3 Sigma 9351
+2 Sigma 9280
Mean 9146
-2 Sigma 9010
-3 Sigma 8942
PIC2B ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.25
PIC2B BETA BKG
+3 Sigma 1.43
+2 Sigma 1.16
Mean 0.63
-2 Sigma 0.09
-3 Sigma -0.182
Denotes Outlier

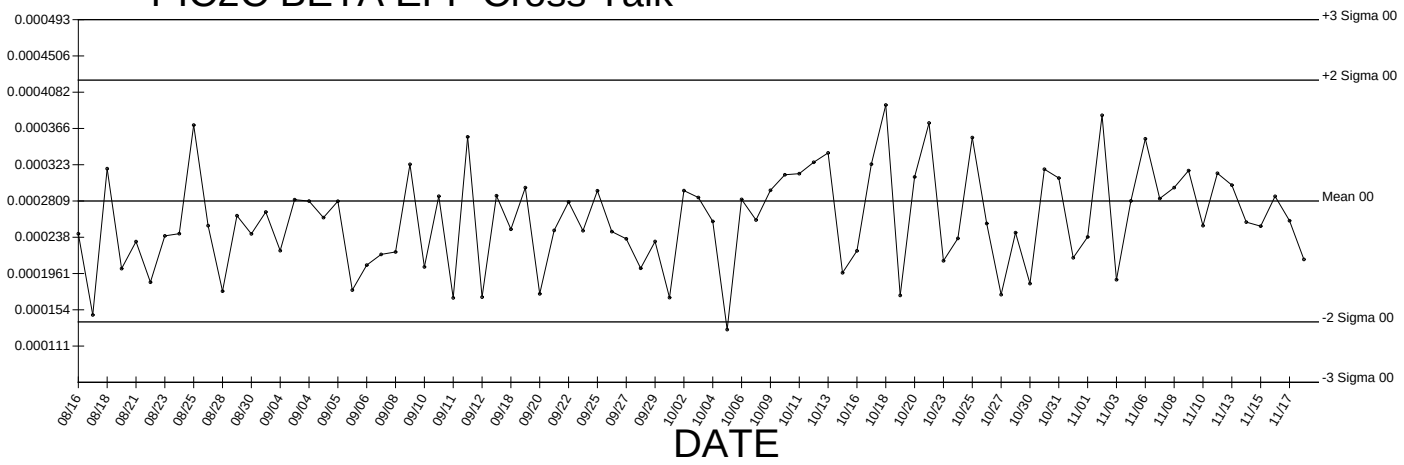




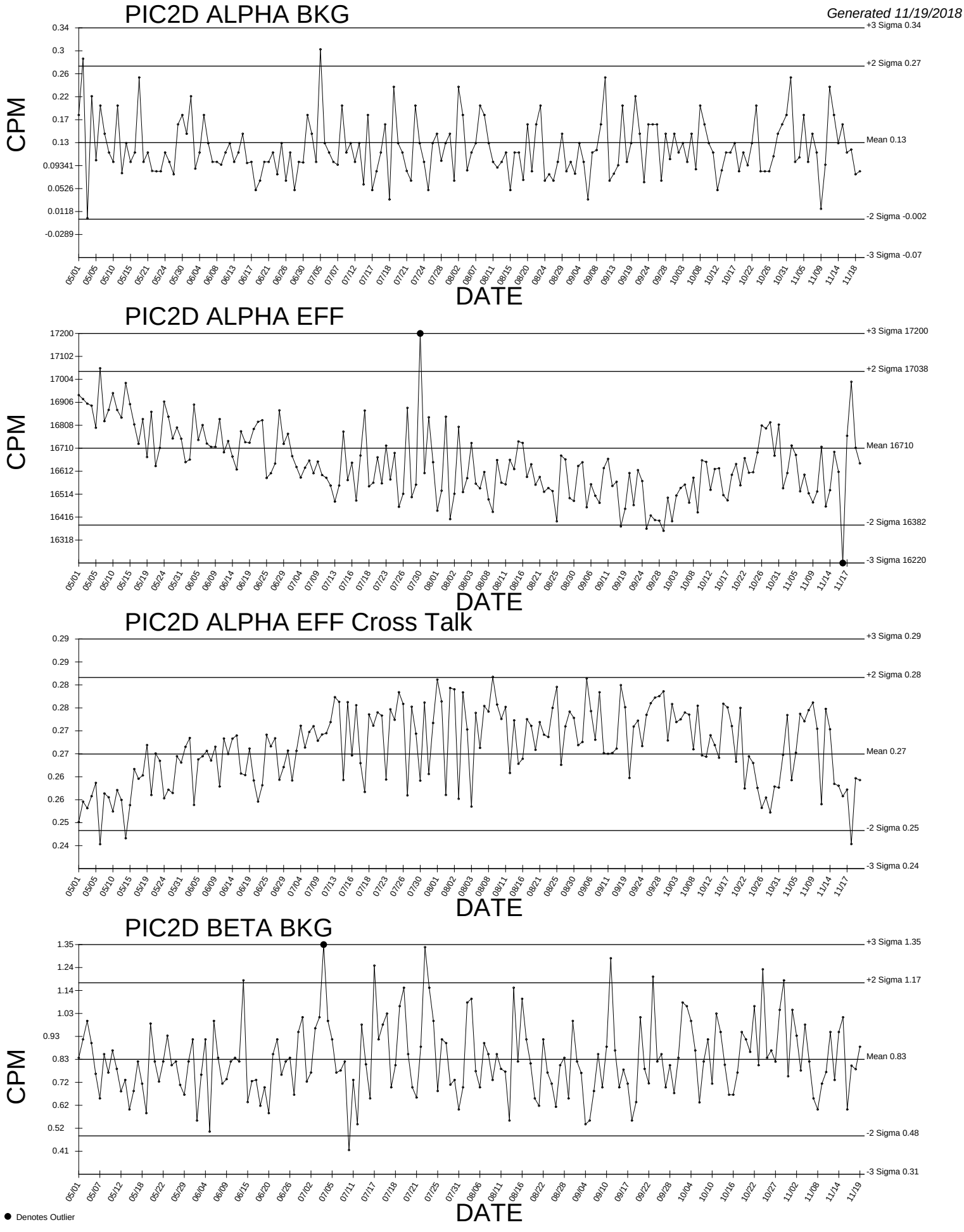
● Denotes Outlier

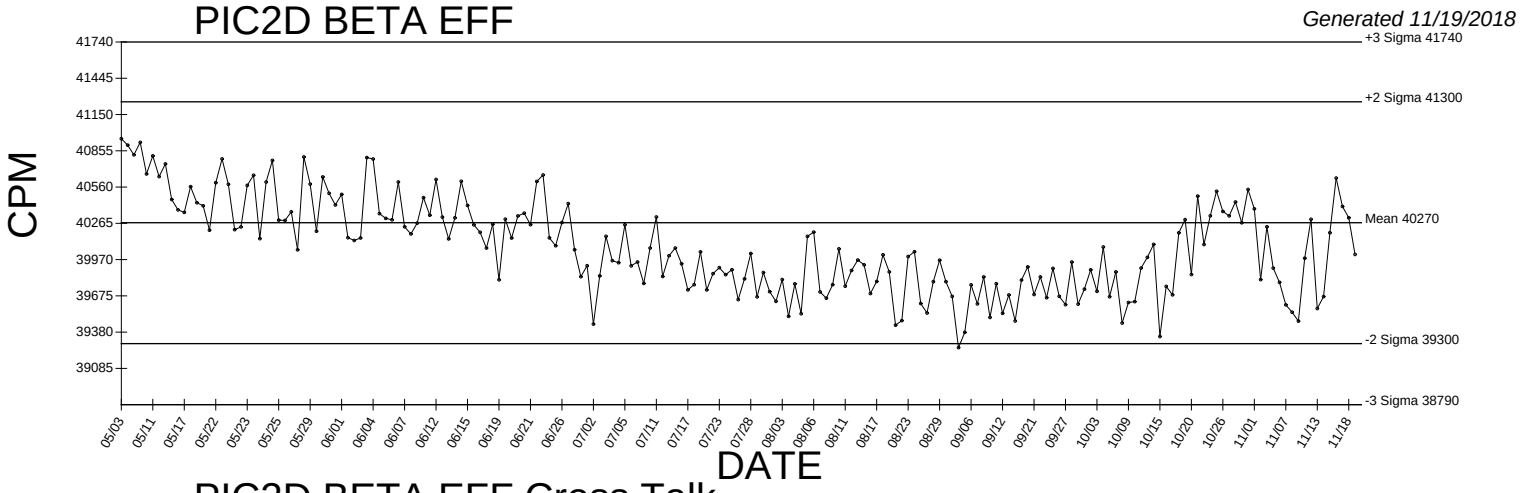

PIC2C ALPHA BKG
Generated 11/19/2018
CPM
0.3
0.27
0.24
0.2
0.17
0.14
0.1
0.07027
0.0369
0.00355
+3 Sigma 0.3
+2 Sigma 0.25
Mean 0.14
-2 Sigma 0.03
-3 Sigma -0.03
08/16 08/16 08/18 08/20 08/20 08/22 08/23 08/25 08/29 09/01 09/06 09/10 09/13 09/18 09/21 09/25 09/28 10/02 10/05 10/09 10/12 10/16 10/19 10/23 10/26 10/30 11/02 11/06 11/09 11/13 11/16
DATE
PIC2C ALPHA EFF
CPM
20480
20214
19948
19682
19416
19150
18884
18618
18352
18086
+3 Sigma 20480
+2 Sigma 20000
Mean 19150
-2 Sigma 18300
-3 Sigma 17820
08/16 08/20 08/23 08/24 08/25 08/29 08/30 09/05 09/08 09/12 09/19 09/22 09/26 09/29 10/03 10/06 10/10 10/13 10/15 10/16 10/19 10/23 10/26 10/29 10/31 10/31 11/03 11/07 11/10 11/14 11/17 11/19
DATE
PIC2C ALPHA EFF Cross Talk
0.43
0.41
0.4
0.39
0.37
0.36
0.35
0.33
0.32
0.31
+3 Sigma 0.43
+2 Sigma 0.41
Mean 0.36
-2 Sigma 0.32
-3 Sigma 0.29
08/16 08/20 08/23 08/24 08/25 08/29 08/30 09/05 09/08 09/12 09/19 09/22 09/26 09/29 10/03 10/06 10/10 10/13 10/15 10/16 10/19 10/23 10/26 10/29 10/31 10/31 11/03 11/07 11/10 11/14 11/17 11/19
DATE
PIC2C BETA BKG
CPM
1.22
1.08
0.95
0.81
0.67
0.53
0.39
0.25
0.12
-0.0226
+3 Sigma 1.22
+2 Sigma 0.99
Mean 0.53
-2 Sigma 0.07
-3 Sigma -0.161
08/16 08/16 08/18 08/20 08/20 08/22 08/23 08/25 08/29 09/01 09/06 09/10 09/13 09/18 09/21 09/25 09/28 10/02 10/05 10/09 10/12 10/16 10/19 10/23 10/26 10/30 11/02 11/06 11/09 11/13 11/16
DATE
● Denotes Outlier

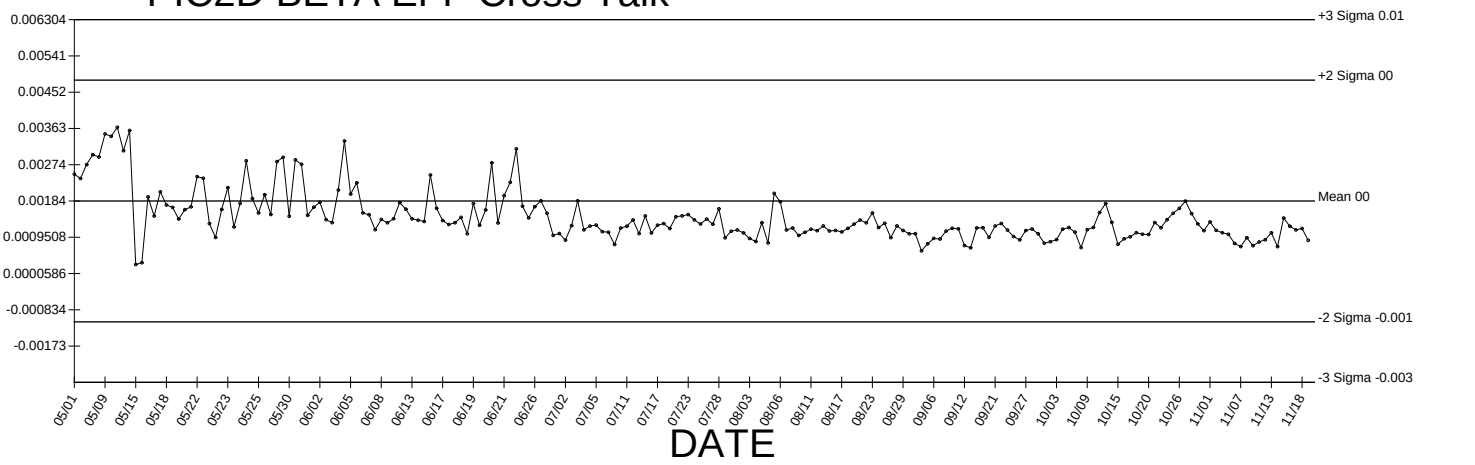




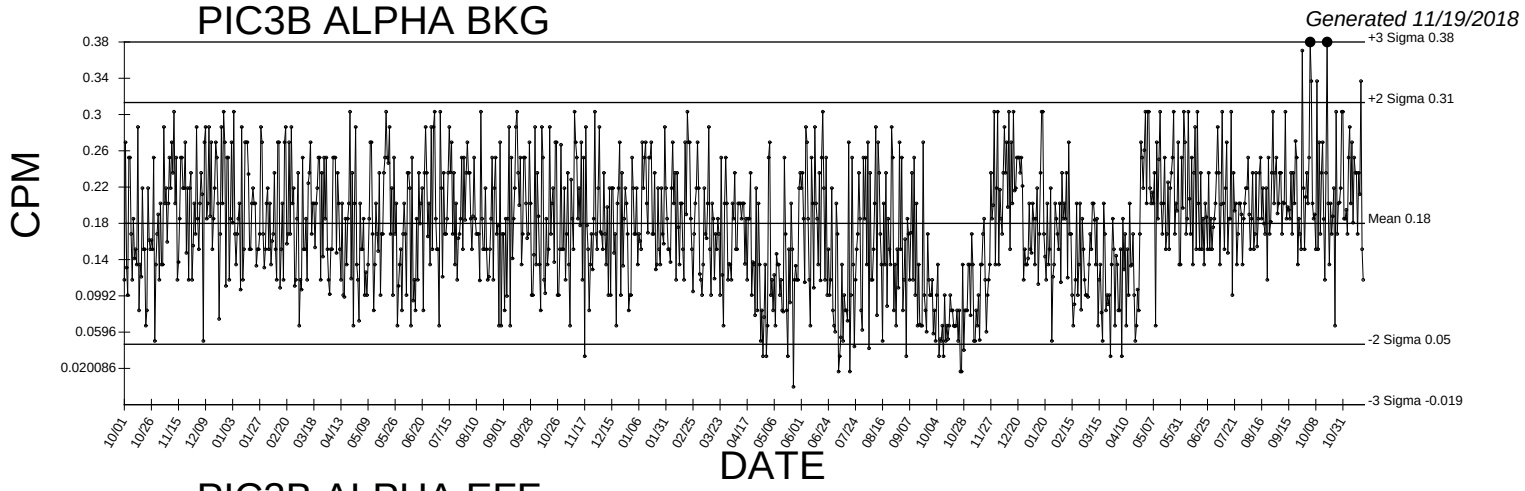
● Denotes Outlier

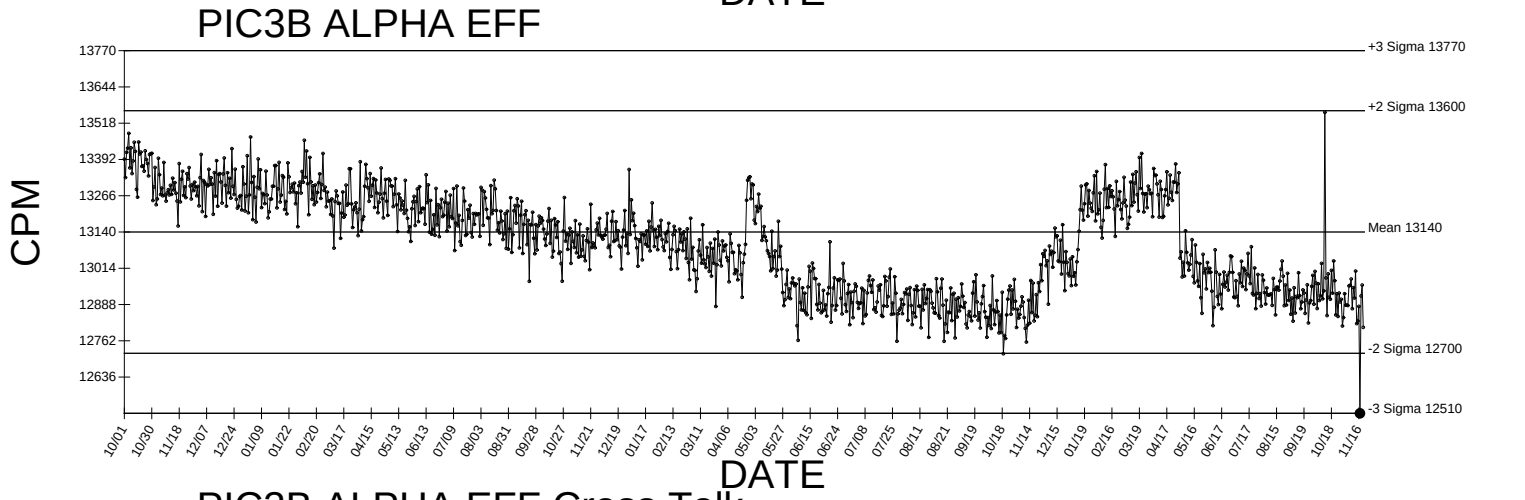

PIC2D ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.34
+2 Sigma 0.27
Mean 0.13
-2 Sigma -0.002
-3 Sigma -0.07
PIC2D ALPHA EFF
+3 Sigma 17200
+2 Sigma 17038
Mean 16710
-2 Sigma 16382
-3 Sigma 16220
PIC2D ALPHA EFF Cross Talk
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.27
-2 Sigma 0.25
-3 Sigma 0.24
PIC2D BETA BKG
+3 Sigma 1.35
+2 Sigma 1.17
Mean 0.83
-2 Sigma 0.48
-3 Sigma 0.31
● Denotes Outlier

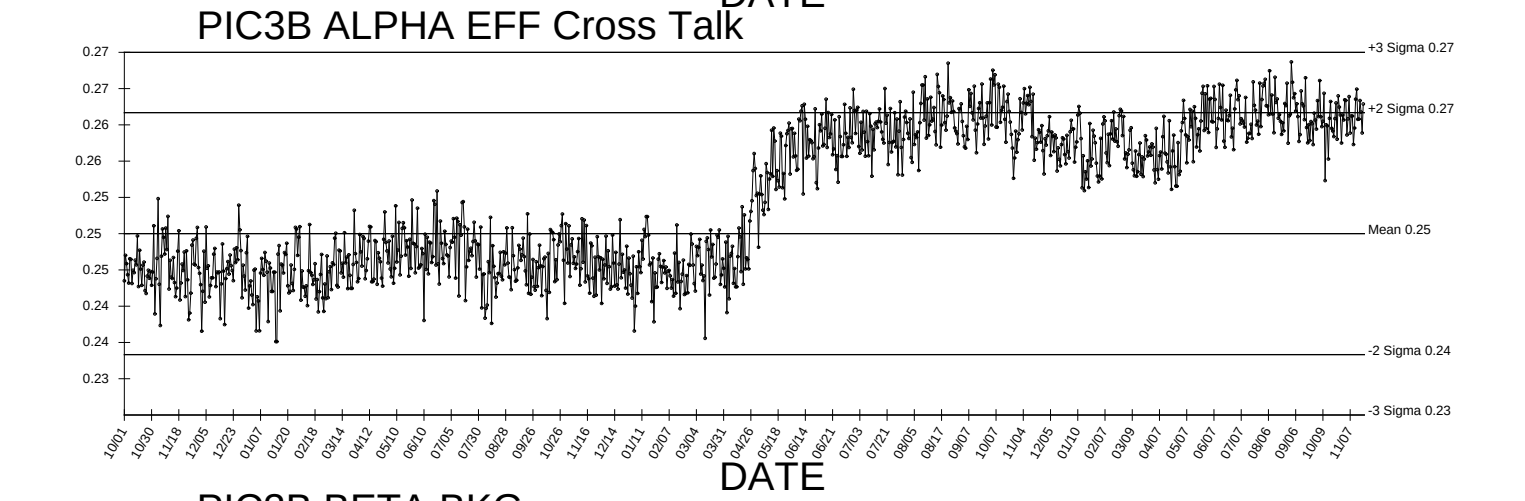


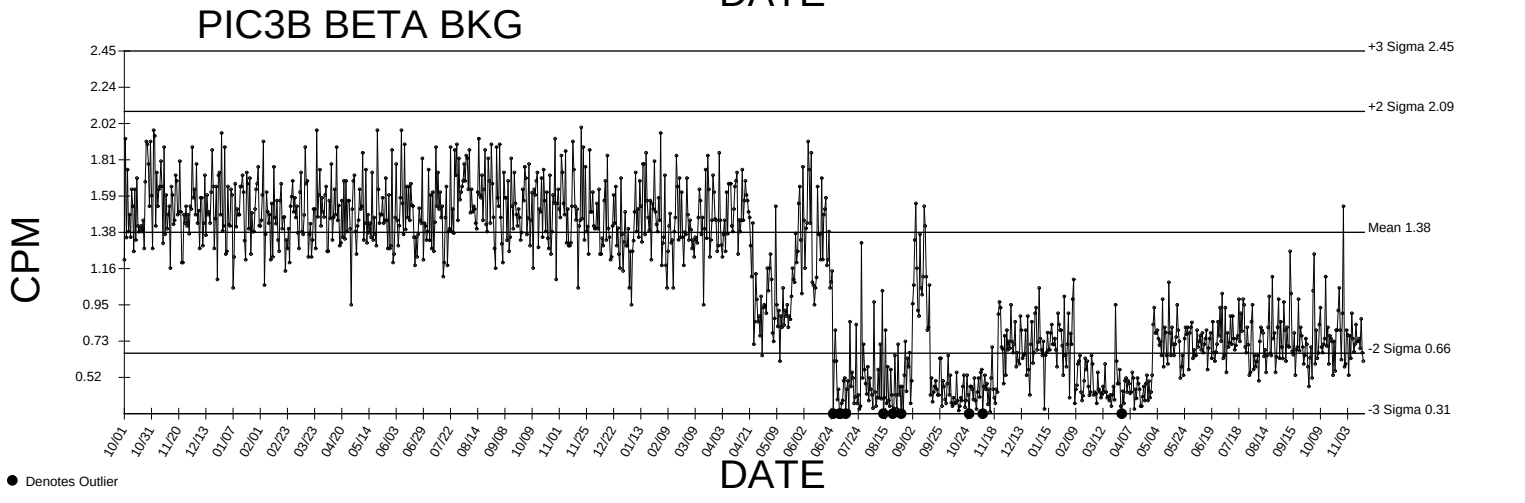


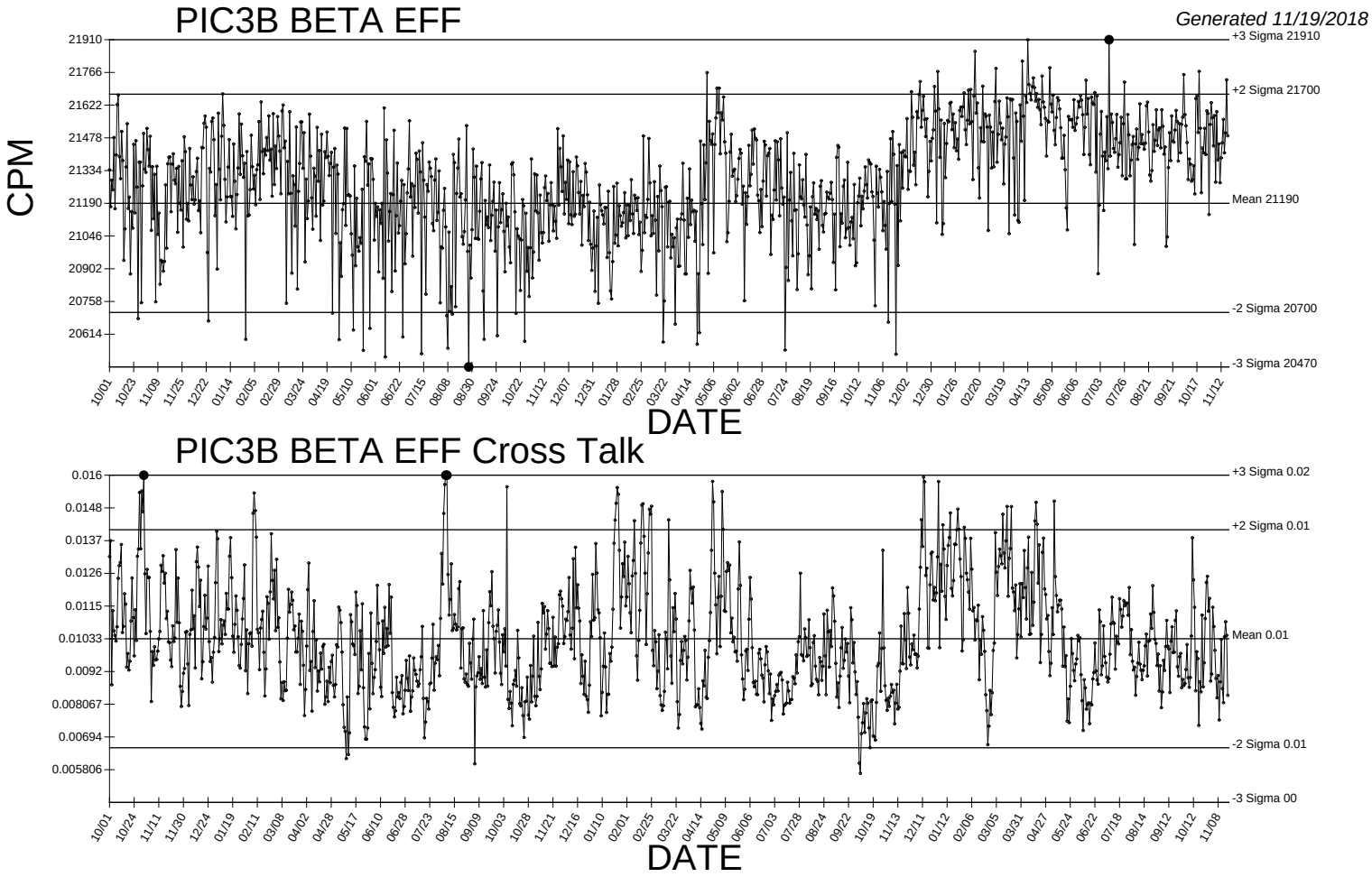
● Denotes Outlier


PIC3B ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.31
Mean 0.18
-2 Sigma 0.05
-3 Sigma -0.019

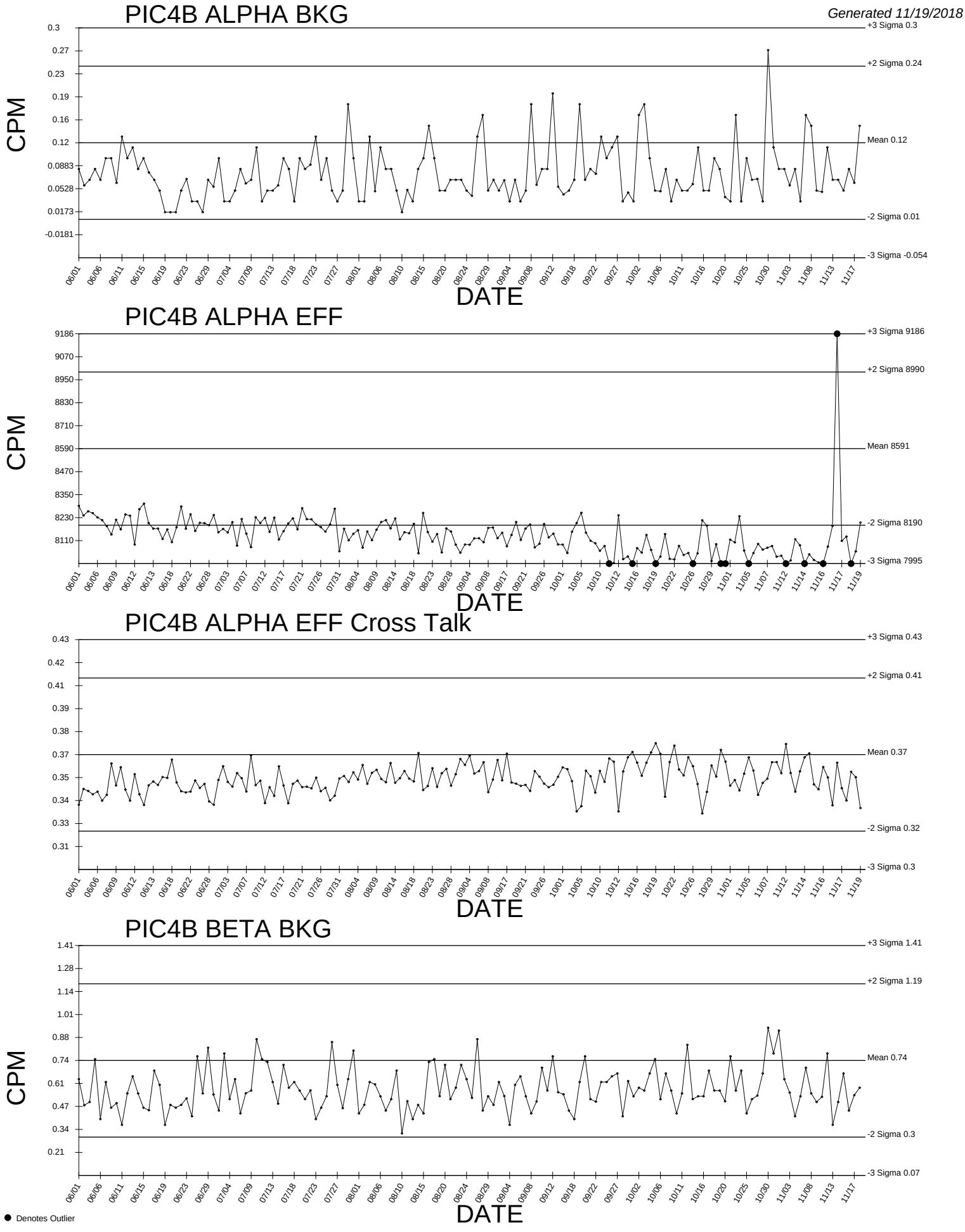

PIC3B ALPHA EFF
CPM
DATE
+3 Sigma 13770
+2 Sigma 13600
Mean 13140
-2 Sigma 12700
-3 Sigma 12510

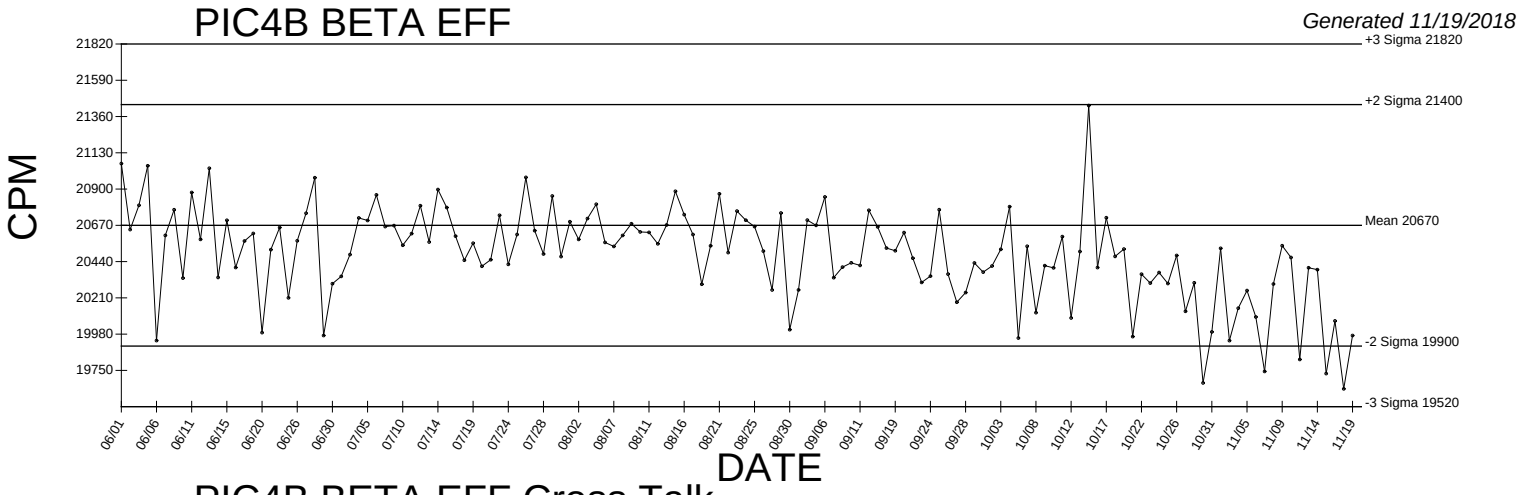

PIC3B ALPHA EFF Cross Talk
DATE
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.25
-2 Sigma 0.24
-3 Sigma 0.23

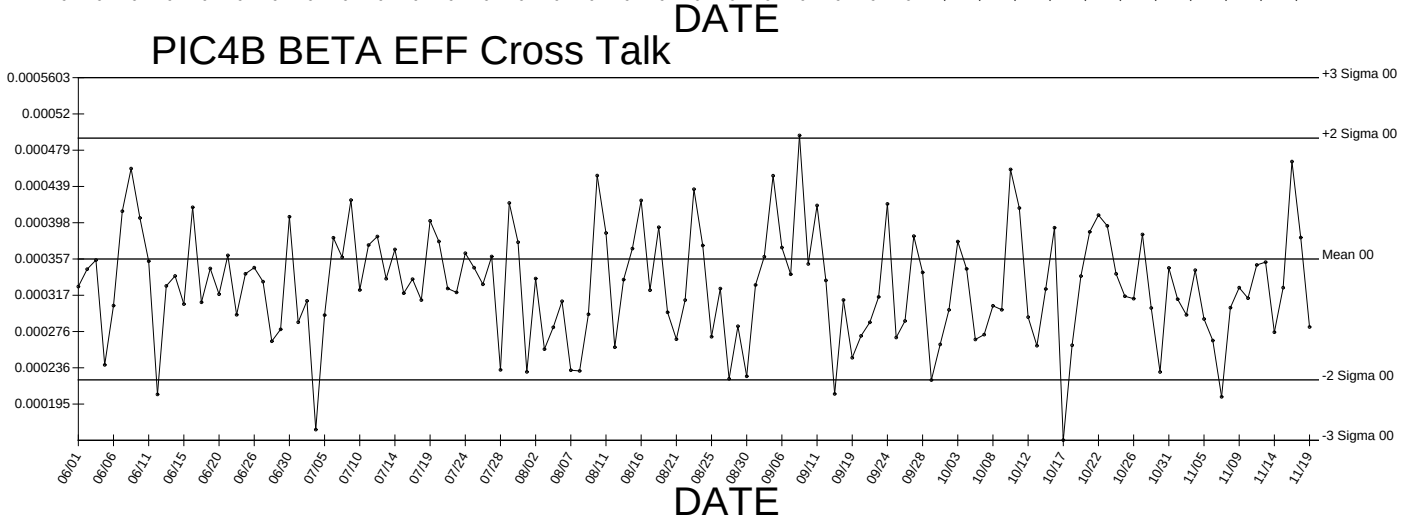

PIC3B BETA BKG
CPM
DATE
+3 Sigma 2.45
+2 Sigma 2.09
Mean 1.38
-2 Sigma 0.66
-3 Sigma 0.31
Denotes Outlier



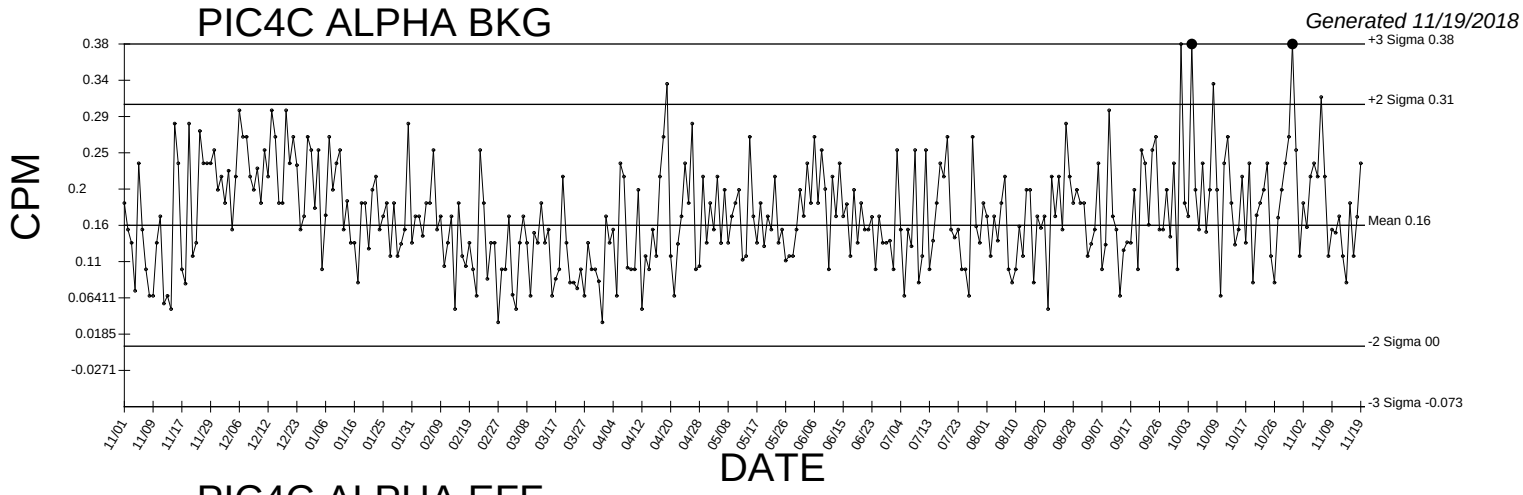
● Denotes Outlier

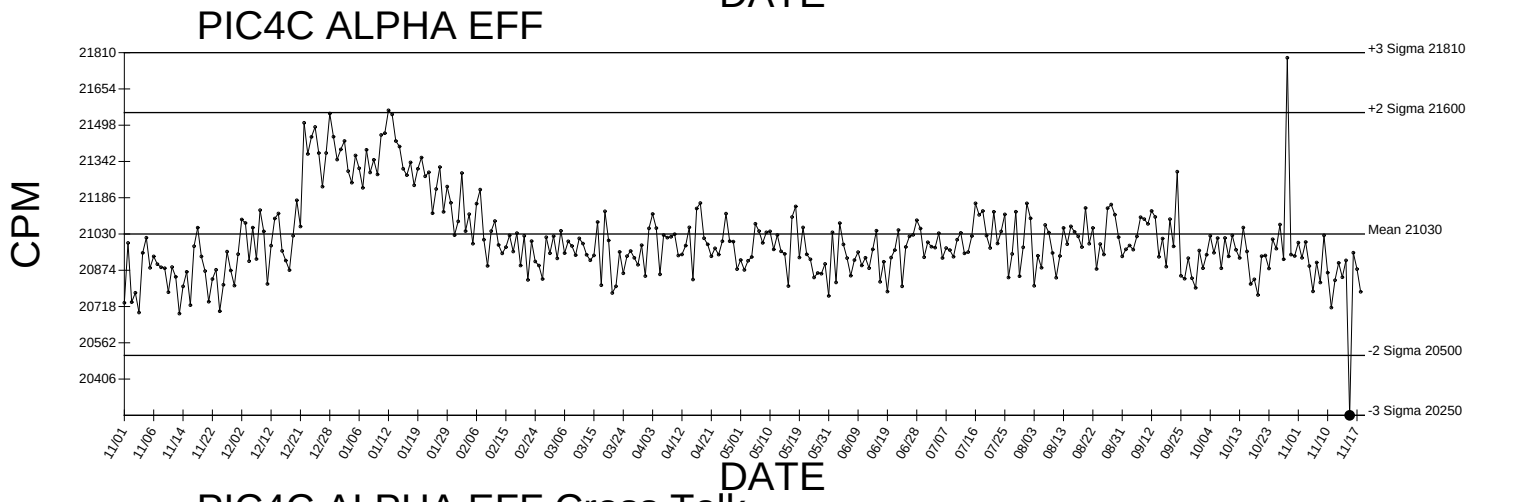

PIC4B ALPHA BKG
Generated 11/19/2018
CPM
0.3
0.27
0.23
0.19
0.16
0.12
0.0883
0.0528
0.0173
-0.0181
+3 Sigma 0.3
+2 Sigma 0.24
Mean 0.12
-2 Sigma 0.01
-3 Sigma -0.054
DATE
PIC4B ALPHA EFF
CPM
9186
9070
8950
8830
8710
8590
8470
8350
8230
8110
+3 Sigma 9186
+2 Sigma 8990
Mean 8591
-2 Sigma 8190
-3 Sigma 7995
DATE
PIC4B ALPHA EFF Cross Talk
0.43
0.42
0.41
0.39
0.38
0.37
0.35
0.34
0.33
0.31
+3 Sigma 0.43
+2 Sigma 0.41
Mean 0.37
-2 Sigma 0.32
-3 Sigma 0.3
DATE
PIC4B BETA BKG
CPM
1.41
1.28
1.14
1.01
0.88
0.74
0.61
0.47
0.34
0.21
+3 Sigma 1.41
+2 Sigma 1.19
Mean 0.74
-2 Sigma 0.3
-3 Sigma 0.07
DATE
Denotes Outlier

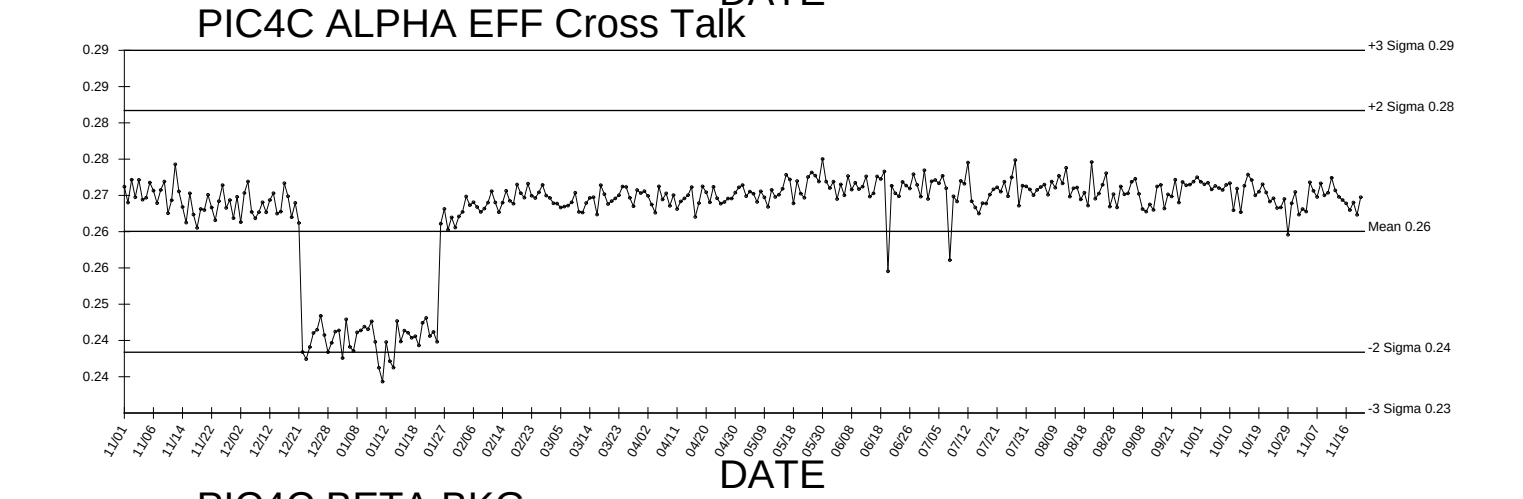


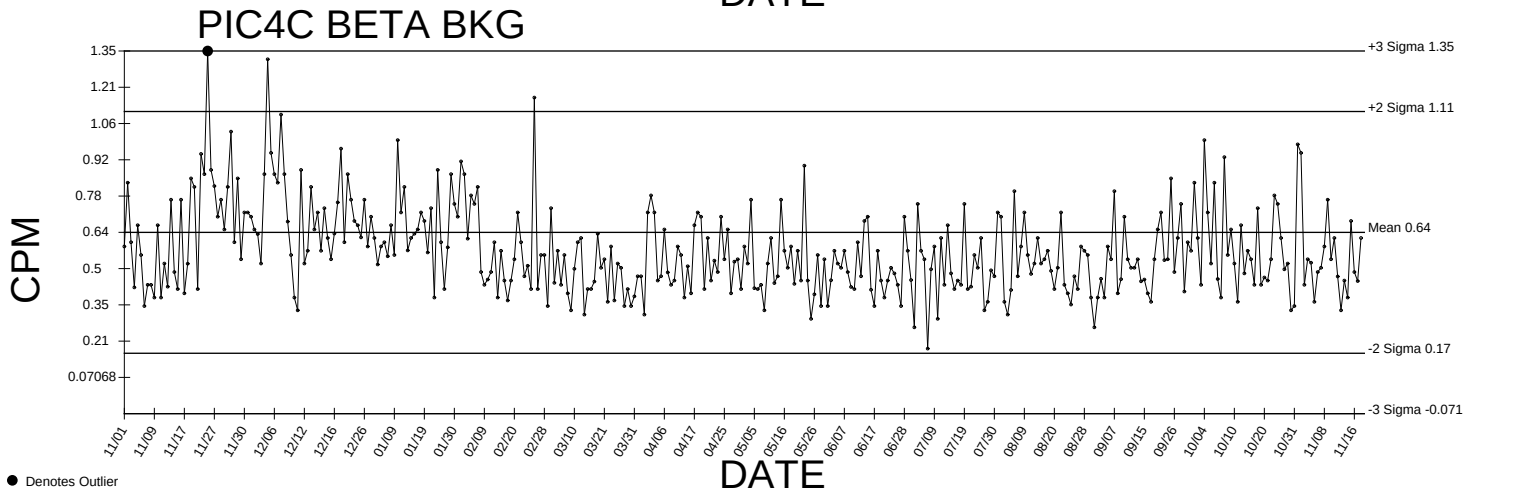


● Denotes Outlier

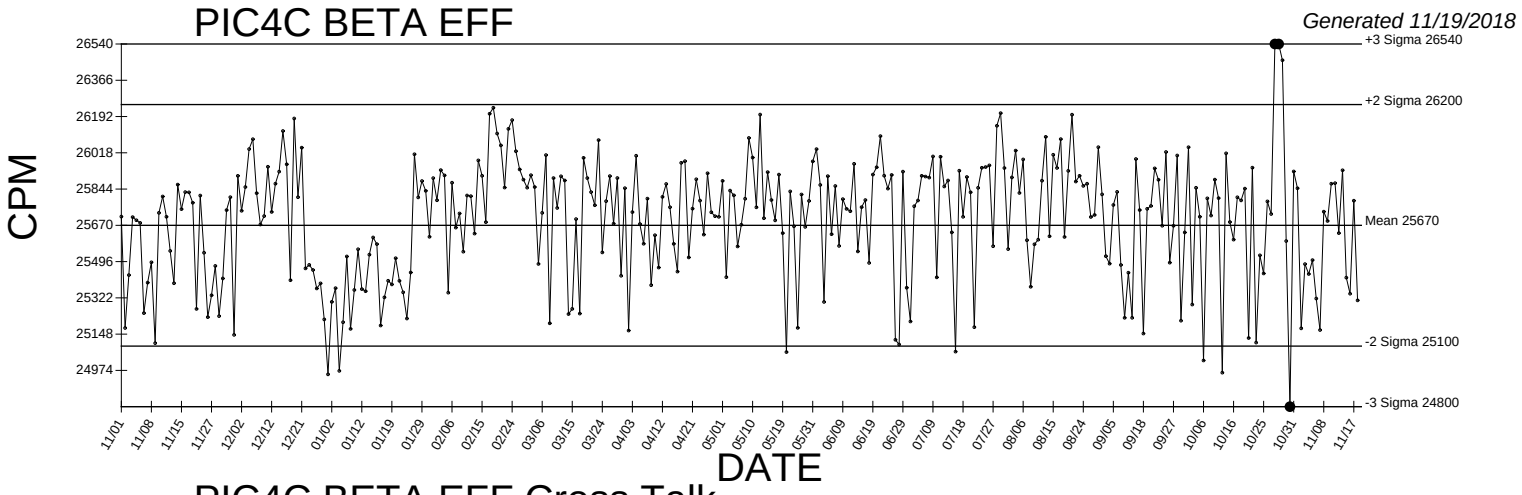


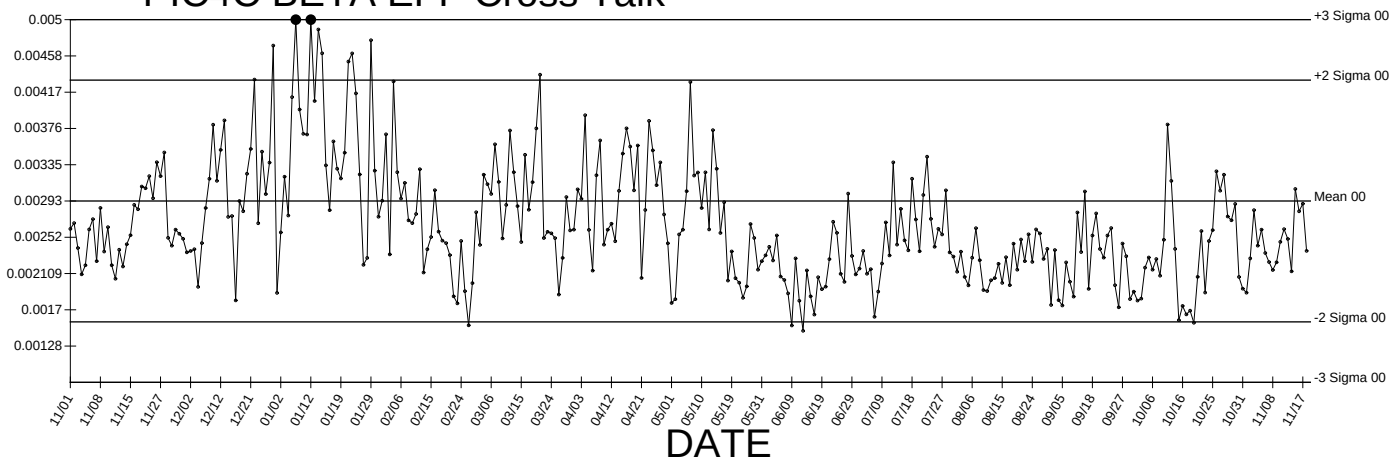




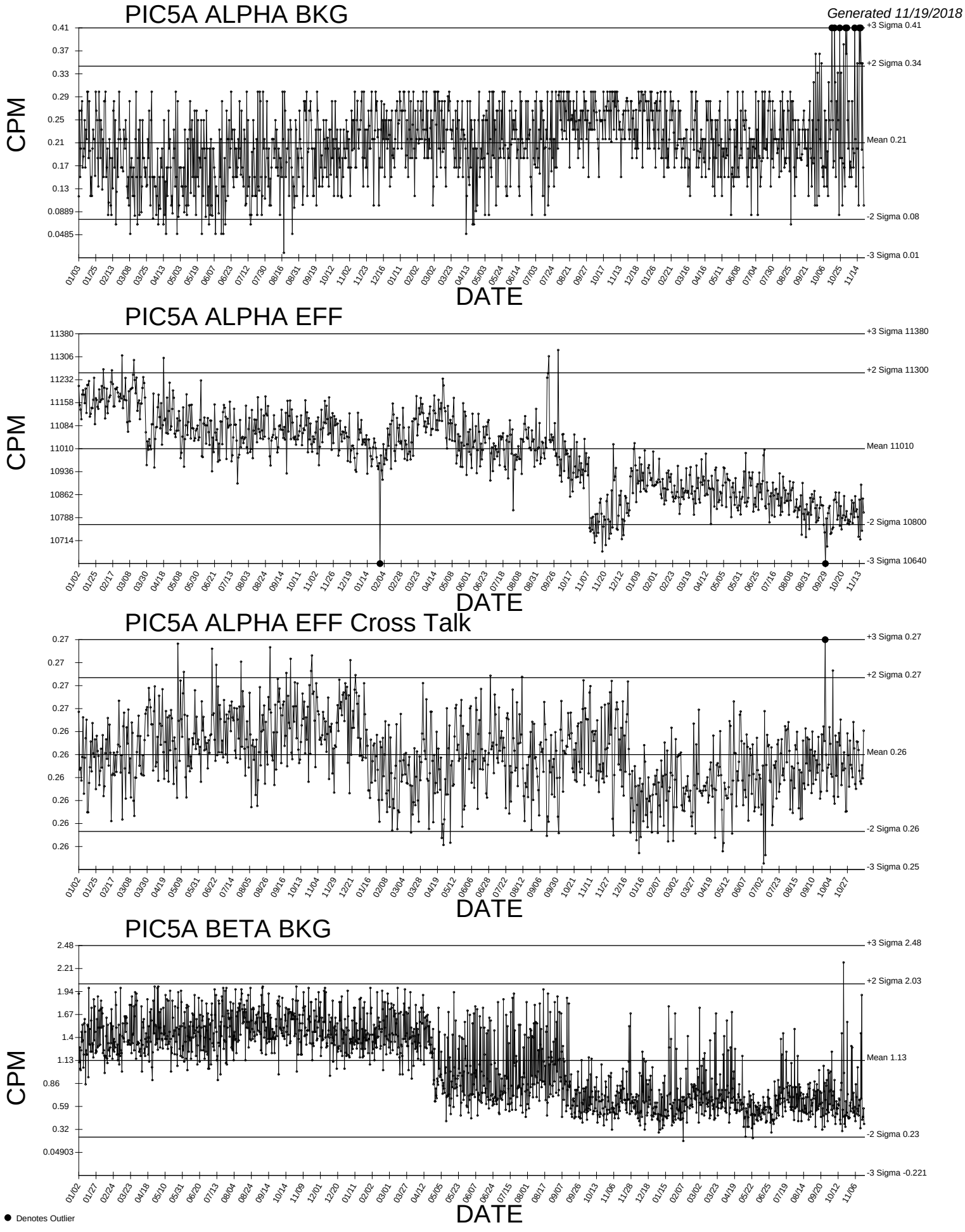


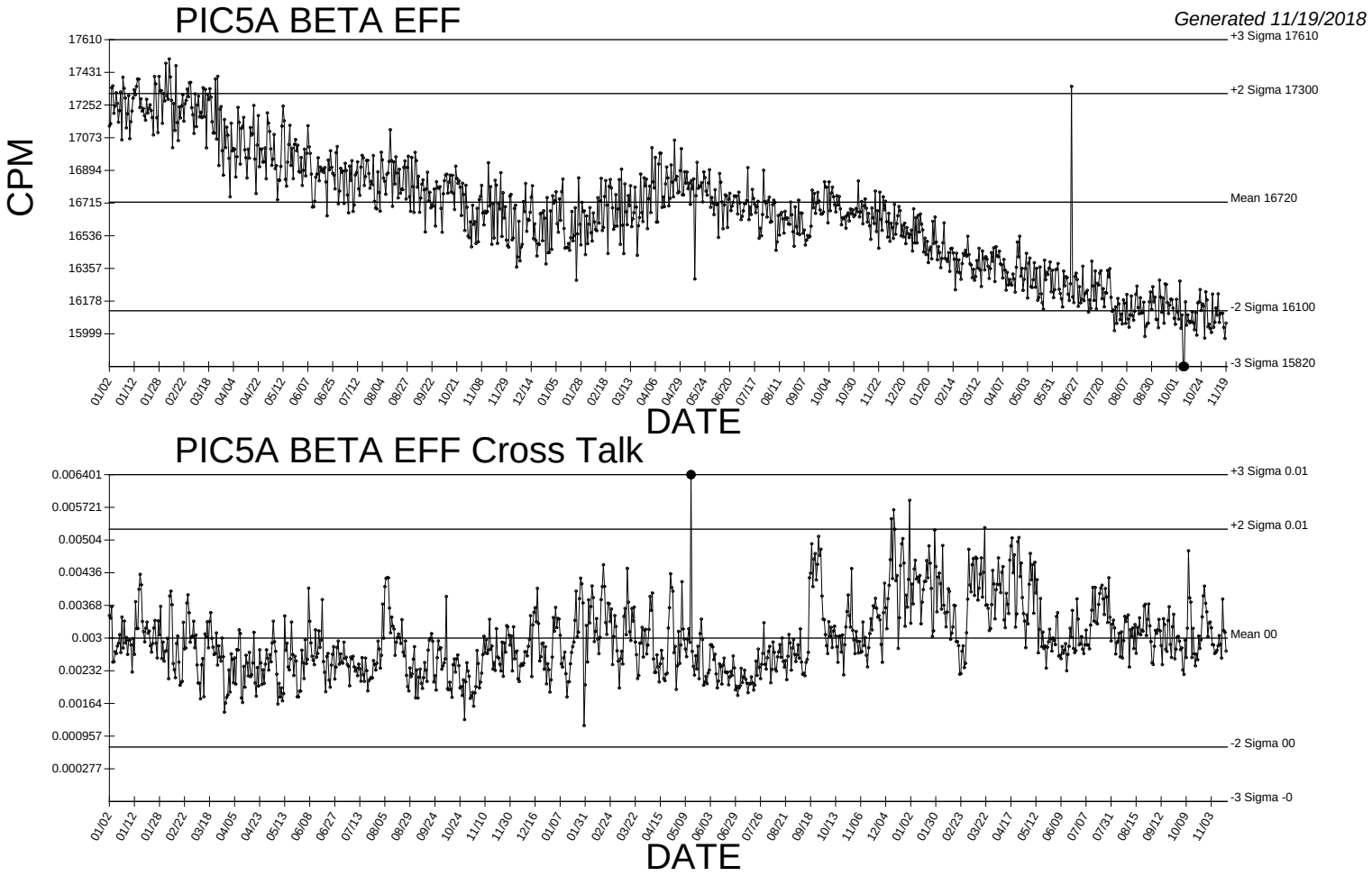
● Denotes Outlier



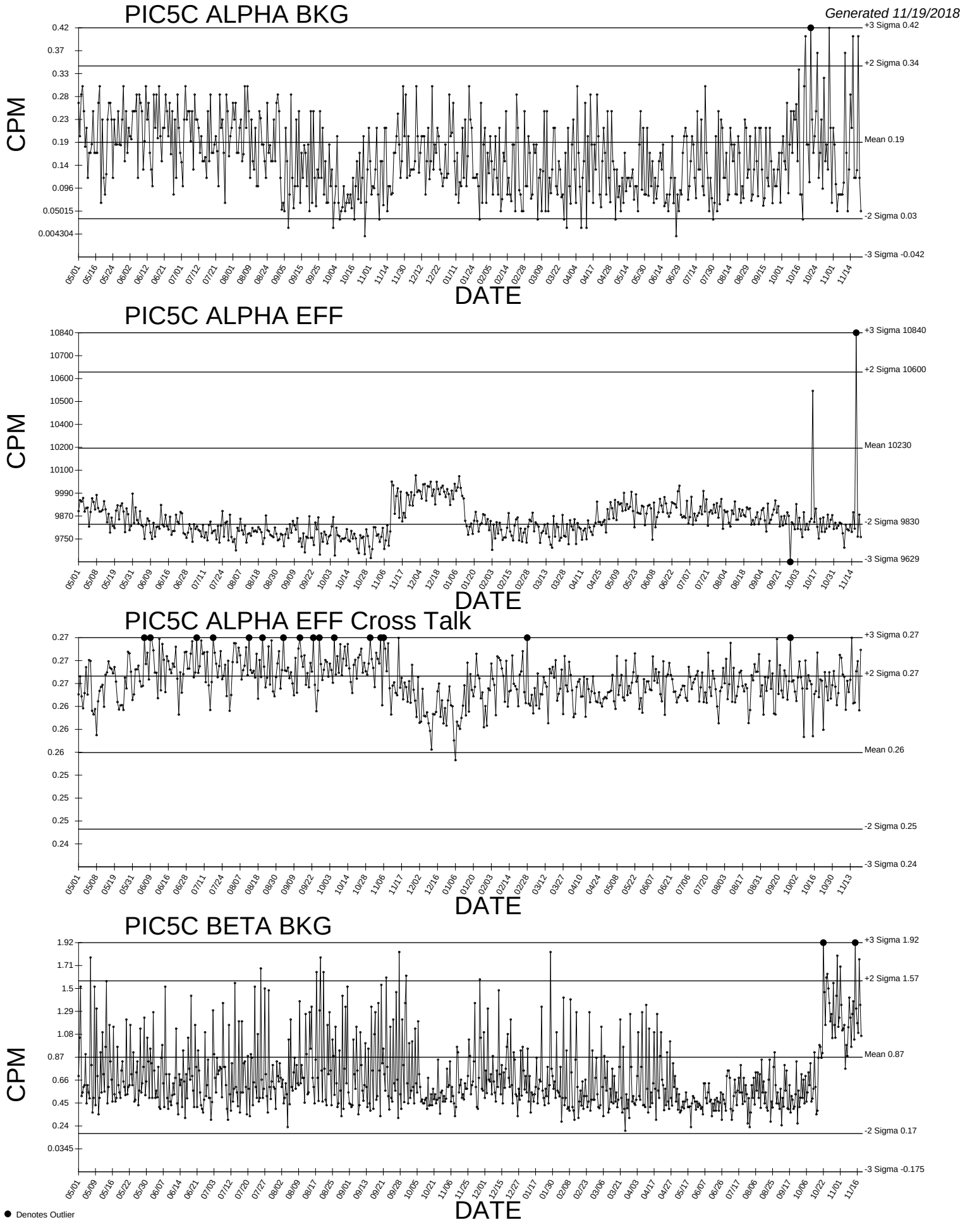


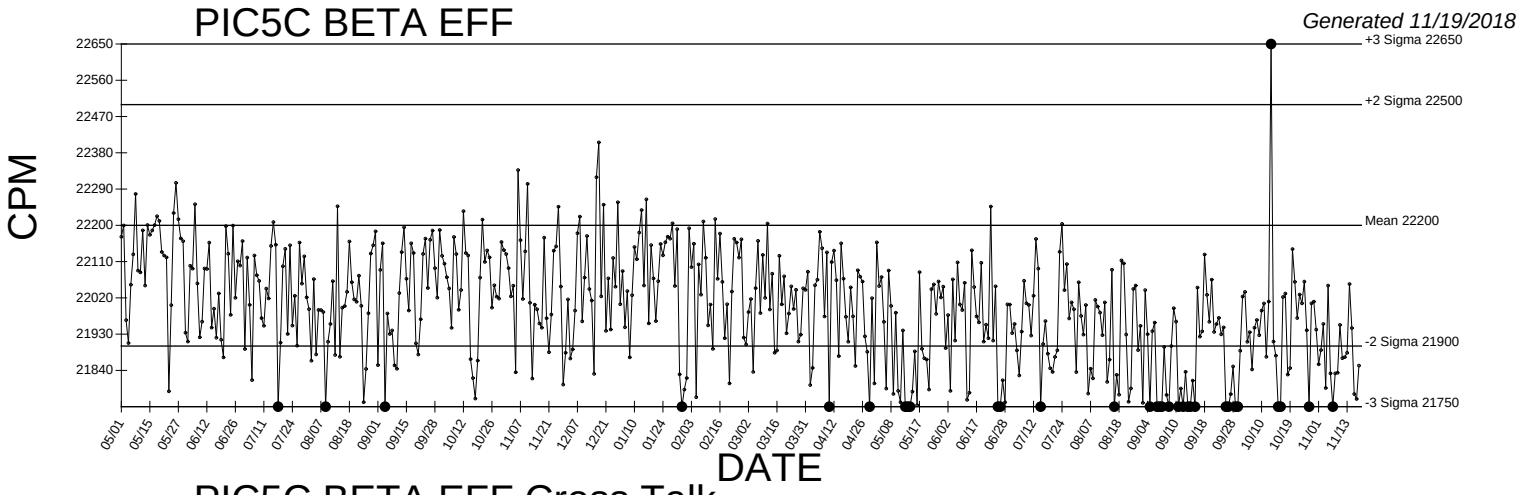
● Denotes Outlier

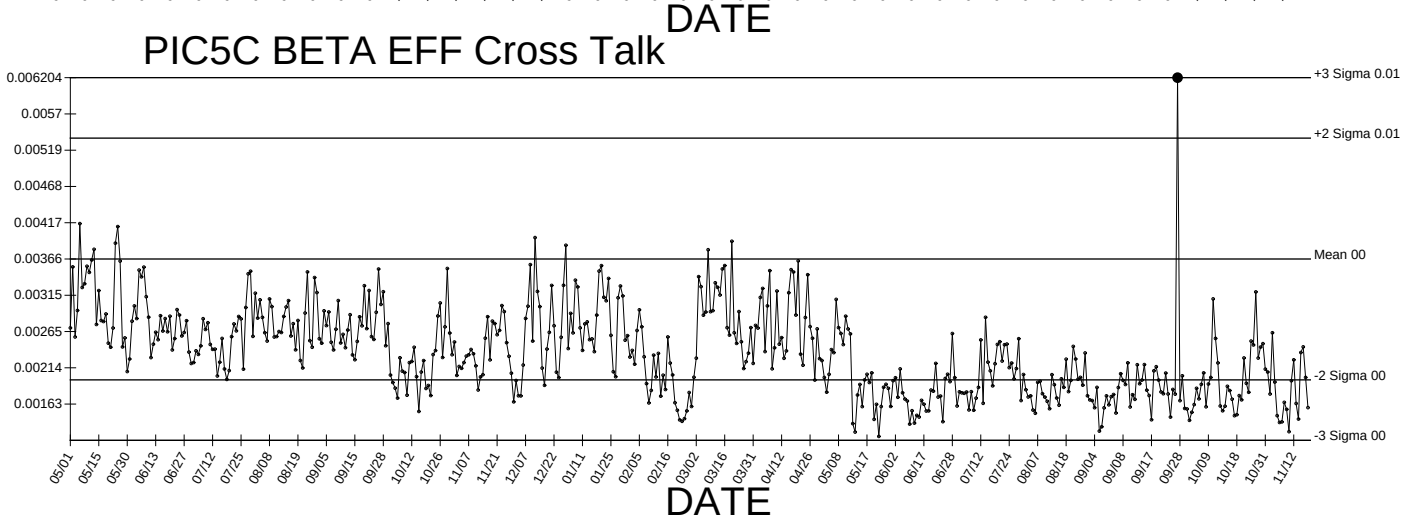

PIC5A ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.41
+2 Sigma 0.34
Mean 0.21
-2 Sigma 0.08
-3 Sigma 0.01
PIC5A ALPHA EFF
+3 Sigma 11380
+2 Sigma 11300
Mean 11010
-2 Sigma 10800
-3 Sigma 10640
PIC5A ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
PIC5A BETA BKG
+3 Sigma 2.48
+2 Sigma 2.03
Mean 1.13
-2 Sigma 0.23
-3 Sigma -0.221
Denotes Outlier



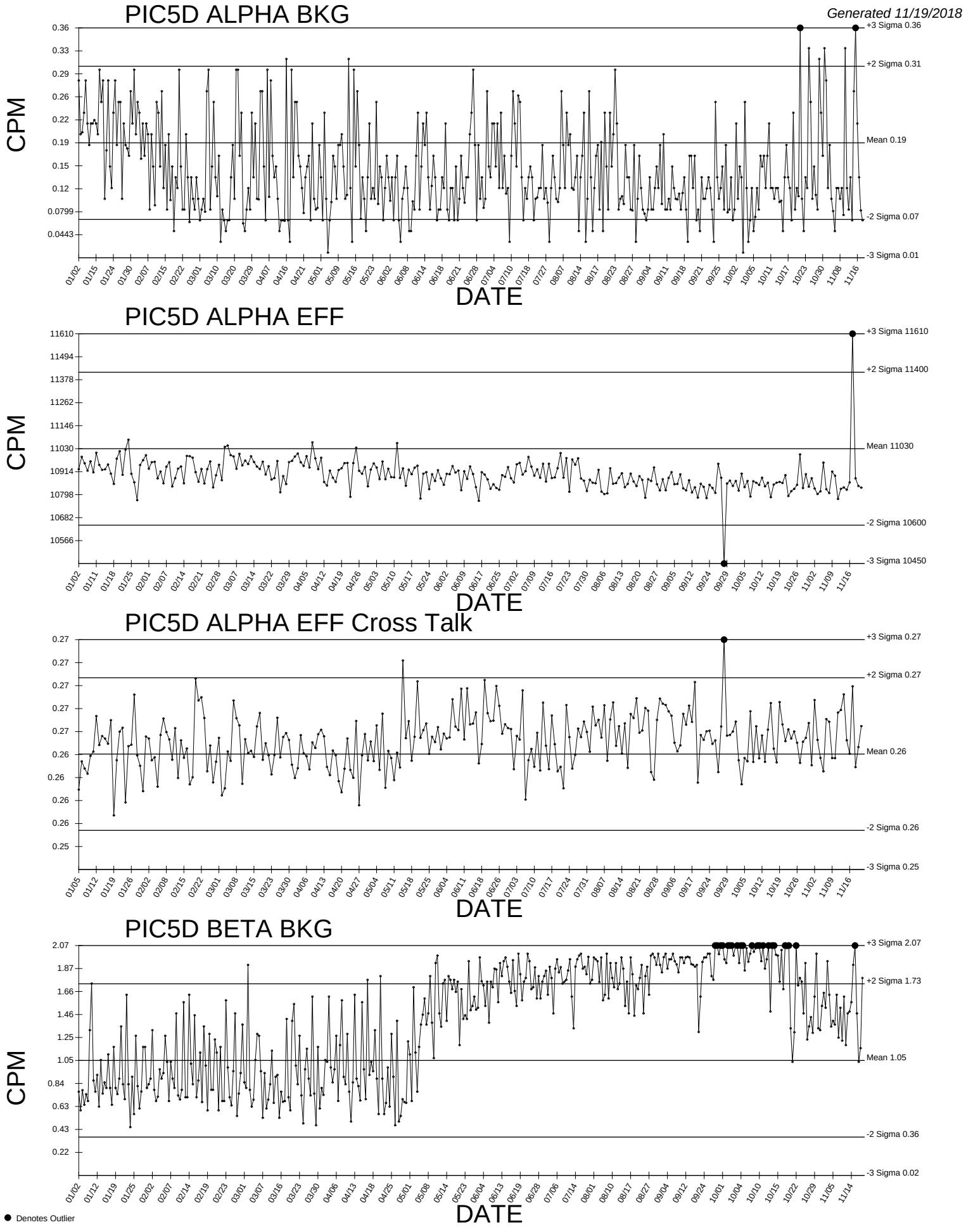
● Denotes Outlier

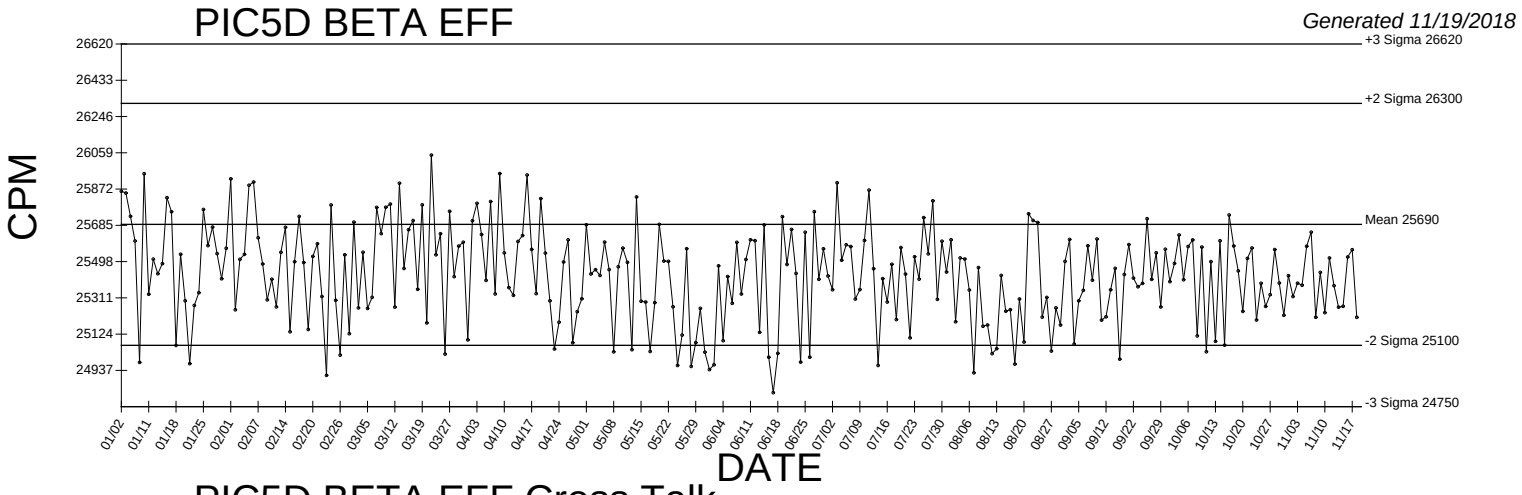

PIC5C ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.42
+2 Sigma 0.34
Mean 0.19
-2 Sigma 0.03
-3 Sigma -0.042
PIC5C ALPHA EFF
+3 Sigma 10840
+2 Sigma 10600
Mean 10230
-2 Sigma 9830
-3 Sigma 9629
PIC5C ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.25
-3 Sigma 0.24
PIC5C BETA BKG
+3 Sigma 1.92
+2 Sigma 1.57
Mean 0.87
-2 Sigma 0.17
-3 Sigma -0.175
Denotes Outlier

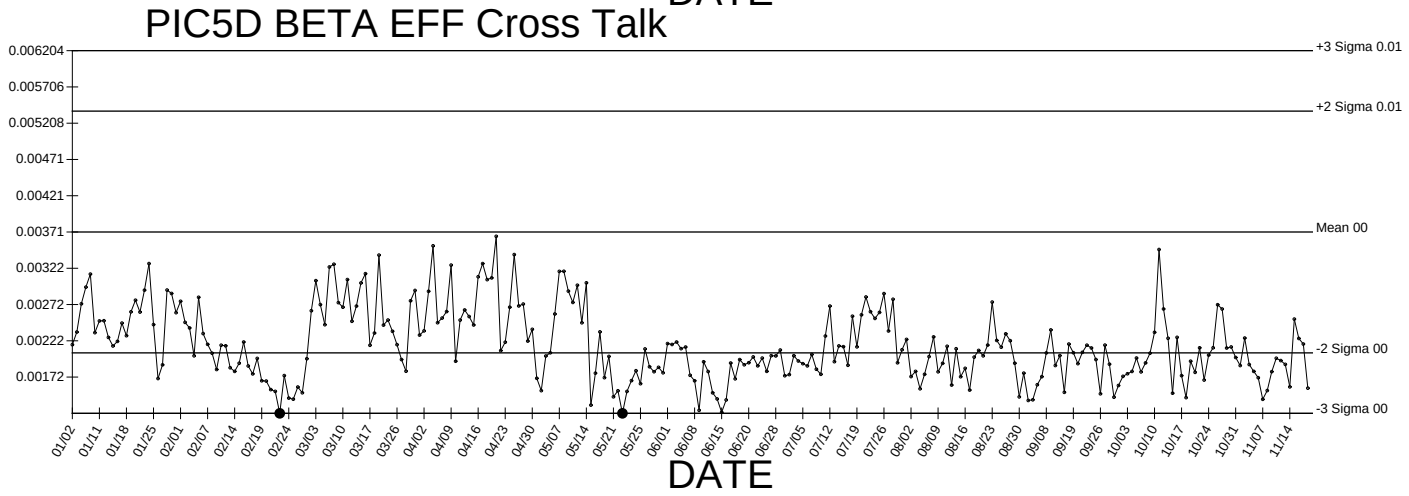




● Denotes Outlier


PIC5D ALPHA BKG
Generated 11/19/2018
CPM
DATE
+3 Sigma 0.36
+2 Sigma 0.31
Mean 0.19
-2 Sigma 0.07
-3 Sigma 0.01
PIC5D ALPHA EFF
+3 Sigma 11610
+2 Sigma 11400
Mean 11030
-2 Sigma 10600
-3 Sigma 10450
PIC5D ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
PIC5D BETA BKG
+3 Sigma 2.07
+2 Sigma 1.73
Mean 1.05
-2 Sigma 0.36
-3 Sigma 0.02
Denotes Outlier





● Denotes Outlier

RAD Standards Traceability

0487

National Institute of Standards & Technology

0487

Certificate

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

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Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have an acid concentration and a carrier concentration comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

*Notes and references are on pages 5 and 6.

RC-5-035-002b

PROPERTIES OF SRM 4251C
(Certified values are shown in bold type)

Source identification number	NIST SRM 4251C		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution density	**(1.015 ± 0.002) g•mL^{-1} at 22.1 °C** [b]*		
Solution mass	**(5.054 ± 0.001) g** [b]		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol•L^{-1})	Mass Fraction (g•g^{-1})
	H_2O HCl $BaCl_2$ $^{133}BaCl_2$	54 1.0 6×10^{-4} 4×10^{-7}	0.96 0.04 1.2×10^{-4} 8×10^{-8}
Radiological Properties:			
Radionuclide	**Barium-133**		
Reference time	**1200 EST, 1 September 1993**		
Massic activity of the solution [c] (Activity per unit mass of solution)	**4.876×10^5 Bq•g^{-1}**		
Relative expanded uncertainty (k=2)	**0.52%** [d]		
Photon-emitting impurities	None detected [e]		
Half lives used	Barium-133: (10.52 ± 0.13) a [f] Radium-226: (1600 ± 7) a [f]		
Measuring instrument	Pressurized "4π"γ ionization chamber A calibrated using a barium-133 solution whose activity was determined by 4π(e+X)-γ-anticoincidence counting		

*Notes and references are on pages 5 and 6.

RC-5-035-002

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i, the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [g]	Relative Sensitivity Factor, $\lvert\partial y/\partial x_i\rvert \cdot (x_i/y)$ [h]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [i]
PIC A net response per gram of SRM 4251C, measured relative to RRS20 [j]	Standard deviation of the mean for 1000 repeated measurements (A)	0.008	1.0	0.01
PIC A background response, measured relative to RRS20	Standard deviation of the mean for >150 repeated measurements (A)	0.25	0.001 [k]	0.00
PIC A net response for RRS200, measured relative to RRS20	Standard deviation of the mean for >100 repeated measurements (A)	0.06	1.0	0.06
PIC A net response per Bq of barium-133 in solution, measured relative to RRS200.	Standard deviation of the mean for 240 repeated measurements (A)	0.02	1.0	0.02
Gravimetric measurements	Estimated (B)	0.01	1.0	0.01
Half life of barium-133 Half life of radium-226	Standard uncertainty of the half life (A)	1.24 [m] 0.44 [m]	0.004 [n] 0.004 [n]	0.00 0.00
Activity used to calibrate PIC A net response per Bq of barium-133 in solution	Standard uncertainty of the activity determined by $4\pi(e+X)$-γ-anticoincidence counting. (B)	0.22	1.0	0.22
Live-time [p]	Estimated (B)	0.10	1.0	0.10
PIC A charge collection	Estimated (B)	0.05	1.0	0.05
Source Positioning	Estimated (B)	0.05	1.0	0.05
Photon-emitting impurities	Limit of detection for Cs-134 (B) [q]	100.	0.00002	0.00
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.26
Coverage Factor, k				x 2
Relative Expanded Uncertainty of the Output Quantity, U/y, (%)				0.52

*Notes and references are on pages 5 and 6.

RC-S-035-002

NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	100	1.5	0.2

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] Estimated limits of detection for photon-emitting impurities are:
600 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 12 and 75 keV,
150 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 84 and 379 keV, and
3 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 387 and 2700 keV, provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of barium-133.

[f] The stated uncertainty is the standard uncertainty. See reference [5].

[g] Relative standard uncertainty of the input quantity x_i.

[h] The relative change in the output quantity y divided by the relative change in the input quantity x_i. If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y. If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y.

[i] Relative component of combined standard uncertainty of output quantity y, rounded to two decimal places. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

RC-S-035-002e

[j] The response of pressurized ionization chamber A (PIC A) is determined from measurement of the time required to collect a given amount of charge on a stable fixed capacitor. All of the response measurements in the NIST pressurized ionization chambers are made relative to the response of one or more artifact standards. These artifact standards consist of microgram quantities of aged radium-226 in small welded stainless-steel capsules. These capsules are encapsulated in plastic rods whose dimensions are similar to those of the standard NIST ampoule. The artifact standards are called **Radium Reference Sources** and are designated as RRSx, where x is the nominal mass (in micrograms) of radium-226 in the capsule.

[k] $|\partial y/\partial x_i| \cdot (x_i/y)$ = (average background response)/(average net sample response)

[m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$

[p] The live time is determined by counting the pulses from a gated oscillator.

[q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i$ = 100%. $|\partial y/\partial x_i| \cdot (x_i/y)$ = {(response per Bq of impurity)/(response per Bq of Ba-133)}·{(Bq of impurity)/(Bq of Ba-133)}. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] Evaluated Nuclear Structure Data File (ENSDF), April 1994.

RC-S-035-002f

Standard Traceability Log Rad

Source Material Info	
Parent Code:	0487
Prepared By:	Angela Johnson
Carrier Conc:	0.1 M HCL
Reference Date:	09/01/1993
Ampoule Mass (g):	5.054 g
Uncertainty:	+/- .26 %
LogBook No:	RC S 035 002

A Solution Material Info			
Isotope:	Barium-133		
Prepared By:	Angela Johnson		
Prep Date:	10/31/2002		
Verification Date:	10/10/2018		
Expiration Date:	10/10/2019		
Primary Code:	0487-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.7696 g		
Density(g/mL):	0.9984	Balance ID:	

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (100 mL) = 1395394.1760 dpm/mL
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (0.9984 g/mL) / (100 mL) = 1397609.3930 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
12/18/2015	Gregory Ramsay	15.0062	1000	0487-B	20972.806 dpm/mL	11/18/2016	11/18/2017
01/17/2017	Bethany Fiem	15.1795	1000	0487-C	21215.0117 dpm/mL	01/17/2017	01/17/2018
11/08/2017	Bethany Fiem	15.5573	1000	0487-D	21708.5658 dpm/mL	10/10/2018	10/10/2019

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ba-133 Standard 0487-D

v1.0.2

Instrument	YELLOW
Analyst	BXF1
Verification Prep Date	10/10/2018

Standard Information	
Isotope	Ba-133
Serial Number	0487-D
Isotope Halflife	3.8410E+03 D
Reference Date	9/1/1993
Ref. Act. (DPM/mL)	21708.5658
Amount of Std. (mL)	1.0
Standard Prep Date	11/8/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	10/11/2018	761.95	3290.62	19.66
2	10/11/2018	761.95	3210.30	19.66
3	10/11/2018	760.37	3256.97	19.66

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	3270.96	0.763851	4282.20	4282.20
2	3190.64	0.763851	4177.04	4177.04
3	3237.31	0.763851	4238.14	4238.14

	dpm/mL
Mean Value =	4232.46
Stdev =	52.80544344
Certificate Value* =	**4148.3**
Two sigma =	105.611
10 % of Mean =	423.246
Rule A (Pass/Fail)	**Pass**
% Recovery	102.03%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**10/10/2019**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ba-133 source 0487-D by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYELLOW for Ba-133 source standard verification. The Ba-133 efficiency calibration which was used for verification calculations was performed on 10/10/2018 using Ba-133 source 1601-A.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,

B = BKG cpm,

C = System efficiency (cpm/dpm), and

D = volume used for standard verification.

RAD-M-001

10-11-18

11/14/18

National Institute of Standards & Technology

Certificate

Received 3-9-17

Standard Reference Material® 4339b

1810

Radium-228 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-228 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4339b consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-228** massic activity value, at a **Reference Time of 1200 EST, 07 October 2010**, is:

(195 ± 14) Bq•g^{-1}

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, Becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4339b** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and Chemical Hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the Physical Measurement Laboratory, Radiation and Biomolecular Physics Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification and photon-emitting impurity analyses were provided by L. Pibida of the NIST Radioactivity Group, with production assistance by J. LaRosa, R. Collé, and L. Laureano-Pérez. Alpha-emitting impurity analyses were provided by J. LaRosa.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation and Biomolecular Physics Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 14 November 2012

Robert L. Watters, Jr., Director
Office of Reference Materials

CLCFD-707-103

Table 1. Certified Massic Activity of SRM 4339b

Radionuclide	**Radium-228[a]**
Reference time	**1200 EST, 07 October 2010**
Massic activity of the solution	**195 Bq g^{-1}**
Relative expanded uncertainty ($k = 2$)	**7.2 %[b]**

[a] The final ^{228}Ra purification from the ^{232}Th mother solution was performed on 02 September 2010 0920 EST.
[b] The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4,5]. The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain what is assumed to be an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4339b

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.3 mol L^{-1} HNO_3 with 19.8 µg g^{-1} Ba^{+2}
Solution density	(1.034 ± 0.002) g mL^{-1} at 20.8 °C[a]
Solution mass	(5.180 ± 0.003) g[a]
Photon-emitting impurities	^{226}Ra: < 0.5 Bq g^{-1}[b]
Alpha-emitting impurities	^{232}Th: < 0.08 Bq g^{-1}[c]
Half-lives used	^{228}Ra: (5.75 ± 0.04) a[d] [6] ^{228}Ac: (6.15 ± 0.02) h [7] ^{226}Ra: (1600 ± 7) a [8] ^{232}Th: (14.02 ± 0.06) x 10^9 a [9]
Calibration methods (and instruments)	The certified massic activity for ^{228}Ra was obtained by high-resolution gamma-ray spectrometry of three master solution ampoules (eleven separate determinations), as measured on three to five different spectrometers and geometries on each ampoule, and used assumed nuclear data for probabilities per decay for 16 gamma-ray transitions. Confirmatory measurements were performed by 2πα spectrometry of ingrown ^{228}Th with a planar, ion-implanted Si detector.

[a] The stated uncertainty is two times the standard uncertainty. See reference 5.
[b] Based on gamma-ray spectrometry of forced-fitted peak at 186.2 keV and assuming a probability per decay of 0.0355 [6].
[c] The maximum ^{232}Th activity concentration in ^{228}Ra.
[d] The stated uncertainty is the standard uncertainty. See reference 5.

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4339b

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{228}Ra (%)
1	Gamma-ray spectrometry precision; relative standard deviation of the grand mean on the average massic gamma-ray emission rates for 16 measured ^{228}Ac gamma-ray transitions. Each mean in the grand mean is based on 11 determinations with three sources in three to five different detectors. The uncertainty in the determination of the massic gamma-ray emission rate for any one transition in a given determination ranged from typically 0.5 % to 1.5 %. The relative standard deviation of the mean for the average of the 16 lines, for any one determination, was typically 1 %; whereas the relative standard deviation of the grand mean for the average of the 16 lines across all 11 determinations is 0.34 %[b]. Data passes normality test.	A	0.84
2	Uncertainty due to assumed gamma-ray probabilities per decay for the measured ^{228}Ac transitions [7]. The uncertainty on each transition has a shared (correlated) component of 2.5 % (see comments in [7]).	B	3.5
3	Detection efficiencies not embodied within component 1	B	0.4
4	Mass determinations for dilution factors and counting source preparations	B	0.1
5	Decay corrections for ^{228}Ra half-life uncertainty of 0.7 % [6]	B	0.003
6	Effect of ^{228}Ra and ^{228}Ac half-life uncertainties on secular equilibrium ratio	B	0.02
Relative combined standard uncertainty			**3.6**
Relative expanded uncertainty (k = 2)			**7.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.
[b] Average massic gamma-ray emission rates of 11 geometries (R_γ) for 16 measured ^{228}Ac gamma-ray transitions with their respective energy (E_γ); assumed gamma-ray probabilities per decay (I_γ) and standard deviation of the mean (S_m).

E_γ (keV)	Assumed I_γ (%) [1]	Mean R_γ (s^{-1} g^{-1})(i)	S_m (%)(ii)
129.065	2.50	1347	0.38
153.967	0.754	421.6	0.40
209.249	3.97	2264	0.55
270.245	3.55	2014	0.33
328.004	3.04	1822	0.43
338.32	11.4	6712	0.43
409.46	2.02	1185	0.29
463.002	4.45	2645	0.33
755.313	1.03	593.3	0.46
772.291	1.52	899.2	0.53
794.942	4.31	2588	0.35
835.704	1.7	995.3	0.42
911.196	26.2	15609	0.29
964.786	4.99	3007	0.35
968.96	15.9	9582	0.30
1588.2	3.06	1889	0.28

(i) Grand mean for n = 11 determinations with three sources in three to five different detectors.
(ii) Relative standard deviation of the grand mean on R_γ for n = 11.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to SDS for further information.

Storage: SRM 4339b should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Nov 2012). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (ISO GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/ (accessed Nov 2012).

[6] Luca, A.; June 2009, ^{228}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-228_tables.pdf (accessed Nov 2012).

[7] Pearce, A.; January 2010, ^{228}Ac. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ac-228_tables.pdf (accessed Nov 2012).

[8] Christé, V. and M.M. Bé; December 2006, ^{226}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Nov 2012).

[9] Arinc, A.; September 2008, ^{232}Th. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Th-232_tables.pdf (accessed Nov 2012).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1810
Prepared By:	Tim Chandler
Carrier Conc:	1.3M HNO3
Reference Date:	10/07/2010
Ampoule Mass (g):	5.18 g
Uncertainty:	+/- 3.6 %
LogBook No:	GL-CED-297-103

A Solution Material Info			
Isotope:	Radium-228 SPIKE		
Prepared By:	Bethany Fiem		
Prep Date:	05/23/2018		
Verification Date:	05/23/2018		
Expiration Date:	05/23/2019		
Primary Code:	1810-A		
Dilution(mL):	200 mL		
Mass of Parent(g):	5.1447 g		
Density(g/mL):	1.0178	Balance ID:	B733529066

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (200 mL) = 300.9650 dpm/mL
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (1.0178 g/mL) / (200 mL) = 295.7015 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-228 Standard 1810-A Jar

v1.1.2
BMF
5/23/2018

Isotope	Result
Ra-228	pCi/L
Ra-228 N1	29340
Ra-228 N2	28510
Ra-228 N3	29320

Mean Value (Counting) =	29056.67	pCi/L	**107.165**	**Fail**	*Exception taken due to the high uncertainty of the certified value
Stdev =	473.533	pCi/L		**Rule B (Pass/Fail)**	
Certificate Value =	27114.0	pCi/L			
Two sigma =	947.0656436				
10 % of Mean =	2905.666667				
Rule A (Pass/Fail)	**Pass**				

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
Rule B = The determined mean value shall be within 5% of the certificate value.

5-23-18

5/25/18

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 1819110**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204151331	MB	JXC9	PIC4B	NOV-19-18 10:44:47	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204151332	DUP	JXC9	PIC4C	NOV-19-18 10:44:53	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204151333	MS	JXC9	PIC5A	NOV-19-18 10:45:00	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204151334	MSD	JXC9	PIC5C	NOV-19-18 10:45:08	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204151335	LCS	JXC9	PIC5D	NOV-19-18 10:45:14	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463203001	SAMPLE	JXC9	PIC1B	NOV-19-18 10:45:24	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463203002	SAMPLE	JXC9	PIC1D	NOV-19-18 10:45:30	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463203003	SAMPLE	JXC9	PIC2A	NOV-19-18 10:45:39	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463203004	SAMPLE	JXC9	PIC2B	NOV-19-18 10:45:45	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463203005	SAMPLE	JXC9	PIC2C	NOV-19-18 10:45:50	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463203006	SAMPLE	JXC9	PIC2D	NOV-19-18 10:45:57	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463203007	SAMPLE	JXC9	PIC3B	NOV-19-18 10:46:04	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463826001	SAMPLE	JXC9	PIC3C	NOV-19-18 10:46:11	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463826002	SAMPLE	JXC9	PIC3D	NOV-19-18 10:46:18	DONE	CeF on 25mm Filter	01-JUN-17 00:00
463826003	SAMPLE	JXC9	PIC4A	NOV-19-18 10:46:30	DONE	CeF on 25mm Filter	01-JUN-17 00:00

Lucas Cell Raw Data

Batch 1818524 Check-list

This check-list was completed on 15-NOV-18 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 15-NOV-18 and Lyndsey Pace on 15-NOV-18.

Batch ID:	**Product:**	**Description:** Lucas Cell Radium 226
1818524	LUC26RAL	GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Radium-226 Queue Sheet

02-NOV-18

GEL Laboratories, Radiochemistry Division

Batch #: 1818524 Analyst: PCW First Client Due Date: 11/23/2018 Internal Due Date: 11/21/2018

Spike Isotope: Radium-226 Spike Code: 1715-D Expiration Date: 12/19/18 Vol: 0.1 End Initial/Degas Date/Time: 11/8/18 0800

LCS Isotope: Radium-226 LCS Code: 1715-D Expiration Date: 12/19/18 Vol: 0.1 End LN De-em Date: 11/12/18

Bkg Count Time: 30 (Min) Sample Count Time: 30 (Min) Start Count Date: 11/12/18

Prep Date: 11/8/18 Pipet ID: 27660953 Balance ID: 18150253 Initials: PW Witness: NA

Sample I	Client Description	Type	Hazard Code	Matrix	Min CRDL	Client	Position (Label)	Aliquot (mL or g)	End LN De-em Time	Start Count Time	Cell #	Det #	Bkg counts	Total Counts
463203001-1	MW-1	SAMPLE		WATER	1 pCi/L	LANC006	1	500	0535	0855	107	1	6	11
463203002-1	MW-2	SAMPLE		WATER	1 pCi/L	LANC006	2	500	0535	0855	203	2	8	5
463203003-1	MW-3	SAMPLE		WATER	1 pCi/L	LANC006	3	500	0535	0855	305	3	2	30
463203004-1	MW-4	SAMPLE		WATER	1 pCi/L	LANC006	4	500	0535	0855	406	4	4	7
463203005-1	MW-5	SAMPLE		WATER	1 pCi/L	LANC006	5	500	0535	0855	506	5	6	15
463203006-1	MW-6	SAMPLE		WATER	1 pCi/L	LANC006	6	500	0535	0855	607	6	1	21
463203007-1	FB-20181029	SAMPLE		WATER	1 pCi/L	LANC006	7	500	0535	0855	705	7	4	9
463221005-1	2018034650	SAMPLE		GROUND WA	1 pCi/L	DUPO007	8	500	0535	0855	804	8	2	7
463221006-1	2018034651	SAMPLE		GROUND WA	1 pCi/L	DUPO007	9	500	0559	0930	101	1	1	35
463221007-1	2018034652	SAMPLE		GROUND WA	1 pCi/L	DUPO007	10	500	0559	0930	201	2	8	14
463221008-1	2018034653	SAMPLE		GROUND WA	1 pCi/L	DUPO007	* 11	~~500~~	~~0559~~	~~0930~~	308	3	8	647
463222001-1	2018034568	SAMPLE		GROUND WA	1 pCi/L	DUPO007	12	500	0559	0930	402	4	4	16
463222002-1	2018034569	SAMPLE		GROUND WA	1 pCi/L	DUPO007	13	500	0559	0930	501	5	4	6
463222003-1	2018034570	SAMPLE		GROUND WA	1 pCi/L	DUPO007	14	500	0559	0930	607	6	4	105
463222004-1	2018034571	SAMPLE		GROUND WA	1 pCi/L	DUPO007	15	500	0559	0930	707	7	2	37
463222005-1	2018034572	SAMPLE		GROUND WA	1 pCi/L	DUPO007	16	500	0559	0930	802	8	8	68
463222006-1	2018034573	SAMPLE		GROUND WA	1 pCi/L	DUPO007	17	500	0624	1000	104	1	6	16
463222007-1	2018034574	SAMPLE		GROUND WA	1 pCi/L	DUPO007	18	500	0624	1000	208	2	6	118
463222008-1	2018034575	SAMPLE		GROUND WA	1 pCi/L	DUPO007	19	500	0624	1000	302	3	1	25
1204150011-1	MB for batch 1818524	MB		GROUND WA	1 pCi/L	QC ACCOUNT	* 20	~~500~~	~~0624~~	~~1000~~	402	4	1	8
1204150012-1	2018034650(463221005DUP)	DUP		GROUND WA	1 pCi/L	QC ACCOUNT	21	500	0624	1000	505	5	6	56
1204150013-1	2018034650(463221005MS)	MS		GROUND WA	1 pCi/L	QC ACCOUNT	22	100	0624	1000	608	6	2	760
1204150014-1	~~MW-1(463203001MSD)~~ 2018034650 (463221005)	MSD		WATER	1 pCi/L	QC ACCOUNT	23	100	0624	1000	703	7	1	690
1204150015-1	LCS for batch 1818524 JP 11/12/18	LCS		GROUND WA	1 pCi/L	QC ACCOUNT	* 24	~~500~~	~~0624~~	~~1000~~	803	8	1	747

JP 11/5/18

JP 11/5/18

JP 11/5/18

Comments: *see verification sheet

Data Reviewed By: 11/5/18

Radium-226 Queue Sheet

15-NOV-18

GEL Laboratories, Radiochemistry Division

Batch #: 1818524 **Analyst:** PCW **First Client Due Date:** 11/23/2018 **Internal Due Date:** 11/21/2018

Spike Isotope: Radium-226 **Spike Code:** — **Expiration Date:** — **Vol:** — **End Initial/Degas Date/Time:** 11/12/18 0624

LCS Isotope: Radium-226 **LCS Code:** 7150 **Expiration Date:** 12/19/18 **Vol:** 0.1 **End LN De-em Date:** 11/15/18

Prep Date: 11/8/18 **Bkg Count Time:** 30 (Min) **Pipet ID:** 2216A152 **Sample Count Time:** 30 (Min) **Balance ID:** 1812005 3 **Start Count Date:** 11/15/18 **Initials:** PW **Witness:** N/A

Sample I	Client Description	Type	Hazard Code	Matrix	Min CRDL	Client	Position (Label)	Aliquot (mL or g)	End LN De-em Time	Start Count Time	Cell #	Det #	Bkg counts	Total Counts
463203001-1	MW-1	SAMPLE		WATER	1 pCi/L	LANC006	1							
463203002-1	MW-2	SAMPLE		WATER	1 pCi/L	LANC006	2							
463203003-1	MW-3	SAMPLE		WATER	1 pCi/L	LANC006	3							
463203004-1	MW-4	SAMPLE		WATER	1 pCi/L	LANC006	4							
463203005-1	MW-5	SAMPLE		WATER	1 pCi/L	LANC006	5							
463203006-1	MW-6	SAMPLE		WATER	1 pCi/L	LANC006	6							
463203007-1	FB-20181029	SAMPLE		WATER	1 pCi/L	LANC006	7							
463221005-1	2018034650	SAMPLE		GROUND WA	1 pCi/L	DUPO007	8							
463221006-1	2018034651	SAMPLE		GROUND WA	1 pCi/L	DUPO007	9							
463221007-1	2018034652	SAMPLE		GROUND WA	1 pCi/L	DUPO007	10							
463221008-1	2018034653	SAMPLE		GROUND WA	1 pCi/L	DUPO007	11	500	0425	0815	202	2	2	110
463222001-1	2018034568	SAMPLE		GROUND WA	1 pCi/L	DUPO007	12							
463222002-1	2018034569	SAMPLE		GROUND WA	1 pCi/L	DUPO007	13							
463222003-1	2018034570	SAMPLE		GROUND WA	1 pCi/L	DUPO007	14							
463222004-1	2018034571	SAMPLE		GROUND WA	1 pCi/L	DUPO007	15							
463222005-1	2018034572	SAMPLE		GROUND WA	1 pCi/L	DUPO007	16							
463222006-1	2018034573	SAMPLE		GROUND WA	1 pCi/L	DUPO007	17							
463222007-1	2018034574	SAMPLE		GROUND WA	1 pCi/L	DUPO007	18							
463222008-1	2018034575	SAMPLE		GROUND WA	1 pCi/L	DUPO007	19							
1204150011-1	MB for batch 1818524	MB		WATER	1 pCi/L	QC ACCOUNT	20	500	0425	0815	305	3	2	8
1204150012-1	2018034650(463221005DUP)	DUP		GROUND WA	1 pCi/L	QC ACCOUNT	21							
1204150013-1	2018034650(463221005MS)	MS		GROUND WA	1 pCi/L	QC ACCOUNT	22							
1204150014-1	2018034650(463221005MSD)	MSD		GROUND WA	1 pCi/L	QC ACCOUNT	23							
1204150015-1	LCS for batch 1818524	LCS		WATER	1 pCi/L	QC ACCOUNT	24	SW	0425	0815	405	4	6	456

JP 11/15/11:

JP 11/15/11

JP 11/15/11

Comments: Verification

Data Reviewed By: 11/15/18

Radium-226 Liquid

Filename : RA226.XLS
File type : Excel
Version # : 1.3.2

Batch : 1818524
Analyst : PETE049
Prep Date : 11/8/2018
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	463203001.1	0.5000	2.0256E-05	10/29/2018 11:30	107	30	11	0.367	6	0.200	30	1.5510
2	463203002.1	0.5000	2.0256E-05	10/29/2018 11:10	203	30	5	0.167	8	0.267	30	1.8290
3	463203003.1	0.5000	2.0256E-05	10/29/2018 15:00	305	30	30	1.000	2	0.067	30	1.4880
4	463203004.1	0.5000	2.0256E-05	10/29/2018 13:00	406	30	7	0.233	4	0.133	30	2.0030
5	463203005.1	0.5000	2.0256E-05	10/29/2018 13:10	506	30	15	0.500	6	0.200	30	2.0990
6	463203006.1	0.5000	2.0256E-05	10/29/2018 15:00	602	30	21	0.700	1	0.033	30	2.1000
7	463203007.1	0.5000	2.0256E-05	10/29/2018 11:00	705	30	9	0.300	4	0.133	30	1.8350
8	463221005.1	0.5000	2.0256E-05	10/31/2018 13:58	804	30	71	2.367	2	0.067	30	1.8590
9	463221006.1	0.5000	2.0256E-05	10/31/2018 14:11	101	30	35	1.167	1	0.033	30	1.5100
10	463221007.1	0.5000	2.0256E-05	10/31/2018 14:53	201	30	14	0.467	8	0.267	30	2.0070
11	463221008.1	0.5000	2.0256E-05	10/31/2018 15:13	202	30	110	3.667	2	0.067	30	1.8580
12	463222001.1	0.5000	2.0256E-05	10/30/2018 10:17	402	30	16	0.533	4	0.133	30	2.0200
13	463222002.1	0.5000	2.0256E-05	10/30/2018 10:16	501	30	6	0.200	4	0.133	30	2.0710
14	463222003.1	0.5000	2.0256E-05	10/30/2018 11:12	607	30	105	3.500	4	0.133	30	2.1300
15	463222004.1	0.5000	2.0256E-05	10/30/2018 11:12	707	30	37	1.233	2	0.067	30	2.0190
16	463222005.1	0.5000	2.0256E-05	10/30/2018 13:06	802	30	68	2.267	8	0.267	30	1.6450
17	463222006.1	0.5000	2.0256E-05	10/30/2018 13:25	104	30	16	0.533	6	0.200	30	2.0520
18	463222007.1	0.5000	2.0256E-05	10/30/2018 14:57	208	30	118	3.933	6	0.200	30	1.8820
19	463222008.1	0.5000	2.0256E-05	10/30/2018 15:17	302	30	25	0.833	1	0.033	30	1.6870
20	1204150011.1	0.5000	2.0256E-05	11/8/2018 0:00	305	30	8	0.267	2	0.067	30	1.4880
21	1204150012.1	0.5000	2.0256E-05	10/31/2018 13:58	505	30	56	1.867	6	0.200	30	1.5140
22	1204150013.1	0.1000	1.1370E-05	10/31/2018 13:58	608	30	760	25.333	2	0.067	30	1.9750
23	1204150014.1	0.1000	1.1370E-05	10/31/2018 13:58	703	30	690	23.000	1	0.033	30	1.9130
24	1204150015.1	0.5000	2.0256E-05	11/8/2018 0:00	405	30	456	15.200	6	0.200	30	1.5460

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-008
Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
9.300%	5/1/2018	4/30/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
9.900%	8/1/2018	7/31/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
2.900%	3/1/2018	2/28/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
5.200%	3/1/2018	2/28/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
2.500%	6/1/2018	5/31/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
2.100%	7/1/2018	6/30/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
1.800%	11/1/2018	10/31/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
4.200%	3/1/2018	2/28/2019	11/8/2018 8:00	11/12/2018 5:35	11/12/2018 8:55	0.507	0.975	1.002	1.000
5.300%	5/1/2018	4/30/2019	11/8/2018 8:00	11/12/2018 5:59	11/12/2018 9:30	0.508	0.974	1.002	1.000
8.300%	8/1/2018	7/31/2019	11/8/2018 8:00	11/12/2018 5:59	11/12/2018 9:30	0.508	0.974	1.002	1.000
9.300%	8/1/2018	7/31/2019	11/12/2018 6:24	11/15/2018 4:25	11/15/2018 8:15	0.411	0.971	1.002	1.000
1.600%	3/1/2018	2/28/2019	11/8/2018 8:00	11/12/2018 5:59	11/12/2018 9:30	0.508	0.974	1.002	1.000
5.400%	6/1/2018	5/31/2019	11/8/2018 8:00	11/12/2018 5:59	11/12/2018 9:30	0.508	0.974	1.002	1.000
2.900%	7/1/2018	6/30/2019	11/8/2018 8:00	11/12/2018 5:59	11/12/2018 9:30	0.508	0.974	1.002	1.000
8.400%	11/1/2018	10/31/2019	11/8/2018 8:00	11/12/2018 5:59	11/12/2018 9:30	0.508	0.974	1.002	1.000
5.600%	3/1/2018	2/28/2019	11/8/2018 8:00	11/12/2018 5:59	11/12/2018 9:30	0.508	0.974	1.002	1.000
7.800%	5/1/2018	4/30/2019	11/8/2018 8:00	11/12/2018 6:24	11/12/2018 10:00	0.510	0.973	1.002	1.000
5.200%	8/1/2018	7/31/2019	11/8/2018 8:00	11/12/2018 6:24	11/12/2018 10:00	0.510	0.973	1.002	1.000
9.700%	3/1/2018	2/28/2019	11/8/2018 8:00	11/12/2018 6:24	11/12/2018 10:00	0.510	0.973	1.002	1.000
2.900%	3/1/2018	2/28/2019	11/12/2018 6:24	11/15/2018 4:25	11/15/2018 8:15	0.411	0.971	1.002	1.000
4.000%	6/1/2018	5/31/2019	11/8/2018 8:00	11/12/2018 6:24	11/12/2018 10:00	0.510	0.973	1.002	1.000
9.100%	7/1/2018	6/30/2019	11/8/2018 8:00	11/12/2018 6:24	11/12/2018 10:00	0.510	0.973	1.002	1.000
6.700%	11/1/2018	10/31/2019	11/8/2018 8:00	11/12/2018 6:24	11/12/2018 10:00	0.510	0.973	1.002	1.000
2.500%	3/1/2018	2/28/2019	11/12/2018 6:24	11/15/2018 4:25	11/15/2018 8:15	0.411	0.971	1.002	1.000

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-D
Spike Exp Date : 12/19/2018
Spike Activity (dpm/ml): 288.42
Spike Volume Added: 0.10

LCS S/N : 1715-D
LCS Exp Date : 12/19/2018
LCS Activity (dpm/ml): 288.42
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3168	0.2237	1	0.5651	**0.1963**	82.98%	0.1667	0.1374	0.3172	0.3205		SAMPLE				
2	0.3102	0.2190	1	0.5379	**-0.0999**	120.59%	-0.1000	0.1202	0.2352	0.2354		SAMPLE				
3	0.1907	0.1346	1	0.3919	**1.1455**	20.41%	0.9333	0.1886	0.4536	0.4872		SAMPLE				
4	0.2003	0.1414	1	0.3740	**0.0912**	110.68%	0.1000	0.1106	0.1976	0.1982		SAMPLE				
5	0.2341	0.1653	1	0.4176	**0.2610**	50.98%	0.3000	0.1528	0.2605	0.2635		SAMPLE				
6	0.0955	0.0674	1	0.2218	**0.5798**	23.55%	0.6667	0.1563	0.2665	0.2804		SAMPLE				
7	0.2186	0.1544	1	0.4082	**0.1659**	72.13%	0.1667	0.1202	0.2344	0.2357		SAMPLE				
8	0.1526	0.1077	1	0.3137	**2.2596**	13.08%	2.3000	0.2848	0.5484	0.6646		SAMPLE				
9	0.1326	0.0936	1	0.3081	**1.3686**	18.43%	1.1333	0.2000	0.4734	0.5323		SAMPLE				
10	0.2823	0.1993	1	0.4894	**0.1817**	78.61%	0.2000	0.1563	0.2784	0.2812		SAMPLE				
11	0.1891	0.1335	1	0.3888	**4.3830**	13.51%	3.6000	0.3528	0.8418	1.3218		SAMPLE				
12	0.1983	0.1400	1	0.3703	**0.3611**	37.30%	0.4000	0.1491	0.2638	0.2691		SAMPLE				
13	0.1934	0.1366	1	0.3612	**0.0587**	158.21%	0.0667	0.1054	0.1819	0.1822		SAMPLE				
14	0.1881	0.1328	1	0.3512	**2.8822**	10.74%	3.3667	0.3480	0.5840	0.7355		SAMPLE				
15	0.1403	0.0990	1	0.2884	**1.0537**	19.72%	1.1667	0.2082	0.3685	0.4348		SAMPLE				
16	0.3444	0.2431	1	0.5971	**2.2170**	15.57%	2.0000	0.2906	0.6314	0.7485		SAMPLE				
17	0.2385	0.1684	1	0.4254	**0.2955**	47.55%	0.3333	0.1563	0.2717	0.2787		SAMPLE				
18	0.2601	0.1836	1	0.4639	**3.6086**	11.22%	3.7333	0.3712	0.7032	0.9493		SAMPLE				
19	0.1184	0.0836	1	0.2751	**0.8627**	23.36%	0.8000	0.1700	0.3592	0.4141		SAMPLE				
20	0.2361	0.1667	1	0.4855	**0.3040**	52.78%	0.2000	0.1054	0.3141	0.3176		MB				
21	0.3233	0.2282	1	0.5766	**2.0026**	16.25%	1.6667	0.2625	0.6181	0.7002	463221005.1	DUP	12.1%			
22	0.7154	0.5051	1	1.4706	**116.3625**	9.80%	25.2667	0.9201	8.3057	27.9619	463221005.1	MS			129.9188	87.8%
23	0.5222	0.3687	1	1.2129	**109.1981**	7.71%	22.9667	0.8762	8.1657	22.8205	463221005.1	MSD	6.4%		129.9188	82.3%
24	0.3937	0.2779	1	0.7022	**21.9480**	5.39%	15.0000	0.7165	2.0548	3.9263		LCS			25.9835	84.5%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 12-NOV-2018

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:30	1	1.28E+05	127844	-1.33		
LUCAS2	EFF	06:30	1	1.34E+05	133993	2.43		
LUCAS3	EFF	06:30	1	1.36E+05	135902	-2.43		
LUCAS4	EFF	06:30	1	1.30E+05	129848	-1.75		
LUCAS5	EFF	06:30	1	1.32E+05	131837	-1.23		
LUCAS6	EFF	06:30	1	1.35E+05	134644	-0.05		
LUCAS7	EFF	06:30	1	1.41E+05	141097	-1.01		
LUCAS8	EFF	06:30	1	1.35E+05	135413	-1.27		

Reviewed by: Lyndsey Pace **Date:** 12-NOV-18

GEL Laboratories LLC

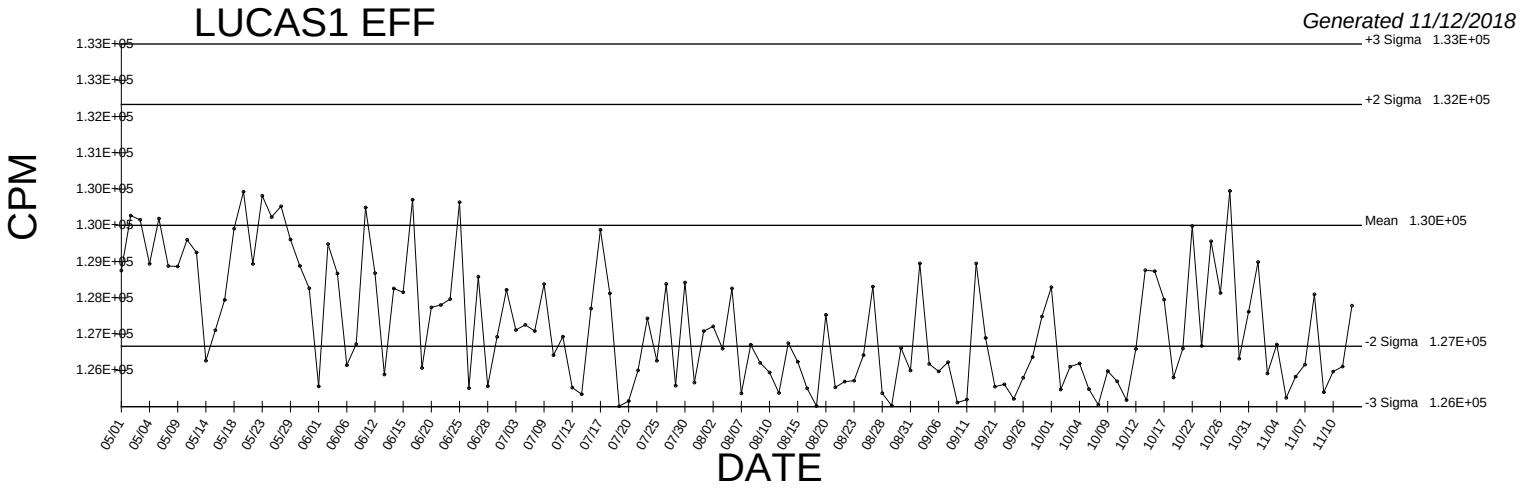
Ludlum Alpha Scintillation Counter Checks for 15-NOV-2018

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	04:00	1	1.28E+05	128138	-1.1		
LUCAS2	EFF	04:00	1	1.34E+05	133727	2.3		
LUCAS3	EFF	04:00	1	1.39E+05	139421	-0.74		
LUCAS4	EFF	04:00	1	1.30E+05	129946	-1.65		
LUCAS5	EFF	04:00	1	1.34E+05	133713	0.01		
LUCAS6	EFF	04:00	1	1.34E+05	133887	-0.84		
LUCAS7	EFF	04:00	1	1.41E+05	141478	-0.53		
LUCAS8	EFF	04:00	1	1.39E+05	138543	-0.18		

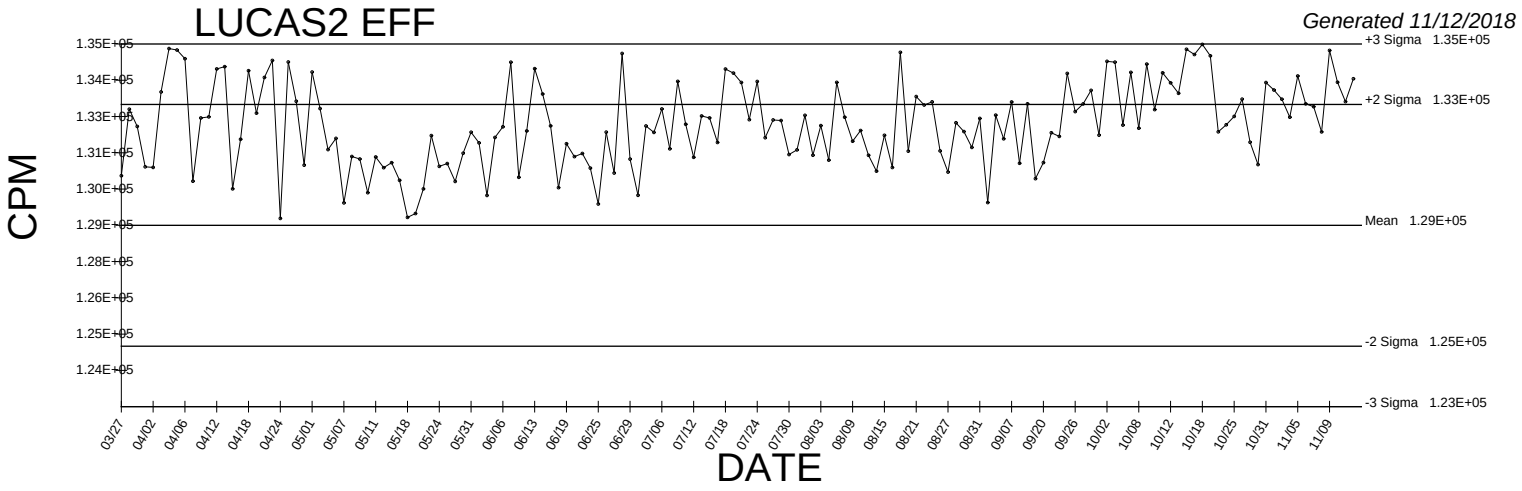
Reviewed by: Lyndsey Pace **Date:** 15-NOV-18

GEL Laboratories LLC

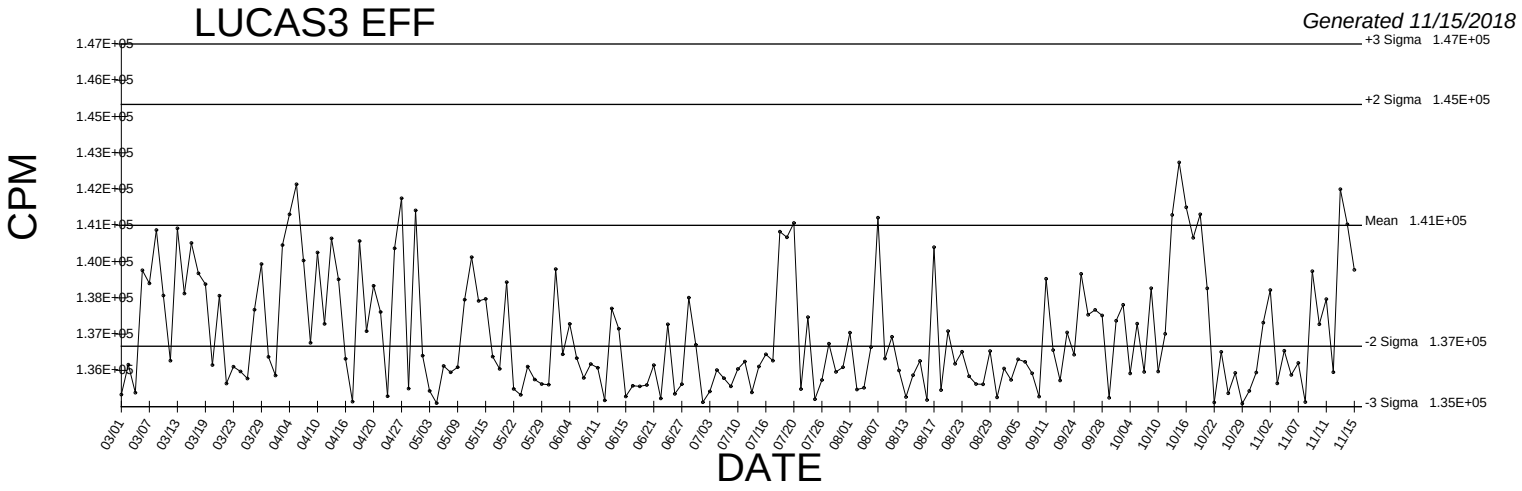
Efficiency Data



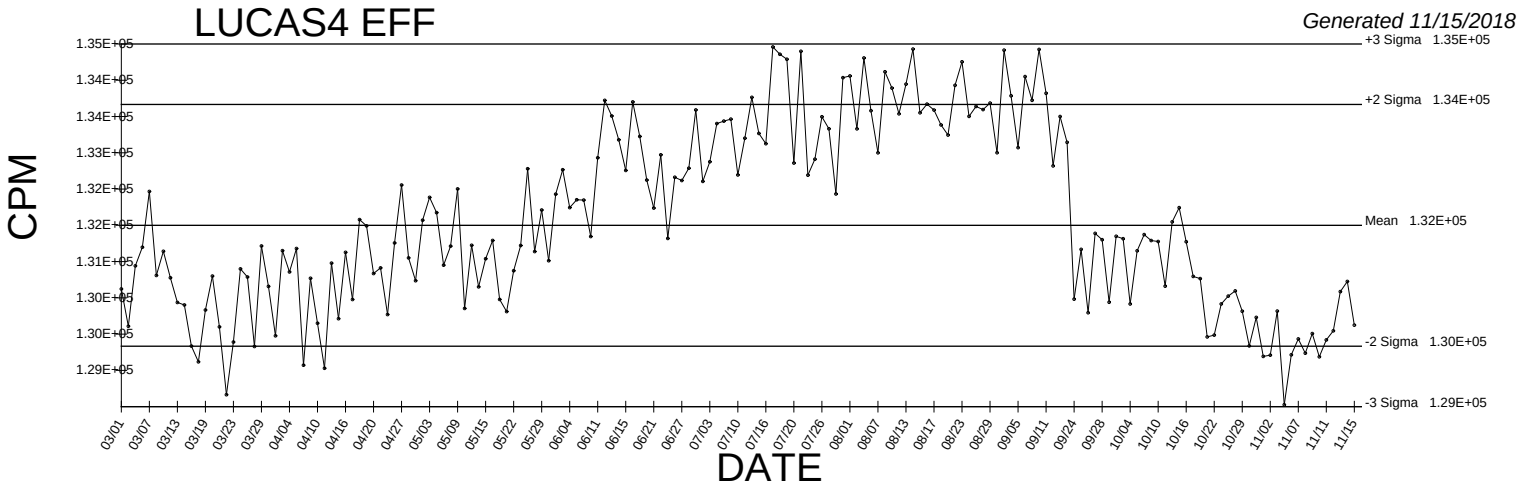
● Denotes Outlier



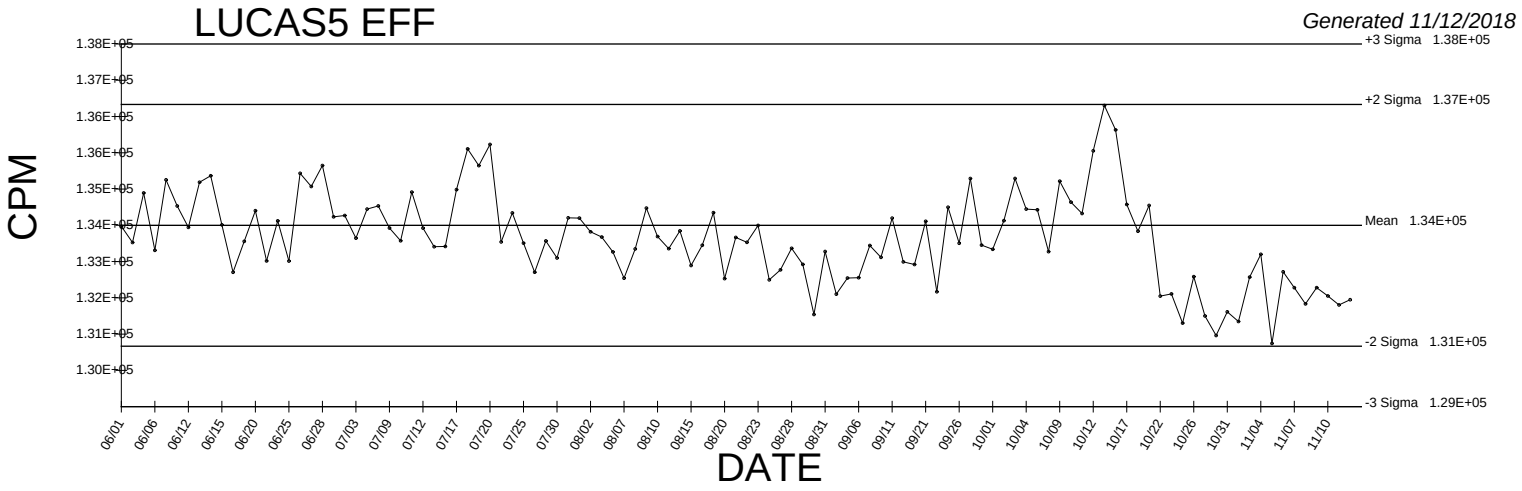
● Denotes Outlier



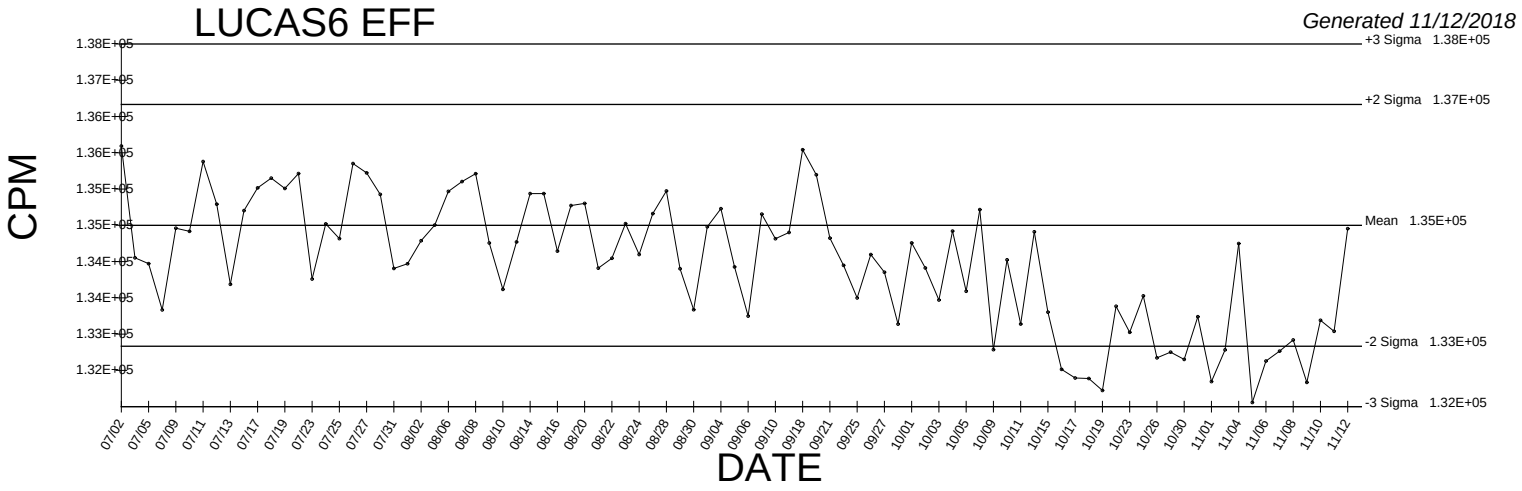
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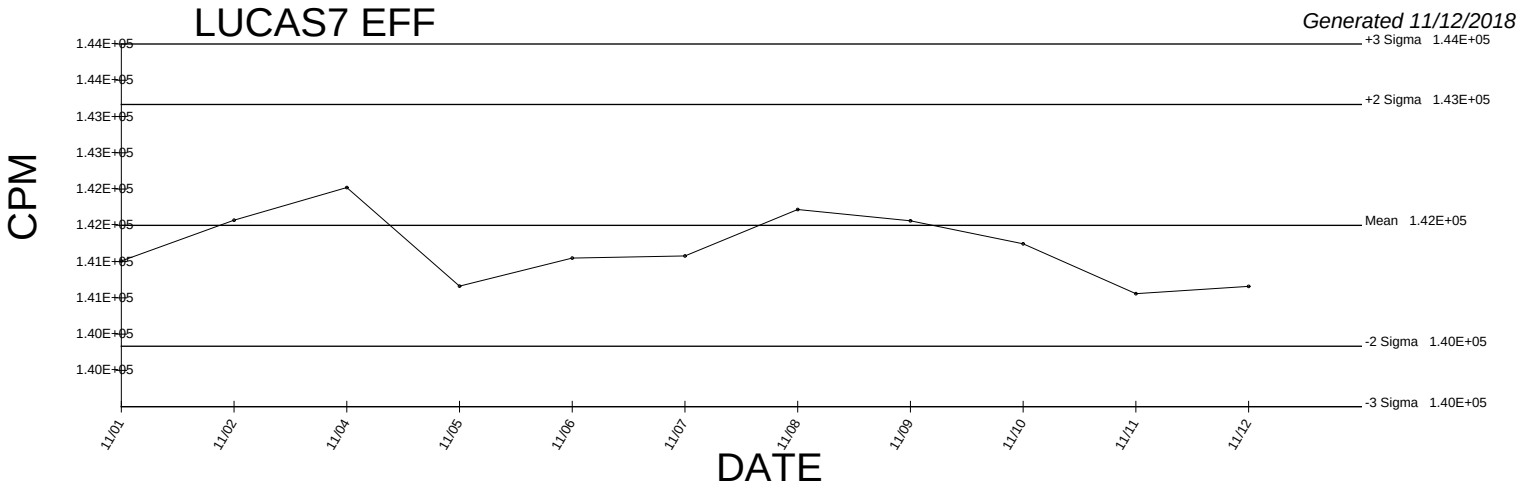
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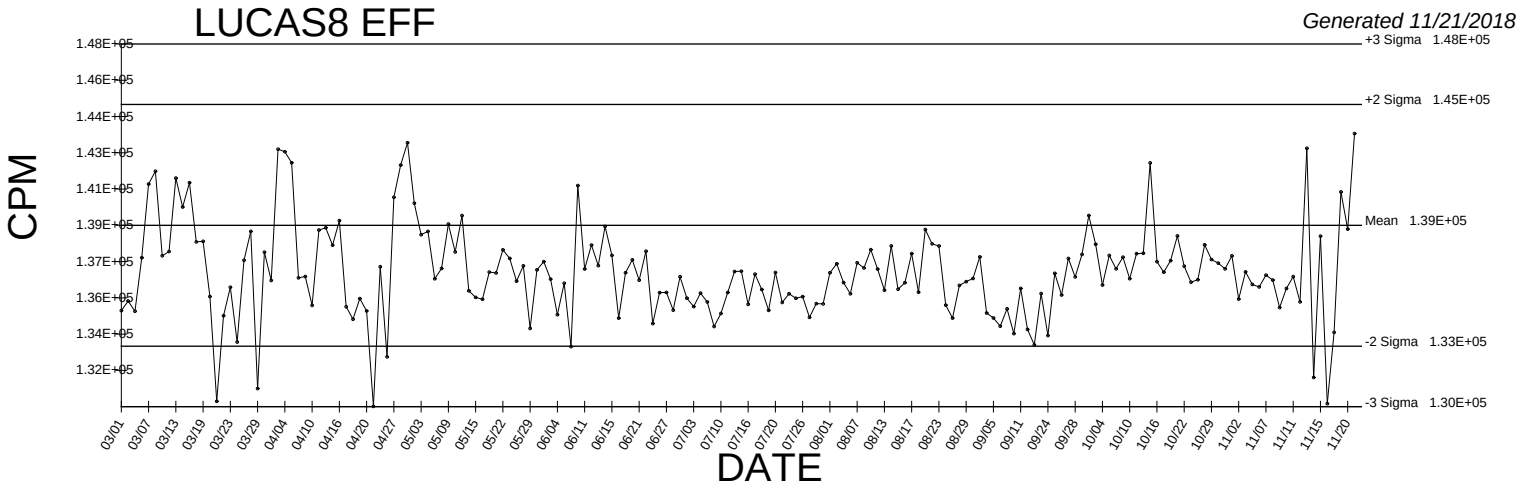
● Denotes Outlier



● Denotes Outlier



● Denotes Outlier



● Denotes Outlier

RAD Standards Traceability

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

1715

98367

Ra-226 5 mL Liquid in Flame Sealed Vial

Customer: GEL Laboratories, LLC
P.O. No.: GEL 1408580, Item 7 Product Code: 8226

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics, using a germanium gamma spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Ra-226	5.844E+05	3.676E+04	1.0	2.1	4.7	09/09/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities (other than decay products)<0.1%.
5.02193 g 0.1M HCl solution with approximately 30 µg/g Ba carrier.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QC Approved: L. Tk
L. Tkavadze, Nuclear Metrologist

Date: 9 Sep 14

RECEIVED 9/10/14

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1715
Prepared By:	Gregory Ramsay
Carrier Conc:	0.1M HCl
Reference Date:	09/09/2014
Ampoule Mass (g):	5.02193 g
Uncertainty:	+/- 2.35 %
LogBook No:	GL-CED-297-008

A Solution Material Info			
Isotope:	Radium-226		
Prepared By:	Gregory Ramsay		
Prep Date:	07/06/2016		
Verification Date:	02/08/2017		
Expiration Date:	02/08/2018		
Primary Code:	1715-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9865 g		
Density(g/mL):	0.9967	Balance ID:	C31514

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / (Ampoule Mass(g) *(Dilution Vol)) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / Density / (Ampoule Mass (g) * (Dilution Vol)) = Parent Activity (dpm/g)
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (5.02193 g * 100 mL) = 21900.3937 dpm/mL
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (0.9967 g/mL)/ (5.02193 g * 100 mL) = 21972.4854 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
07/06/2016	Gregory Ramsay	2.6261	200	1715-B	288.51 dpm/ml	01/25/2017	11/10/2018
02/08/2017	Gregory Ramsay	21.96	250	1715-C	1930.063 dpm/ml	02/08/2017	02/08/2018
12/19/2017	Gregory Ramsay	2.63	200	1715-D	288.938 dpm/ml	12/19/2017	12/19/2018

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-226 Standard 1715-D

v1.0.2

Instrument	Yellow
Analyst	GXR1
Verification Prep Date	12/19/2017

Standard Information	
Isotope	Ra-226
Serial Number	1715-D
Isotope Halflife	1.6000E+03 Y
Reference Date	9/9/2014
Ref. Act. (DPM/mL)	288.938
Amount of Std. (mL)	0.5
Standard Prep Date	12/19/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	12/20/2017	773.48	70.40	11.00
2	12/20/2017	774.10	70.70	11.00
3	12/20/2017	772.98	73.30	11.00

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	59.40	0.422157	281.41	140.71
2	59.70	0.422157	282.83	141.42
3	62.30	0.422157	295.15	147.58

	dpm/mL
Mean Value =	286.47
Stdev =	7.555402963
Certificate Value* =	**288.5**
Two sigma =	15.111
10 % of Mean =	28.647
Rule A (Pass/Fail)	**Pass**
% Recovery	99.29%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**12/19/2018**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-226 source 1715-D by transferring 0.5 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYellow for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 12/20/2017 using Ra-226 source 0299-H.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,
B = BKG cpm,
C = System efficiency (cpm/dpm), and
D = volume used for standard verification.

RAD-M-001

12/21/17

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 1818524**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
463203001	SAMPLE	PCW	LUCAS1	NOV-12-18 08:55:00	DONE	Lucas Cell	01-MAY-18 00:00
463203002	SAMPLE	PCW	LUCAS2	NOV-12-18 08:55:00	DONE	Lucas Cell	01-AUG-18 00:00
463203003	SAMPLE	PCW	LUCAS3	NOV-12-18 08:55:00	DONE	Lucas Cell	01-MAR-18 00:00
463203004	SAMPLE	PCW	LUCAS4	NOV-12-18 08:55:00	DONE	Lucas Cell	01-MAR-18 00:00
463203005	SAMPLE	PCW	LUCAS5	NOV-12-18 08:55:00	DONE	Lucas Cell	01-JUN-18 00:00
463203006	SAMPLE	PCW	LUCAS6	NOV-12-18 08:55:00	DONE	Lucas Cell	01-JUL-18 00:00
463203007	SAMPLE	PCW	LUCAS7	NOV-12-18 08:55:00	DONE	Lucas Cell	01-NOV-18 00:00
463221005	SAMPLE	PCW	LUCAS8	NOV-12-18 08:55:00	DONE	Lucas Cell	01-MAR-18 00:00
463221006	SAMPLE	PCW	LUCAS1	NOV-12-18 09:30:00	DONE	Lucas Cell	01-MAY-18 00:00
463221007	SAMPLE	PCW	LUCAS2	NOV-12-18 09:30:00	DONE	Lucas Cell	01-AUG-18 00:00
463222001	SAMPLE	PCW	LUCAS4	NOV-12-18 09:30:00	DONE	Lucas Cell	01-MAR-18 00:00
463222002	SAMPLE	PCW	LUCAS5	NOV-12-18 09:30:00	DONE	Lucas Cell	01-JUN-18 00:00
463222003	SAMPLE	PCW	LUCAS6	NOV-12-18 09:30:00	DONE	Lucas Cell	01-JUL-18 00:00
463222004	SAMPLE	PCW	LUCAS7	NOV-12-18 09:30:00	DONE	Lucas Cell	01-NOV-18 00:00
463222005	SAMPLE	PCW	LUCAS8	NOV-12-18 09:30:00	DONE	Lucas Cell	01-MAR-18 00:00
463222006	SAMPLE	PCW	LUCAS1	NOV-12-18 10:00:00	DONE	Lucas Cell	01-MAY-18 00:00
463222007	SAMPLE	PCW	LUCAS2	NOV-12-18 10:00:00	DONE	Lucas Cell	01-AUG-18 00:00
463222008	SAMPLE	PCW	LUCAS3	NOV-12-18 10:00:00	DONE	Lucas Cell	01-MAR-18 00:00
1204150012	DUP	PCW	LUCAS5	NOV-12-18 10:00:00	DONE	Lucas Cell	01-JUN-18 00:00
1204150013	MS	PCW	LUCAS6	NOV-12-18 10:00:00	DONE	Lucas Cell	01-JUL-18 00:00
1204150014	MSD	PCW	LUCAS7	NOV-12-18 10:00:00	DONE	Lucas Cell	01-NOV-18 00:00
463221008	SAMPLE	PCW	LUCAS2	NOV-15-18 08:15:00	DONE	Lucas Cell	01-AUG-18 00:00
1204150011	MB	PCW	LUCAS3	NOV-15-18 08:15:00	DONE	Lucas Cell	01-MAR-18 00:00
1204150015	LCS	PCW	LUCAS4	NOV-15-18 08:15:00	DONE	Lucas Cell	01-MAR-18 00:00

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Type III Data Package

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Project: PSEG Mercer
Groundwater and Water Samples
Collected on 12/06/18

SDG# GEJ62

GROUP	SAMPLE NUMBERS
2016608	9931021-9931027

PA Cert. # 36-00037
NY Cert. # 10670
NJ Cert. # PA011
NC Cert. # 521
TX Cert. # T104704194-18-27
AZ Cert. # AZ0780

Through our technical processes and second person review of data, we have established that our data/deliverables are in compliance with the methods and project requirements unless otherwise noted or previously resolved with the client.

Authorized by: Dana M Kauffman **Date:** **01/15/2019**

Dana M. Kauffman
Manager

Any questions or concerns you might have regarding this data package should be directed to your client representative, Kerri Sachtleben at (717)-556-7376.

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Sample Reference List for SDG Number GEJ62 with a Data Package Type of III

07701 - GEI Consultants, Inc.

Project: PSEG Mercer

Lab Sample Number	Client Sample ID	Collection Date	Date Received
9931021	MW-1	12/06/2018 10:10	12/07/2018 19:30
9931022	MW-2	12/06/2018 10:10	12/07/2018 19:30
9931023	MW-3	12/06/2018 13:30	12/07/2018 19:30
9931024	MW-4	12/06/2018 11:35	12/07/2018 19:30
9931025	MW-5	12/06/2018 12:40	12/07/2018 19:30
9931026	MW-6	12/06/2018 14:20	12/07/2018 19:30
9931027	FB-20181206	12/06/2018 12:00	12/07/2018 19:30

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Sample pH Log

SDG: GEJ62

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9931021	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:08:30PM	12616
9931021	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:15:47PM	12665
9931021	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:14:09PM	12665
9931021	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:17:11AM	12616
9931021	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 10:06:52PM	12665
9931021	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:08:30PM	12616
9931021	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:17:11AM	12616
9931022	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:11:46PM	12616
9931022	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:13:32PM	12665
9931022	055B	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 7:59:51PM	12665
9931022	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:15:00AM	12616
9931022	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 9:57:01PM	12665
9931022	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:11:46PM	12616
9931022	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:15:00AM	12616
9931023	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:13:42PM	12616
9931023	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:17:55PM	12665
9931023	055B	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 7:59:36PM	12665
9931023	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:12:52AM	12616
9931023	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 9:13:15PM	12665
9931023	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:13:42PM	12616
9931023	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:12:52AM	12616
9931024	004A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:09:03PM	12616
9931024	055A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 7:58:49PM	12665
9931024	055B	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:12:28PM	12665
9931024	070A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:20:15AM	12616
9931024	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 9:43:49PM	12665
9931024	089B	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 10:22:42PM	12665
9931024	330A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:09:03PM	12616
9931024	332A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:20:15AM	12616
9931025	004A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:03:08PM	12616
9931025	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:14:23PM	12665
9931025	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:14:37PM	12665
9931025	070A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:19:42AM	12616
9931025	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 10:16:02PM	12665
9931025	330A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:03:08PM	12616
9931025	332A	7	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:19:42AM	12616
9931026	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:06:43PM	12616
9931026	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:16:57PM	12665

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9931026	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:17:25PM	12665
9931026	070A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:17:57AM	12616
9931026	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 10:25:05PM	12665
9931026	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:06:43PM	12616
9931026	332A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:17:57AM	12616
9931027	004A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:19:49PM	12616
9931027	055A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:16:41PM	12665
9931027	055B	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/9/2018 9:17:09PM	12665
9931027	070A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:13:54AM	12616
9931027	089A	<2	<2	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/12/2018 9:20:00PM	12665
9931027	330A	6	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 12:19:49PM	12616
9931027	332A	5	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	12/10/2018 11:13:54AM	12616

***pH Check Code Key**
PK = Original container checked - pH is within the correct range. (No preservative was added)
PA = Original container checked - pH adjusted to correct range. (Preservative was added)
PV = Volatile container checked
PC = pH checked (unpreserved container)
SPK = Subsampled from an original container. Original container checked - pH is within correct range
SPA = Subsampled from an original container. Subsample container checked - pH adjusted to correct range.
SPC = Subsampled from an original container. pH checked (unpreserved container).
SUP = Subsampled from original container. Unable to be preserved due to the matrix of the sample.
UP = Unable to preserve due to matrix of the sample.
NA = Not applicable

****Chlorine Present Code Key**
NA = Chlorine Not Checked
Y = Chlorine Present
N = Chlorine Not Present

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00259 Mercury

The solution resulting from the mercury digestion is analyzed by Cold Vapor AA.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

14044 ICP-WW, 3005A (tot rec) - U345

The sample is digested with nitric acid and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3005A, July 1992

14047 ICPMS - Water, 3020A - U345

The sample is digested with nitric and hydrochloric acid.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 3020A, July 1992

05713 WW SW846 Hg Digest

The sample is heated at 95 c with nitric acid, sulfuric acid, potassium persulfate, and potassium permanganate. Excess potassium permanganate is reduced with sodium chloride/hydroxylamine hydrochloride. Mercuric ions are reduced to mercury metal using stannous chloride.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Method 7470A, September 1994

07046 Barium
08014 Boron
01750 Calcium
07051 Chromium
07052 Cobalt
01756 Lithium
07036 Selenium
07022 Thallium

The solution resulting from the metals digestion is analyzed by Trace ICP.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6010D, Rev. 4, July 2014.

06024 Antimony
06025 Arsenic
06027 Beryllium
06028 Cadmium
06035 Lead
06038 Molybdenum

The solution resulting from the metals digestion is analyzed by ICP/MS.

Reference: Test Methods for Evaluating Solid Wastes, SW-846 Update V, Method 6020B, Rev.2, July 2014.

00224 Chloride
01504 Fluoride
00228 Sulfate

A small volume of sample is introduced into an ion chromatograph. The anions are then separated and measured by a system consisting of a guard column, separator column, suppressor, and conductivity detector.

Reference: Method 300.0, Revision 2.1 (1993), Methods for Chemical Analysis of Water and Wastes USEPA 600.

12152 pH

The activity of hydrogen ions in the sample is measured using a glass electrode and a reference electrode.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 4500-H+ B-2011

00212 Total Dissolved Solids

A well-mixed sample is filtered through a glass fiber filter. The filtrate is collected in a tared beaker, evaporated in a steam bath and dried in an oven at 180C +/- 2C to a constant weight. The increase in weight is the total dissolved solids.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2540 C-2011

12151 Temperature of pH

The temperature of the sample measured during the pH analysis.

Reference: Standard Methods for the Examination of Water and Wastewater, Method 2550 B-2010

Analysis Reports / Field Chain of Custody

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

GEI Consultants, Inc.
400 Unicorn Park Drive
Wobern MA 01801

Report Date: December 26, 2018 14:51

Project: PSEG Mercer

Account #: 07701
Group Number: 2016608
SDG: GEJ62
PO Number: 1504710
State of Sample Origin: NJ

Electronic Copy To	GEI Consultants, Inc.	Attn: Jason Kohl
Electronic Copy To	GEI Consultants, Inc.	Attn: Data Group

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-1 Grab Groundwater	12/06/2018 10:10	9931021
MW-2 Grab Groundwater	12/06/2018 10:10	9931022
MW-3 Grab Groundwater	12/06/2018 13:30	9931023
MW-4 Grab Groundwater	12/06/2018 11:35	9931024
MW-5 Grab Groundwater	12/06/2018 12:40	9931025
MW-6 Grab Groundwater	12/06/2018 14:20	9931026
FB-20181206 Grab Water	12/06/2018 12:00	9931027

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: GEI Consultants, Inc.
Project: PSEG Mercer
Sampling Date(s): 12/06/18
Laboratory Sample ID(s): 9931021-9931027
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	No
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality."
***The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.**

Dorothy M Love

Dorothy M. Love
Director

12/26/2018



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Project Name: PSEG Mercer
ELLE Group #: 2016608

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Sample #s: 9931021-9931027

The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 9931021, 9931022, 9931023, 9931024, 9931025, 9931026, 9931027

The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.

Batch #: 183481404402 (Sample number(s): 9931021-9931027 UNSPK: 9931026 BKG: 9931026)

The recovery(ies) for the following analyte(s) in the MS and/or MSD exceeded the acceptance window indicating a positive bias: Calcium

The duplicate RPD for the following analyte(s) exceeded the acceptance window: Lithium

SW-846 6020B Rev.2, July 2014, Metals Dissolved

Sample #s: 9931021, 9931022, 9931023, 9931024, 9931025, 9931027

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

SM 2540 C-2011, Wet Chemistry

Batch #: 18346921202A (Sample number(s): 9931023-9931026 UNSPK: 9931026 BKG: 9931026)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: Total Dissolved Solids

Sample Description: **MW-1 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 10:10
SDG#: GEJ62-01

GEI Consultants, Inc.
ELLE Sample #: GW 9931021
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.140	0.0010	0.0050	1
08014	Boron	7440-42-8	2.18	0.0120	0.0500	1
01750	Calcium	7440-70-2	312	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0015 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0158 J	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	0.00015 J	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0577	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	87.0	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	571	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,570	160	480	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 10:10
SDG#: GEJ62-01

GEI Consultants, Inc.
ELLE Sample #: GW 9931021
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.0	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:10	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 23:57	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:10	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:10	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183481404402	12/20/2018 12:57	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:10	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:10	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 23:57	Cindy M Gehman	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:31	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:46	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:31	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:46	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:46	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183511404702C	12/20/2018 18:46	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183470571303	12/15/2018 09:15	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	183481404402	12/17/2018 05:40	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 10:10
SDG#: GEJ62-01

GEI Consultants, Inc.
ELLE Sample #: GW 9931021
ELLE Group #: 2016608
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	183471404706	12/14/2018 03:44	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	2	183511404702	12/18/2018 04:51	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183470571303	12/14/2018 10:15	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	18348120315B	12/15/2018 00:45	Hallie A Burnett	50
01504	Fluoride	EPA 300.0	1	18348120315B	12/15/2018 00:28	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	18348120315B	12/15/2018 00:45	Hallie A Burnett	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18346921201A	12/12/2018 10:36	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18344003101A	12/10/2018 21:05	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18344003101A	12/10/2018 21:05	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 10:10
SDG#: GEJ62-02

GEI Consultants, Inc.
ELLE Sample #: GW 9931022
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0287	0.0010	0.0050	1
08014	Boron	7440-42-8	0.201	0.0120	0.0500	1
01750	Calcium	7440-70-2	39.0	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D. K1	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0039	0.00068	0.0020	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0089	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	3.1	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	26.4	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	153	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 10:10
SDG#: GEJ62-02

GEI Consultants, Inc.
ELLE Sample #: GW 9931022
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.4	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.7	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:13	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:07	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:13	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:13	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:07	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:13	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:13	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:07	Cindy M Gehman	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:46	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:54	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:46	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:54	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:54	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183511404702C	12/20/2018 18:54	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183470571303	12/15/2018 09:17	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	183481404402	12/17/2018 05:40	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 10:10
SDG#: GEJ62-02

GEI Consultants, Inc.
ELLE Sample #: GW 9931022
ELLE Group #: 2016608
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	183471404706	12/14/2018 03:44	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	2	183511404702	12/18/2018 04:51	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183470571303	12/14/2018 10:15	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	18348120315B	12/15/2018 01:01	Hallie A Burnett	5
01504	Fluoride	EPA 300.0	1	18348120315B	12/17/2018 21:50	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	18348120315B	12/15/2018 01:01	Hallie A Burnett	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18346921201A	12/12/2018 10:37	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18344003101A	12/10/2018 20:39	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18344003101A	12/10/2018 20:39	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 13:30
SDG#: GEJ62-03

GEI Consultants, Inc.
ELLE Sample #: GW 9931023
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.196	0.0010	0.0050	1
08014	Boron	7440-42-8	0.260	0.0120	0.0500	1
01750	Calcium	7440-70-2	54.8	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0038 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0254 J	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0059	0.00068	0.0020	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0122	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	68.5	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	25.1	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	328	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 13:30
SDG#: GEJ62-03

GEI Consultants, Inc.
ELLE Sample #: GW 9931023
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.4	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:22	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:10	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:22	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:22	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183481404402	12/20/2018 13:00	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:22	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:22	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:10	Cindy M Gehman	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:48	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:56	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:48	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:56	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:56	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183511404702C	12/20/2018 18:56	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183470571303	12/15/2018 09:19	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	183481404402	12/17/2018 05:40	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 13:30
SDG#: GEJ62-03

GEI Consultants, Inc.
ELLE Sample #: GW 9931023
ELLE Group #: 2016608
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	183471404706	12/14/2018 03:44	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	2	183511404702	12/18/2018 04:51	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183470571303	12/14/2018 10:15	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	18348120315B	12/15/2018 02:25	Hallie A Burnett	50
01504	Fluoride	EPA 300.0	1	18348120315B	12/15/2018 02:08	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	18348120315B	12/15/2018 02:08	Hallie A Burnett	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18346921202A	12/12/2018 10:41	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18344003101A	12/10/2018 20:48	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18344003101A	12/10/2018 20:48	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 11:35
SDG#: GEJ62-04

GEI Consultants, Inc.
ELLE Sample #: GW 9931024
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0057	0.0010	0.0050	1
08014	Boron	7440-42-8	0.0142 J	0.0120	0.0500	1
01750	Calcium	7440-70-2	2.94	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D. K1	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0029	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	1.4 J	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	2.1 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	34.0 J	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 11:35
SDG#: GEJ62-04

GEI Consultants, Inc.
ELLE Sample #: GW 9931024
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.5	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.4	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:25	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:14	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:25	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:25	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:14	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:25	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:25	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:14	Cindy M Gehman	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:50	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:58	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:50	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:58	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:58	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183511404702C	12/20/2018 18:58	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183470571303	12/15/2018 09:21	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	183481404402	12/17/2018 05:40	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 11:35
SDG#: GEJ62-04

GEI Consultants, Inc.
ELLE Sample #: GW 9931024
ELLE Group #: 2016608
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	183471404706	12/14/2018 03:44	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	2	183511404702	12/18/2018 04:51	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183470571303	12/14/2018 10:15	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	18348120315B	12/15/2018 02:42	Hallie A Burnett	5
01504	Fluoride	EPA 300.0	1	18348120315B	12/15/2018 02:42	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	18348120315B	12/15/2018 02:42	Hallie A Burnett	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18346921202A	12/12/2018 10:41	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18344003101A	12/10/2018 20:30	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18344003101A	12/10/2018 20:30	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 12:40
SDG#: GEJ62-05

GEI Consultants, Inc.
ELLE Sample #: GW 9931025
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.202	0.0010	0.0050	1
08014	Boron	7440-42-8	0.444	0.0120	0.0500	1
01750	Calcium	7440-70-2	105	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D. K1	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0185	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	94.5	10.0	20.0	50
01504	Fluoride	16984-48-8	0.58	0.25	0.50	5
00228	Sulfate	14808-79-8	103	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	660	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 12:40
SDG#: GEJ62-05

GEI Consultants, Inc.
ELLE Sample #: GW 9931025
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.5	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.3	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:28	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:17	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:28	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:28	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:17	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:28	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:28	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:17	Cindy M Gehman	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:53	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:59	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:53	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:59	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 18:59	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183511404702C	12/20/2018 18:59	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183470571303	12/15/2018 09:23	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	183481404402	12/17/2018 05:40	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 12:40
SDG#: GEJ62-05

GEI Consultants, Inc.
ELLE Sample #: GW 9931025
ELLE Group #: 2016608
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	183471404706	12/14/2018 03:44	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	2	183511404702	12/18/2018 04:51	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183470571303	12/14/2018 10:15	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	18348120215B	12/15/2018 22:44	Hallie A Burnett	50
01504	Fluoride	EPA 300.0	1	18348120215B	12/17/2018 22:26	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	18348120215B	12/15/2018 22:44	Hallie A Burnett	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	18346921202A	12/12/2018 10:41	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18344003102A	12/10/2018 21:37	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18344003102A	12/10/2018 21:37	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 14:20
SDG#: GEJ62-06

GEI Consultants, Inc.
ELLE Sample #: GW 9931026
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.211	0.0010	0.0050	1
08014	Boron	7440-42-8	0.157	0.0120	0.0500	1
01750	Calcium	7440-70-2	38.5	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0024 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0150 J	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0022	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	261	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	6.3	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	504	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.3	0.010	0.010	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 14:20
SDG#: GEJ62-06

GEI Consultants, Inc.
ELLE Sample #: GW 9931026
ELLE Group #: 2016608
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 07:16	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 22:51	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 07:16	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 07:16	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183481404402	12/20/2018 12:35	Lisa J Cooke	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 07:16	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 07:16	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 22:51	Cindy M Gehman	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183551404708A	12/22/2018 22:25	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183551404708A	12/23/2018 13:07	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183551404708A	12/23/2018 13:07	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183551404708A	12/23/2018 13:07	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183551404708A	12/22/2018 22:25	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183551404708C	12/22/2018 22:25	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	183470571303	12/15/2018 09:25	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	183481404402	12/17/2018 05:40	Annamaria Kuhns	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	183471404706	12/14/2018 03:44	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	2	183551404708	12/21/2018 15:10	JoElla L Rice	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183470571303	12/14/2018 10:15	Denise L Trimby	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 14:20
SDG#: GEJ62-06

GEI Consultants, Inc.
ELLE Sample #: GW 9931026
ELLE Group #: 2016608
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00224	Chloride	EPA 300.0	1	18348120215B	12/15/2018 23:17	Hallie A Burnett	50
01504	Fluoride	EPA 300.0	1	18348120215B	12/15/2018 23:01	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	18348120215B	12/15/2018 23:01	Hallie A Burnett	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	18346921202A	12/12/2018 10:42	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18344003101A	12/10/2018 21:01	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18344003101A	12/10/2018 21:01	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181206 Grab Water**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 12:00
SDG#: GEJ62-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9931027
ELLE Group #: 2016608
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D.	0.0010	0.0050	1
08014	Boron	7440-42-8	N.D.	0.0120	0.0500	1
01750	Calcium	7440-70-2	0.157 J	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D. K1	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181206 Grab Water**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 12:00
SDG#: GEJ62-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9931027
ELLE Group #: 2016608
Matrix: Water

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.1	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:31	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:20	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:31	Lisa J Cooke	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:31	Lisa J Cooke	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:20	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:31	Lisa J Cooke	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/18/2018 08:31	Lisa J Cooke	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	183481404402	12/19/2018 00:20	Cindy M Gehman	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:34	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 19:02	Choon Y Tian	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/21/2018 09:34	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 19:02	Choon Y Tian	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	183511404702A	12/20/2018 19:02	Choon Y Tian	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	183511404702C	12/20/2018 19:02	Choon Y Tian	1
00259	Mercury	SW-846 7470A	1	183470571303	12/15/2018 09:27	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	183481404402	12/17/2018 05:40	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-20181206 Grab Water**
PSEG Mercer / 1504710

Project Name: **PSEG Mercer**

Submittal Date/Time: 12/07/2018 19:30
Collection Date/Time: 12/06/2018 12:00
SDG#: GEJ62-07FB

GEI Consultants, Inc.
ELLE Sample #: GW 9931027
ELLE Group #: 2016608
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	183471404706	12/14/2018 03:44	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	2	183511404702	12/18/2018 04:51	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	183470571303	12/14/2018 10:15	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	18348120215B	12/15/2018 23:34	Hallie A Burnett	1
01504	Fluoride	EPA 300.0	1	18348120215B	12/15/2018 23:34	Hallie A Burnett	1
00228	Sulfate	EPA 300.0	1	18348120215B	12/15/2018 23:34	Hallie A Burnett	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	18346921201A	12/12/2018 10:37	Amy L Hankins	1
12151	Temperature of pH	SM 2550 B-2010	1	18344003101A	12/10/2018 20:52	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	18344003101A	12/10/2018 20:52	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2016608
Reported: 12/26/2018 14:51

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 183470571303	Sample number(s): 9931021-9931027		
Mercury	N.D.	0.000050	0.00020
Batch number: 183481404402	Sample number(s): 9931021-9931027		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	N.D.	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	N.D.	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 183511404702A	Sample number(s): 9931021-9931025,9931027		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Batch number: 183511404702C	Sample number(s): 9931021-9931025,9931027		
Molybdenum	N.D.	0.00031	0.0020
Batch number: 183551404708A	Sample number(s): 9931026		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Batch number: 183551404708C	Sample number(s): 9931026		
Molybdenum	N.D.	0.00031	0.0020
Batch number: 18348120215B	Sample number(s): 9931025-9931027		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 18348120315B	Sample number(s): 9931021-9931024		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2016608
Reported: 12/26/2018 14:51

Method Blank (continued)

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 18346921201A	Sample number(s): 9931021-9931022,9931027		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 18346921202A	Sample number(s): 9931023-9931026		
Total Dissolved Solids	N.D.	20.0	60.0

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 183470571303	Sample number(s): 9931021-9931027								
Mercury	0.00100	0.000846			85		80-120		
Batch number: 183481404402	Sample number(s): 9931021-9931027								
Barium	2.00	2.03			102		80-120		
Boron	2.00	1.94			97		80-120		
Calcium	4.00	4.20			105		80-120		
Chromium	0.200	0.204			102		80-120		
Cobalt	0.500	0.541			108		80-120		
Lithium	1.00	1.03			103		80-120		
Selenium	0.150	0.150			100		80-120		
Thallium	0.150	0.159			106		80-120		
Batch number: 183511404702A	Sample number(s): 9931021-9931025,9931027								
Antimony	0.00600	0.00525	0.00600	0.00519	87	87	80-120	1	20
Arsenic	0.0100	0.0115	0.0100	0.0102	115	102	80-120	13	20
Beryllium	0.00400	0.00407	0.00400	0.00424	102	106	80-120	4	20
Cadmium	0.00500	0.00526	0.00500	0.00506	105	101	80-120	4	20
Lead	0.0150	0.0157	0.0150	0.0156	105	104	80-120	1	20
Batch number: 183511404702C	Sample number(s): 9931021-9931025,9931027								
Molybdenum	0.0500	0.0528	0.0500	0.0518	106	104	80-120	2	20
Batch number: 183551404708A	Sample number(s): 9931026								
Antimony	0.00600	0.00533	0.00600	0.00515	89	86	80-120	3	20
Arsenic	0.0100	0.00901	0.0100	0.0105	90	105	80-120	16	20
Beryllium	0.00400	0.00391	0.00400	0.00372	98	93	80-120	5	20
Cadmium	0.00500	0.00548	0.00500	0.00471	110	94	80-120	15	20
Lead	0.0150	0.0149	0.0150	0.0140	99	93	80-120	6	20
Batch number: 183551404708C	Sample number(s): 9931026								
Molybdenum	0.0500	0.0527	0.0500	0.0501	105	100	80-120	5	20

*- Outside of specification
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(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2016608
Reported: 12/26/2018 14:51

LCS/LCSD (continued)

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18348120215B	Sample number(s): 9931025-9931027								
Chloride	3.00	3.09			103		90-110		
Fluoride	0.750	0.692			92		90-110		
Sulfate	7.50	7.88			105		90-110		
Batch number: 18348120315B	Sample number(s): 9931021-9931024								
Chloride	3.00	3.06			102		90-110		
Fluoride	0.750	0.704			94		90-110		
Sulfate	7.50	7.76			104		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 18346921201A	Sample number(s): 9931021-9931022,9931027								
Total Dissolved Solids	200	199			100		62-127		
Batch number: 18346921202A	Sample number(s): 9931023-9931026								
Total Dissolved Solids	200	193			97		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 18344003101A	Sample number(s): 9931021-9931024,9931026-9931027								
pH	7.00	7.00			100		95-105		
Batch number: 18344003102A	Sample number(s): 9931025								
pH	7.00	7.01			100		95-105		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 183481404402	Sample number(s): 9931021-9931027 UNSPK: 9931026									
Barium	0.211	2.00	2.24	2.00	2.25	101	102	75-125	0	20
Boron	0.157	2.00	2.16	2.00	2.14	100	99	75-125	1	20
Calcium	38.5	4.00	43.69	4.00	43.39	130 (2)	122 (2)	75-125	1	20
Chromium	N.D.	0.200	0.203	0.200	0.201	102	101	75-125	1	20
Cobalt	0.00243	0.500	0.529	0.500	0.523	105	104	75-125	1	20
Lithium	0.0150	1.00	1.04	1.00	1.03	102	102	75-125	1	20
Selenium	N.D.	0.150	0.156	0.150	0.155	104	103	75-125	0	20
Thallium	N.D.	0.150	0.153	0.150	0.155	102	104	75-125	2	20
	mg/l	**mg/l**	**mg/l**	**mg/l**	**mg/l**					

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: GEI Consultants, Inc. Group Number: 2016608
Reported: 12/26/2018 14:51

MS/MSD (continued)

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18346921202A	Sample number(s): 9931023-9931026 UNSPK: 9931026									
Total Dissolved Solids	504	800	1318			102		62-127		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc mg/l	DUP Conc mg/l	DUP RPD	DUP RPD Max
Batch number: 183481404402	Sample number(s): 9931021-9931027 BKG: 9931026			
Barium	0.211	0.217	3	20
Boron	0.157	0.159	2 (1)	20
Calcium	38.5	39.53	3	20
Chromium	N.D.	N.D.	0 (1)	20
Cobalt	0.00243	0.00238	2 (1)	20
Lithium	0.0150	0.0188	22* (1)	20
Selenium	N.D.	N.D.	0 (1)	20
Thallium	N.D.	N.D.	0 (1)	20
	mg/l	mg/l		
Batch number: 18346921202A	Sample number(s): 9931023-9931026 BKG: 9931026			
Total Dissolved Solids	504	560	11* (1)	5

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 7701 For Eurofins Lancaster Laboratories Environmental use only Group # 2016608 Sample # 993102 (3) 12/8/18 993102-27

COC # 571680

Client Information

Client: GEI Consultants, Inc.	Acct. #:
Project Name/#: PSEG Mercer / 150471D	PWSID #:
Project Manager: Jason Kohl	P.O. #: 150471D
Sampler: Anthony J. Shields	Quote #:
State where samples were collected: NJ	For Compliance: Yes ☐ No ☐

Matrix: Soil ☐ Sediment ☐ Tissue ☐ | Water: Potable ☐ Ground ☑ NPDES ☐ Surface ☐ | Other: Aqueous

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Metals	GC Meths	Mercury	Chloride	Fluoride	Sulfate	pH	TDS	Ra 226 & Ra 228
MW-1	12-6-18	1010	✓		7	✓		✓	✓	✓	✓	✓	✓	✓
MW-2	12-6-18	1010	✓		7	✓		✓	✓	✓	✓	✓	✓	✓
MW-3	12-6-18	1330	✓		7	✓		✓	✓	✓	✓	✓	✓	✓
MW-4	12-6-18	1135	✓		8	✓		✓	✓	✓	✓	✓	✓	✓
MW-5	12-6-18	1240	✓		7	✓		✓	✓	✓	✓	✓	✓	✓
MW-6	12-6-18	1420	✓		7	✓		✓	✓	✓	✓	✓	✓	✓
FB-20181206	12-6-18	1200	✓		7	✓		✓	✓	✓	✓	✓	✓	✓

Analysis Requested

Preservation and Filtration Codes

For Lab Use Only

FSC:

SCR#: 234853

Preservation Codes

H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 P=H_3PO_4
F=Field Filtered O=Other

Remarks

Metals Include: As, B, Ba, Be, Ca, Cd, Co, Cr, Li, Mn, Pb, Sb, Se, Tl

Turnaround Time (TAT) Requested (please circle)

Standard Rush

(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days:

E-mail address: JKohl@GEIConsultants.com

Data Package Options (circle if required)

Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only)

Type III (Reduced non-CLP) NJ DKQP TX TRRP-13

NYSDEC Category A or B MA MCP CT RCP

Relinquished by	Date	Time	Received by	Date	Time
Bottle Storage	11-30-18	1200			
				12-7-18	1645
Washington	12-7-18	1930			
				12-7-18	1930

EDD Required? Yes / No

If yes, format:

Site-Specific QC (MS/MSD/Dup)? Yes / No

(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier: UPS _____ FedEx _____ Other _____

Temperature upon receipt 2-3.2°C

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Sample Administration Receipt Documentation Log

Doc Log ID: 235522

Group Number(s): 2316608

Client: GEI Consultants, Inc.

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	12/07/2018 19:30
Number of Packages:	4	Number of Projects:	2
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	No	Sample Date/Times match COC:	Yes
Samples Chilled:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	0
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Melvin Sanchez (8943) at 22:46 on 12/07/2018

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	3.2	DT	Wet	Y	Bagged	N
2	DT42-02	1.4	DT	Wet	Y	Bagged	N
3	DT42-02	1.8	DT	Wet	Y	Bagged	N
4	DT42-02	1.2	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17601-2435
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Metals in Liquid Data

Case Narrative/Conformance Summary

Metals in Liquid

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

ICP Metals

Fraction: Metals in Liquid

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9931021	MW-1	X		1	
9931022	MW-2	X		1	
9931023	MW-3	X		1	
9931024	MW-4	X		1	
9931025	MW-5	X		1	
9931026	MW-6	X		1	
9931027	FB-20181206	X		1	Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Method defined actions are taken for any failed matrix QC.

Batch#: 183481404402 (Sample number(s): 9931021-9931027, UNSPK: 9931026, BKG: 9931026)
The recovery(ies) for the following analyte(s) in the MS exceeded the acceptance window indicating a positive bias: Calcium

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

ICP Metals

Fraction: Metals in Liquid

Sample Duplicate

Batch#: 183481404402 (Sample number(s): 9931021-9931027, UNSPK: 9931026, BKG: 9931026)
The duplicate RPD for the following analyte(s) is outside the acceptance window: Lithium

SAMPLE ANALYSIS:

The instrument detection limits (IDLs) are used for determining the U flags on the initial and continuing calibration blanks. The highest IDL is selected when multiple instruments are used for an analysis. The method detection limits (MDLs) are used for determining all other U flags.

(Sample number(s): 9931021-9931027)
The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.
(Sample number(s): 9931021-9931027: Analysis: 07036)
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.

(Sample number(s): 9931021-9931027: Analysis: 07022)
The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.

(Sample number(s): 9931021-9931025, 9931027: Analysis: 06025)
The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

No other problems were encountered with the analysis of the samples.

Abbreviation Key

BKG – Background	AF - Cold Vapor Atomic Fluorescence
DUP – Duplicate	U - Below MDL
MS - Matrix Spike	B - Below LOQ
MSD - Matrix Spike Dup	N - Matrix Spike out of specifications
B – Blank	* - Duplicate out of specifications
Q - Laboratory Control Sample	E - Matrix Effects exist as proven by Serial Dilution or Spiked Dilution
Y - Laboratory Control Sample Duplicate	A - Post Digestion Spike

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

ICP Metals

Fraction: Metals in Liquid

P - ICP Atomic Emission Spectrometer	L - Serial Dilution
MS - ICP Mass Spectrometry	R - Internal Standard Relative Intensity OOS
CV - Cold Vapor	NR - Not Required

Sample Data

Metals in Liquid

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9931021 % Solids: 0.0
Concentration Units: UG/L Date Received: 12/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	140			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	2180			P
7440-43-9	Cadmium	0.15	B		MS
7440-70-2	Calcium	312000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	15.8	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	57.7			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

_____
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_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence
NR = Not Required

CONCENTRATION QUALIFIERS:
U = Below MDL,
B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9931022 % Solids: 0.0
Concentration Units: UG/L Date Received: 12/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	3.9			MS
7440-39-3	Barium	28.7			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	201			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	39000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	8.9			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9931023 % Solids: 0.0
Concentration Units: UG/L Date Received: 12/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	5.9			MS
7440-39-3	Barium	196			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	260			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	54800			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	3.8	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	25.4	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	12.2			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9931024 % Solids: 0.0
Concentration Units: UG/L Date Received: 12/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	5.7			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	14.2	B		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	2940			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	2.9			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9931025 % Solids: 0.0
Concentration Units: UG/L Date Received: 12/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	202			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	444			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	105000			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	18.5			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9931026, 9931026BKG % Solids: 0.0
Concentration Units: UG/L Date Received: 12/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	211			P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	157			P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	38500			P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	2.4	B		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	15.0	B		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	2.2			MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 1
INORGANIC ANALYSIS DATA SHEET
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Lab Sample ID: 9931027 % Solids: 0.0
Concentration Units: UG/L Date Received: 12/07/2018

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.41	U		MS
7440-38-2	Arsenic	0.68	U		MS
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	0.091	U		MS
7440-42-8	Boron	12.0	U		P
7440-43-9	Cadmium	0.15	U		MS
7440-70-2	Calcium	157	B		P
7440-47-3	Chromium	5.3	U		P
7440-48-4	Cobalt	1.5	U		P
7439-92-1	Lead	1.1	U		MS
7439-93-2	Lithium	11.0	U		P
7439-97-6	Mercury	0.050	U		CV
7439-98-7	Molybdenum	0.31	U		MS
7782-49-2	Selenium	21.0	U		P
7440-28-0	Thallium	14.0	U		P

Comments:

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_____
_____

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence NR = Not Required	U = Below MDL, B = Below LOQ

Quality Control and Calibration Summary Forms

Metals in Liquid

QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ62
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Barium	183481404402	9931021
Boron		9931022
Calcium		9931023
Chromium		9931024
Cobalt		9931025
Lithium		9931026BKG
Selenium		9931026MS
Thallium		9931026MSD
		9931026DUP
		9931027
		P34804BB
		P34804BQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ62
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Antimony	183511404702	*31001BKG
Arsenic		9931021
Beryllium		9931022
Cadmium		9931023
Lead		9931024
Molybdenum		9931025
		9931027
		P35104BB
		P35104BQ
		P35104BY

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ62
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Antimony	183551404708	9931026BKG
Arsenic		P35504HB
Beryllium		P35504HQ
Cadmium		P35504HY
Lead		
Molybdenum		

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

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QUALITY CONTROL REFERENCE LIST

SDG No.: GEJ62
Matrix: WATER

Analyte	Batch Number	Lab Sample ID
Mercury	183470571303	*31001BKG
		9931021
		9931022
		9931023
		9931024
		9931025
		9931026
		9931027
		P34771CB
		P34771CQ

LEGEND:

BKG = Background	B = Blank
DUP = Duplicate	Q = Laboratory Control Sample
MS = Matrix Spike	Y = Laboratory Control Sample Duplicate
MSD = Matrix Spike Duplicate	

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835202T70
Calibration Date(s): 12/18/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium		600.0	600.03	100.0	500.0	502.47	100.5	500.0	509.86	102.0
Boron										
Calcium		30000.0	30469.96	101.6	25000.0	25644.06	102.6	25000.0	25645.97	102.6
Chromium		600.0	596.64	99.4	500.0	501.03	100.2	500.0	505.74	101.1
Cobalt										
Lithium		600.0	602.23	100.4	500.0	513.19	102.6	500.0	531.72	106.3
Selenium		600.0	606.15	101.0	500.0	511.36	102.3	500.0	505.35	101.1
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835202T70
Calibration Date(s): 12/18/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	513.01	102.6	500.0	495.24	99.0
Boron										
Calcium					25000.0	25691.68	102.8	25000.0	25169.26	100.7
Chromium					500.0	496.38	99.3	500.0	480.91	96.2
Cobalt										
Lithium					500.0	527.56	105.5	500.0	496.80	99.4
Selenium					500.0	505.02	101.0	500.0	486.43	97.3
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1835202T70
Calibration Date(s): 12/18/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium					500.0	501.70	100.3			
Boron										
Calcium					25000.0	25304.33	101.2			
Chromium					500.0	486.51	97.3			
Cobalt										
Lithium					500.0	509.08	101.8			
Selenium					500.0	499.73	99.9			
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835208T72
Calibration Date(s): 12/18/2018 - 12/19/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron		600.0	643.17	107.2	500.0	500.61	100.1	500.0	509.67	101.9
Calcium										
Chromium										
Cobalt		600.0	606.97	101.2	500.0	508.53	101.7	500.0	514.80	103.0
Lithium										
Selenium										
Thallium		600.0	609.90	101.7	500.0	502.02	100.4	500.0	520.12	104.0

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835208T72
Calibration Date(s): 12/18/2018 - 12/19/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron					500.0	510.61	102.1	500.0	515.44	103.1
Calcium										
Chromium										
Cobalt					500.0	520.97	104.2	500.0	519.57	103.9
Lithium										
Selenium										
Thallium					500.0	523.19	104.6	500.0	524.32	104.9

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835208T72
Calibration Date(s): 12/18/2018 - 12/19/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron					500.0	505.29	101.1			
Calcium										
Chromium										
Cobalt					500.0	522.18	104.4			
Lithium										
Selenium										
Thallium					500.0	524.32	104.9			

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835402T70
Calibration Date(s): 12/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron										
Calcium										
Chromium										
Cobalt		600.0	595.15	99.2	500.0	486.47	97.3	500.0	492.24	98.4
Lithium										
Selenium										
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835402T70
Calibration Date(s): 12/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron										
Calcium										
Chromium										
Cobalt					500.0	494.25	98.9	500.0	501.74	100.3
Lithium										
Selenium										
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: P
Run Name: 1835402T70
Calibration Date(s): 12/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Barium										
Boron										
Calcium										
Chromium										
Cobalt					500.0	508.53	101.7			
Lithium										
Selenium										
Thallium										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835407E03
Calibration Date(s): 12/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic	75	500.0	477.19	95.4	250.0	248.24	99.3	250.0	273.63	109.5
Beryllium										
Cadmium	111	50.0	48.05	96.1	25.0	26.24	105.0	25.0	26.25	105.0
Lead	208	50.0	49.29	98.6	25.0	25.89	103.6	25.0	25.61	102.4
Molybdenum	98	50.0	46.03	92.1	25.0	24.75	99.0	25.0	25.20	100.8

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835407E03
Calibration Date(s): 12/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic	75				250.0	266.03	106.4	250.0	272.78	109.1
Beryllium										
Cadmium	111				25.0	27.14	108.6	25.0	27.17	108.7
Lead	208				25.0	25.54	102.2	25.0	27.06	108.2
Molybdenum	98				25.0	25.77	103.1	25.0	26.84	107.4

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835503E05
Calibration Date(s): 12/21/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121	50.0	50.61	101.2	25.0	23.70	94.8	25.0	23.65	94.6
Arsenic										
Beryllium	9	50.0	49.67	99.3	25.0	24.84	99.4	25.0	25.64	102.6
Cadmium										
Lead										
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835503E05
Calibration Date(s): 12/21/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Antimony	121				25.0	23.22	92.9	25.0	27.24	109.0
Arsenic										
Beryllium	9				25.0	25.27	101.1	25.0	25.25	101.0
Cadmium										
Lead										
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835603E03
Calibration Date(s): 12/22/2018 - 12/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Antimony	121	50.0	54.96	109.9	25.0	26.51	106.0	25.0	26.06	104.2
Arsenic										
Beryllium										
Cadmium										
Lead	208	50.0	51.64	103.3	25.0	24.79	99.2	25.0	24.93	99.7
Molybdenum	98	50.0	51.24	102.5	25.0	23.44	93.8	25.0	25.13	100.5

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835603E03
Calibration Date(s): 12/22/2018 - 12/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Antimony	121				25.0	24.66	98.6	25.0	27.37	109.5
Arsenic										
Beryllium										
Cadmium										
Lead	208				25.0	24.63	98.5	25.0	25.23	100.9
Molybdenum	98				25.0	23.90	95.6	25.0	26.86	107.4

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835603E03
Calibration Date(s): 12/22/2018 - 12/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony	121				25.0	25.33	101.3			
Arsenic										
Beryllium										
Cadmium										
Lead	208				25.0	25.40	101.6			
Molybdenum	98				25.0	24.77	99.1			

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: MS
Run Name: 1835702E05
Calibration Date(s): 12/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Antimony										
Arsenic	75	500.0	507.65	101.5	250.0	260.25	104.1	250.0	258.99	103.6
Beryllium	9	50.0	50.28	100.6	25.0	24.18	96.7	25.0	24.46	97.8
Cadmium	111	50.0	50.94	101.9	25.0	26.83	107.3	25.0	27.43	109.7
Lead										
Molybdenum										

(1) Control Limits: 90 - 110
(2) Control Limits: 90 - 110
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury		2.5	2.42	96.8	1.0	1.02	102.0	1.0	1.01	101.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	1.02	102.0	1.0	1.01	101.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration			Continuing Calibration					
		True	Found	%R(1)	True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	1.02	102.0	1.0	1.00	100.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION
SDG No.: GEJ62

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018
Concentration Units: UG/L

Analyte	Mass	Initial Calibration True	Found	%R(1)	Continuing Calibration True	Found	%R(2)	True	Found	%R(2)
Mercury					1.0	0.99	99.0	1.0	1.00	100.0

(1) Control Limits: 90 - 110
(2) Control Limits: 80 - 120
* Outside Limits. If Continuing Calibration is outside limits, high, only ND samples are accepted.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1835202T70
Calibration Date(s): 12/18/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium		5.0	4.91	98.2		
Boron						
Calcium		500.0	513.14	102.6		
Chromium		15.0	14.70	98.0		
Cobalt						
Lithium		50.0	47.82	95.6		
Selenium		50.0	47.25	94.5		
Thallium						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1835208T72
Calibration Date(s): 12/18/2018 - 12/19/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium						
Boron		50.0	49.44	98.9		
Calcium						
Chromium						
Cobalt		5.0	6.93	138.6		
Lithium						
Selenium						
Thallium		30.0	34.53	115.1		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1835402T70
Calibration Date(s): 12/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Barium						
Boron						
Calcium						
Chromium						
Cobalt		5.0	5.11	102.2		
Lithium						
Selenium						
Thallium						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2B
LOW LEVEL CHECK STANDARD
SDG No.: GEJ62

Method: MS
Run Name: 1835407E03
Calibration Date(s): 12/20/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony						
Arsenic	75	2.0	2.00	100.0		
Beryllium						
Cadmium	111	1.0	1.14	114.0		
Lead	208	3.0	2.96	98.7		
Molybdenum	98	2.0	1.83	91.5		

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 2B
LOW LEVEL CHECK STANDARD
SDG No.: GEJ62

Method: MS
Run Name: 1835503E05
Calibration Date(s): 12/21/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony	121	2.0	2.09	104.5		
Arsenic						
Beryllium	9	0.5	0.56	112.0		
Cadmium						
Lead						
Molybdenum						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1835603E03
Calibration Date(s): 12/22/2018 - 12/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony	121	2.0	1.90	95.0	1.79	89.5
Arsenic						
Beryllium						
Cadmium						
Lead	208	3.0	2.62	87.3	2.67	89.0
Molybdenum	98	2.0	1.66	83.0	1.68	84.0

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: MS
Run Name: 1835702E05
Calibration Date(s): 12/23/2018
Concentration Units: UG/L

Analyte	Mass	Initial True	Initial Found	Initial %R	Final Found	Final %R
Antimony						
Arsenic	75	2.0	1.97	98.5		
Beryllium	9	0.5	0.52	104.0		
Cadmium	111	1.0	1.11	111.0		
Lead						
Molybdenum						

Control limits: 80% - 120%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018
Concentration Units: UG/L

			Initial		Final	
Analyte	Mass	True	Found	%R	Found	%R
Mercury		0.2	0.21	105.0	0.22	110.0

Control limits: 50% - 150%

For 6010B - Control limits apply to values up to 10 times the true value of the low level check standard. If LLC is out of specification, high, results < RL are acceptable.
For 6010C - If Low Level Check (LLC) is out of specification, results > CCV are acceptable. If LLC is out of specification, high, results < RL are acceptable.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: P
Run Name: 1835202T70
Calibration Date(s): 12/18/2018
Preparation Blank Matrix: WATER

Analyte	Mass	Initial Calibration Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank (UG/L) Mass		C	Batch Number
Barium		0.33	U	0.33	U	0.33	U	0.33	U		1.000	U	183481404402
Boron													
Calcium		33.4	U	33.4	U	33.4	U	33.4	U		33.000	U	183481404402
Chromium		0.96	U	0.96	U	0.96	U	0.96	U		5.300	U	183481404402
Cobalt													
Lithium		9.6	U	9.6	U	10.0	B	9.6	U		11.000	U	183481404402
Selenium		8.4	U	8.4	U	8.4	U	8.4	U		21.000	U	183481404402
Thallium													

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: P
Run Name: 1835202T70
Calibration Date(s): 12/18/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium				0.33	U	0.33	U						
Boron													
Calcium				75.6	B	33.4	U						
Chromium				0.96	U	0.96	U						
Cobalt													
Lithium				9.6	U	9.6	U						
Selenium				8.4	U	8.4	U						
Thallium													

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

Method: P
Run Name: 1835208T72
Calibration Date(s): 12/18/2018 - 12/19/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium													
Boron		8.4	U	8.4	U	8.4	U	8.4	U		12.000	U	183481404402
Calcium													
Chromium													
Cobalt		3.2	B	0.82	B	0.54	B	0.54	U		1.500	U	183481404402
Lithium													
Selenium													
Thallium		3.8	U	3.8	U	3.8	U	3.8	U		14.000	U	183481404402

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: P
Run Name: 1835208T72
Calibration Date(s): 12/18/2018 - 12/19/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium													
Boron				8.4	U	8.4	U						
Calcium													
Chromium													
Cobalt				0.54	U	0.54	U						
Lithium													
Selenium													
Thallium				3.8	U	4.1	B						

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: P
Run Name: 1835402T70
Calibration Date(s): 12/20/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium													
Boron													
Calcium													
Chromium													
Cobalt		0.54	U	0.54	U	0.54	U	0.54	U				
Lithium													
Selenium													
Thallium													

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: P
Run Name: 1835402T70
Calibration Date(s): 12/20/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Barium													
Boron													
Calcium													
Chromium													
Cobalt				0.54	U	0.54	U						
Lithium													
Selenium													
Thallium													

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: MS
Run Name: 1835407E03
Calibration Date(s): 12/20/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony													
Arsenic	75	0.40	U	0.40	U	0.40	U	0.40	U	75	0.680	U	183511404702A
Beryllium													
Cadmium	111	0.17	U	0.17	U	0.17	U	0.17	U	111	0.150	U	183511404702A
Lead	208	0.20	U	0.20	U	0.20	U	0.20	U	208	1.100	U	183511404702A
Molybdenum	98	0.25	U	0.25	U	0.25	U	0.25	U	98	0.310	U	183511404702A

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: MS
Run Name: 1835407E03
Calibration Date(s): 12/20/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony													
Arsenic	75			0.40	U								
Beryllium													
Cadmium	111			0.17	U								
Lead	208			0.20	U								
Molybdenum	98			0.25	U								

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: MS
Run Name: 1835503E05
Calibration Date(s): 12/21/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121	0.52	U	0.52	U	0.52	U	0.52	U	121	0.410	U	183511404702A
Arsenic													
Beryllium	9	0.067	U	0.067	U	0.067	U	0.067	U	9	0.091	U	183511404702A
Cadmium													
Lead													
Molybdenum													

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below IDL/MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: MS
Run Name: 1835503E05
Calibration Date(s): 12/21/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121			0.52	U								
Arsenic													
Beryllium	9			0.067	U								
Cadmium													
Lead													
Molybdenum													

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: MS
Run Name: 1835603E03
Calibration Date(s): 12/22/2018 - 12/23/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121	0.52	U	0.52	U	0.52	U	0.52	U	121	-0.437	B	183551404708A
Arsenic													
Beryllium													
Cadmium													
Lead	208	-0.40	B	-0.40	B	-0.42	B	-0.41	B	208	1.100	U	183551404708A
Molybdenum	98	-0.30	B	-0.27	B	-0.33	B	-0.31	B	98	-0.358	B	183551404708A

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: MS
Run Name: 1835603E03
Calibration Date(s): 12/22/2018 - 12/23/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony	121			0.52	U	0.52	U						
Arsenic													
Beryllium													
Cadmium													
Lead	208			-0.44	B	-0.43	B						
Molybdenum	98			-0.32	B	0.25	U						

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

Method: MS
Run Name: 1835702E05
Calibration Date(s): 12/23/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Antimony													
Arsenic	75	0.45	B	0.40	U	0.46	B			75	0.680	U	183551404708A
Beryllium	9	0.067	U	0.067	U	0.067	U			9	0.091	U	183551404708A
Cadmium	111	0.17	U	0.17	U	0.17	U			111	0.150	U	183551404708A
Lead													
Molybdenum													

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018
Preparation Blank Matrix: WATER

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury		0.050	U	0.050	U	0.050	U	0.050	U		0.050	U	183470571303

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U	0.050	U				

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer	U= Below IDL/MDL
MS = ICP Mass Spectrometry	B= Below LOQ
CV = Cold Vapor	
AF = Cold Vapor Atomic Fluorescence	

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QUALITY ASSURANCE SUMMARY
FORM 3
BLANKS
SDG No.: GEJ62

Method: CV
Run Name: 1834901M09
Calibration Date(s): 12/15/2018

		Initial Calibration Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank (UG/L)			
Analyte	Mass		C	1	C	2	C	3	C	Mass		C	Batch Number
Mercury				0.050	U	0.050	U						

METHODS:	CONCENTRATION QUALIFIERS:
P = ICP Atomic Emission Spectrometer MS = ICP Mass Spectrometry CV = Cold Vapor AF = Cold Vapor Atomic Fluorescence	U= Below IDL/MDL B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ62

Instrument ID: 11016
Run Name: 1835202T70
Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found %R	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found %R	Final Found Sol. AB	Final Found %R
Aluminum	500000		502404	100.5						
Barium	0		1							
Boron										
Calcium	500000		495564	99.1						
Chromium	0		16							
Cobalt										
Iron	200000		200863	100.4						
Lithium	0		6							
Magnesium	500000		464944	93.0						
Selenium	0		-27							
Thallium										

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ62

Instrument ID: 16417
Run Name: 1835208T72
Concentration Units: ug/L

Analyte	True		Initial Found				Final Found			
	Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R	Sol. A	%R	Sol. AB	%R
Aluminum	500000		532647	106.5						
Barium										
Boron	0		10							
Calcium	500000		502555	100.5						
Chromium										
Cobalt	0		1							
Iron	200000		196085	98.0						
Lithium										
Magnesium	500000		451335	90.3						
Selenium										
Thallium	0		-3							

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 4A
ICP-AES INTERFERENCE CHECK SAMPLE
SDG No.: GEJ62

Instrument ID: 11016
Run Name: 1835402T70
Concentration Units: ug/L

Analyte	True		Initial Found				Final Found			
	Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R	Sol. A	%R	Sol. AB	%R
Aluminum	500000		503058	100.6						
Barium										
Boron										
Calcium	500000		497748	99.5						
Chromium										
Cobalt	0		1							
Iron	200000		199766	99.9						
Lithium										
Magnesium	500000		457986	91.6						
Selenium										
Thallium										

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ62

Instrument ID: 11332
Run Name: 1835407E03
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		94923	94.9		
Antimony							
Arsenic	75	0		1			
Beryllium							
Cadmium	111	0		0			
Calcium	44	300000		280842	93.6		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		254343	101.7		
Lead	208	0		0			
Magnesium	24	100000		98835	98.8		
Molybdenum	98	2000		1938	96.9		
Phosphorus	31	10000		NA			
Potassium	39	100000		107723	107.7		
Sodium	23	250000		243167	97.3		
Sulfur	34	10000		NA			
Titanium	47	2000		2118	105.9		

Control Limits: All Metals 80%-120%

Instrument ID: 19204
Run Name: 1835503E05
Concentration Units: ug/L

Analyte	Mass	True Sol. A	True Sol. AB	Found Sol. A	Found %R	Found Sol. AB	Found %R
Aluminum	27	100000		93411	93.4		
Antimony	121	0		1			
Arsenic							
Beryllium	9	0		0			
Cadmium							
Calcium	44	300000		247033	82.3		
Carbon	13	20000		NA			
Chloride	37	100000		NA			
Iron	57	250000		224496	89.8		
Lead							
Magnesium	24	100000		91268	91.3		
Molybdenum	98	2000		2086	104.3		
Phosphorus	31	10000		NA			
Potassium	39	100000		91426	91.4		
Sodium	23	250000		218949	87.6		
Sulfur	34	10000		NA			
Titanium	47	2000		2085	104.3		

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ62

Instrument ID: 11332
Run Name: 1835603E03
Concentration Units: ug/L

Analyte	Mass	True		Found			
		Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R
Aluminum	27	100000	100000	98848	98.8	99698.8	99.7
Antimony	121	0	0	1		0.9	
Arsenic							
Beryllium							
Cadmium							
Calcium	44	300000	300000	287487	95.8	293982.4	98.0
Carbon	13	20000	20000	NA		NA	
Chloride	37	100000	100000	NA		NA	
Iron	57	250000	250000	244246	97.7	239109.4	95.6
Lead	208	0	0	0		-0.1	
Magnesium	24	100000	100000	95394	95.4	98457.0	98.5
Molybdenum	98	2000	2000	2017	100.9	1951.3	97.6
Phosphorus	31	10000	10000	NA		NA	
Potassium	39	100000	100000	99043	99.0	99234.3	99.2
Sodium	23	250000	250000	257733	103.1	255509.7	102.2
Sulfur	34	10000	10000	NA		NA	
Titanium	47	2000	2000	1973	98.7	2065.3	103.3

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ62

Instrument ID: 11332
Run Name: 1835603E03
Concentration Units: ug/L

Analyte	Mass	True		Found			
		Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R
Aluminum	27	100000	100000	102019	102.0	103614.5	103.6
Antimony	121	0	0	1		1.0	
Arsenic							
Beryllium							
Cadmium							
Calcium	44	300000	300000	303776	101.3	311065.9	103.7
Carbon	13	20000	20000	NA		NA	
Chloride	37	100000	100000	NA		NA	
Iron	57	250000	250000	245664	98.3	253064.9	101.2
Lead	208	0	0	0		-0.2	
Magnesium	24	100000	100000	101395	101.4	101203.9	101.2
Molybdenum	98	2000	2000	1987	99.4	2068.1	103.4
Phosphorus	31	10000	10000	NA		NA	
Potassium	39	100000	100000	102572	102.6	106798.5	106.8
Sodium	23	250000	250000	259188	103.7	273634.0	109.5
Sulfur	34	10000	10000	NA		NA	
Titanium	47	2000	2000	2118	105.9	2185.9	109.3

Control Limits: All Metals 80%-120%

QUALITY ASSURANCE SUMMARY
FORM 4B
ICP-MS INTERFERENCE CHECK SAMPLE
SDG No.: GEJ62

Instrument ID: 19204
Run Name: 1835702E05
Concentration Units: ug/L

Analyte	Mass	True		Found			
		Sol. A	Sol. AB	Sol. A	%R	Sol. AB	%R
Aluminum	27	100000	100000	108640	108.6	100957.7	101.0
Antimony							
Arsenic	75	0	100	0		112.0	112.0
Beryllium	9	0	0	0		0.0	
Cadmium	111	0	100	0		106.9	106.9
Calcium	44	300000	300000	314818	104.9	301258.5	100.4
Carbon	13	20000	20000	NA		NA	
Chloride	37	100000	100000	NA		NA	
Iron	57	250000	250000	264078	105.6	251291.5	100.5
Lead							
Magnesium	24	100000	100000	111255	111.3	105283.6	105.3
Molybdenum	98	2000	2000	2262	113.1	2277.7	113.9
Phosphorus	31	10000	10000	NA		NA	
Potassium	39	100000	100000	109322	109.3	103899.0	103.9
Sodium	23	250000	250000	270125	108.1	259036.1	103.6
Sulfur	34	10000	10000	NA		NA	
Titanium	47	2000	2000	2292	114.6	2015.4	100.8

Control Limits: All Metals 80%-120%

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QUALITY ASSURANCE SUMMARY
FORM 5A(MS/MSD)
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9931026BKG Matrix Spike Lab Sample ID: 9931026MS Matrix Spike Duplicate Lab Sample ID: 9931026MSD
Batch Number(s): 183481404402

		BKG Sample		MS Sample		MSD Sample		MS Spike	MSD Spike		MS		MSD				Control Limit		
Analyte	Mass	Result	C	Result	C	Result	C	Added	Added	Units	%R	Q	%R	Q	RPD	Q	%R	RPD	M
Barium		211.2600		2238.4600		2247.7100		2000.0000	2000.0000	UG/L	101		102		0		75 - 125	20	P
Boron		156.5100		2159.5600		2141.3700		2000.0000	2000.0000	UG/L	100		99		1		75 - 125	20	P
Calcium		38500.6600		43687.6100		43393.3800		4000.0000	4000.0000	UG/L	130		122		1			20	P
Chromium		5.3000	U	203.0400		201.2300		200.0000	200.0000	UG/L	102		101		1		75 - 125	20	P
Cobalt		2.4300	B	528.6300		523.4500		500.0000	500.0000	UG/L	105		104		1		75 - 125	20	P
Lithium		15.0200	B	1039.7300		1033.8900		1000.0000	1000.0000	UG/L	102		102		1		75 - 125	20	P
Selenium		21.0000	U	155.5400		154.7700		150.0000	150.0000	UG/L	104		103		0		75 - 125	20	P
Thallium		14.0000	U	153.0300		155.4500		150.0000	150.0000	UG/L	102		104		2		75 - 125	20	P

Note: Results shown are reported on an as-received basis.
If Matrix Spike/ Matrix Spike Duplicate were out of specification, see Post Digestion Spike form.

METHODS:
P = ICP Atomic Emission Spectrometer CV = Cold Vapor
MS = ICP Mass Spectrometry AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL, B= Below LOQ
FLAGS:
N = Matrix Spike OOS, * = Duplicate OOS

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QUALITY ASSURANCE SUMMARY
FORM 6
DUPLICATES
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9931026BKG 9931026DUP
Batch Number(s): 1834814044
02
Concentration Units: UG/L

Analyte	Mass	Control Limit	Samples (S)	C	Duplicate (D)	C	RPD	Max RPD	Q	M
Barium			211.2600		216.6100		3		P	
Boron		50.0	156.5100		159.4000		2		P	
Calcium			38500.6600		39534.7100		3		P	
Chromium			5.3000	U	5.3000	U			P	
Cobalt			2.4300	B	2.3800	B	2		P	
Lithium			15.0200	B	18.7600	B	22		P	
Selenium			21.0000	U	21.0000	U			P	
Thallium			14.0000	U	14.0000	U			P	

NOTE: An asterisk (*) in column "Q" indicates poor duplicate precision (RPD > Max OR |(S) - (D)| > LOQ for values < 5x LOQ).
The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample.

Note: Results shown are reported on an as-received basis.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
* = Duplicate Out of Spec

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QUALITY ASSURANCE SUMMARY
FORM 7
LABORATORY CONTROL SAMPLE
SDG No.: GEJ62
Matrix: WATER

Analyte	Mass	Batch Number	Units	True	Found	C	Control Limits (%)	%R	M	In Spec
Barium		183481404402	UG/L	2000.000	2030.960		80 - 120	102	P	Yes
Boron		183481404402	UG/L	2000.000	1935.970		80 - 120	97	P	Yes
Calcium		183481404402	UG/L	4000.000	4199.180		80 - 120	105	P	Yes
Chromium		183481404402	UG/L	200.000	203.680		80 - 120	102	P	Yes
Cobalt		183481404402	UG/L	500.000	541.200		80 - 120	108	P	Yes
Lithium		183481404402	UG/L	1000.000	1028.870		80 - 120	103	P	Yes
Mercury		183470571303	UG/L	1.000	0.846		80 - 120	85	CV	Yes
Selenium		183481404402	UG/L	150.000	149.850		80 - 120	100	P	Yes
Thallium		183481404402	UG/L	150.000	159.140		80 - 120	106	P	Yes

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 7(LCS/LCSD)
LABORATORY CONTROL SAMPLE/SAMPLE DUPLICATE
SDG No.: GEJ62
Matrix: WATER

Analyte	Mass	Lab Sample ID LCS	Lab Sample ID LCSD	Batch Number	Units	True	LCS Found	LCS C	LCS %R	LCSD Found	LCSD C	LCSD %R	Control Limits (%)	RPD	M	In Spec
Antimony	121	P35104BQ	P35104BY	183511404702	UG/L	6.000	5.247		87	5.192		87	80 - 120	1	MS	Yes
Arsenic	75	P35104BQ	P35104BY	183511404702	UG/L	10.000	11.536		115	10.159		102	80 - 120	13	MS	Yes
Beryllium	9	P35104BQ	P35104BY	183511404702	UG/L	4.000	4.071		102	4.240		106	80 - 120	4	MS	Yes
Cadmium	111	P35104BQ	P35104BY	183511404702	UG/L	5.000	5.261		105	5.060		101	80 - 120	4	MS	Yes
Lead	208	P35104BQ	P35104BY	183511404702	UG/L	15.000	15.736		105	15.623		104	80 - 120	1	MS	Yes
Molybdenum	98	P35104BQ	P35104BY	183511404702	UG/L	50.000	52.786		106	51.795		104	80 - 120	2	MS	Yes

RPD Control Limit: 20

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 7(LCS/LCSD)
LABORATORY CONTROL SAMPLE/SAMPLE DUPLICATE
SDG No.: GEJ62
Matrix: WATER

Analyte	Mass	Lab Sample ID LCS	Lab Sample ID LCSD	Batch Number	Units	True	LCS Found	LCS C	LCS %R	LCSD Found	LCSD C	LCSD %R	Control Limits (%)	RPD	M	In Spec
Antimony	121	P35504HQ	P35504HY	183551404708	UG/L	6.000	5.335		89	5.152		86	80 - 120	3	MS	Yes
Arsenic	75	P35504HQ	P35504HY	183551404708	UG/L	10.000	9.007		90	10.549		105	80 - 120	16	MS	Yes
Beryllium	9	P35504HQ	P35504HY	183551404708	UG/L	4.000	3.913		98	3.716		93	80 - 120	5	MS	Yes
Cadmium	111	P35504HQ	P35504HY	183551404708	UG/L	5.000	5.475		110	4.712		94	80 - 120	15	MS	Yes
Lead	208	P35504HQ	P35504HY	183551404708	UG/L	15.000	14.861		99	14.012		93	80 - 120	6	MS	Yes
Molybdenum	98	P35504HQ	P35504HY	183551404708	UG/L	50.000	52.696		105	50.145		100	80 - 120	5	MS	Yes

RPD Control Limit: 20

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: *31001BKG Serial Dilution Lab Sample ID: *31001L
Batch Number(s): 183511404702
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Antimony	121	0.7577	B	2.0300	U	100		MS
Arsenic	75	1.9808	B	4.0397	B	104		MS
Beryllium	9	0.0910	U	0.4550	U			MS
Cadmium	111	0.1510	U	0.7550	U			MS
Lead	208	1.0700	U	5.3500	U			MS
Molybdenum	98	2.6967		2.9998	B	11		MS

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

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QUALITY ASSURANCE SUMMARY
FORM 9
SERIAL DILUTIONS
SDG No.: GEJ62
Matrix: WATER Level (low/med): LOW

Background Lab Sample ID: 9931026BKG Serial Dilution Lab Sample ID: 9931026L
Batch Number(s): 183551404708, 183481404402
Concentration Units: UG/L

Analyte	Mass	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Diff.	Q	M
Antimony	121	0.4060	U	2.0300	U			MS
Arsenic	75	0.6800	U	3.4000	U			MS
Barium		211.2600		203.4500		4		P
Beryllium	9	0.0910	U	0.4550	U			MS
Boron		156.5100		170.8000	B	9		P
Cadmium	111	0.1510	U	0.7550	U			MS
Calcium		38500.6600		37868.8000		2		P
Chromium		5.3000	U	26.5000	U			P
Cobalt		2.4300	B	7.5000	U	100		P
Lead	208	1.0700	U	5.3500	U			MS
Lithium		15.0200	B	55.0000	U	100		P
Molybdenum	98	2.2219		1.5450	U	100		MS
Selenium		21.0000	U	105.0000	U			P
Thallium		14.0000	U	70.0000	U			P

NOTE: An E in column Q indicates the presence of a chemical or physical interference in the matrix when the % difference is greater than 10%. This applies only when (I) is greater than or equal to 50x MDL for ICP, 100x MDL for ICP-MS (6020), 50x MDL for ICP-MS (200.8), or 25x MDL for GFAA.

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry

CONCENTRATION QUALIFIERS:
U= Below MDL
B= Below LOQ
FLAGS:
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution

QUALITY ASSURANCE SUMMARY
FORM 10
INSTRUMENT DETECTION LIMITS (QUARTERLY)
SDG No.: GEJ62

Method: P
Instrument ID: 11016
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium	455.40		0.33
Boron			
Calcium	317.93		33.4
Chromium	267.72		0.96
Cobalt	228.62		0.53
Lithium	670.78		9.6
Selenium	196.09		8.4
Thallium			

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

QUALITY ASSURANCE SUMMARY
FORM 10
INSTRUMENT DETECTION LIMITS (QUARTERLY)
SDG No.: GEJ62

Method: P
Instrument ID: 16417
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Barium			
Boron	249.67		8.4
Calcium			
Chromium			
Cobalt	228.62		0.54
Lithium			
Selenium			
Thallium	190.86		3.8

Comments:

_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10
INSTRUMENT DETECTION LIMITS (QUARTERLY)
SDG No.: GEJ62

Method: MS
Instrument ID: 11332
Date: 07/2018

Analyte	MASS (amu)	Background	IDL (UG/L)
Antimony	121		0.34
Arsenic	75		0.40
Beryllium			
Cadmium	111		0.14
Lead	208		0.20
Molybdenum	98		0.25

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10
INSTRUMENT DETECTION LIMITS (QUARTERLY)
SDG No.: GEJ62

Method: MS
Instrument ID: 19204
Date: 07/2018

Analyte	MASS (amu)	Background	IDL (UG/L)
Antimony	121		0.52
Arsenic	75		0.40
Beryllium	9		0.067
Cadmium	111		0.17
Lead			
Molybdenum			

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

Method: CV
Instrument ID: 23283
Date: 07/2018

Analyte	Wavelength (nm)	Background	IDL (UG/L)
Mercury			0.050

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ62
Matrix: WATER

Method: P
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium	455.40		5.0	1.0
Boron	249.67		50.0	12.0
Calcium	317.93		500	33.0
Chromium				
Cobalt	228.62		5.0	1.5
Lithium	670.78		50.0	11.0
Selenium				
Thallium				

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ62
Matrix: WATER

Method: P
Date: 09/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Barium				
Boron				
Calcium				
Chromium	267.72		15.0	5.3
Cobalt				
Lithium				
Selenium	196.09		50.0	21.0
Thallium	190.86		30.0	14.0

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
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_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ62
Matrix: WATER

Method: MS
Date: 07/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony	121		2.0	0.41
Arsenic				
Beryllium	9		0.50	0.091
Cadmium	111		1.0	0.15
Lead				
Molybdenum	98		2.0	0.31

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
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METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ62
Matrix: WATER

Method: MS
Date: 09/2018

Analyte	Mass	Background	LOQ (UG/L)	MDL (UG/L)
Antimony				
Arsenic	75		2.0	0.68
Beryllium				
Cadmium				
Lead	208		3.0	1.1
Molybdenum				

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:
_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

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QUALITY ASSURANCE SUMMARY
FORM 10 MDL
METHOD DETECTION LIMITS (ANNUALLY)
SDG No.: GEJ62
Matrix: WATER

Method: CV
Date: 06/2018

Analyte	Wavelength (nm)	Background	LOQ (UG/L)	MDL (UG/L)
Mercury			0.20	0.050

The LOQ/MDL must be adjusted for % Solids and Sample Weight for samples reporting in mg/kg and ug/L.

Comments:

_____
_____
_____
_____

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

US EPA Tune Check Report

Operator Name	US19_USR_INS14259
Acq/Data Batch	C:\Agilent\ICPMH\1\DATA\~EPATUNEaa.b
Acq. Date-Time	12/20/2018 5:41:57 PM
Report Comment	ICP-MS #19204 (E05) Daily Tune Check
Instrument Name	G3281A JP12071581

[No Gas]

Sensitivity

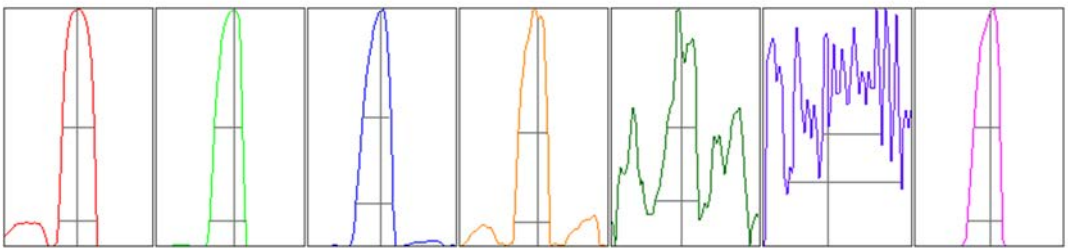
Mass	Conc. [ug/l]	Count	CPS	Resp (Required) [cps/ug/l]	Resp (Flag)	RSD%	RSD% (Required)
7	10.00	1129	11290.75			1.263	5.000
89	10.00	2194	21935.38			0.683	5.000
205	10.00	581	5806.88			0.857	5.000
70	1.00	39	388.73	0.00		8.088	
156	1.00	5	46.00	0.00		10.398	
220	1.00	2	22.40	0.00		14.672	
140	10.00	1440	14402.18	0.00		0.714	

Mass	RSD% (Flag)
7	
89	
205	
70	
156	
220	
140	

Mass	Rep#1 Count	Rep#2 Count	Rep#3 Count	Rep#4 Count	Rep#5 Count
7	1150	1119	1122	1117	1138
89	2184	2176	2205	2213	2190
205	580	580	587	582	574
70	39	36	41	43	36
156	4	5	4	4	5
220	3	3	2	2	2
140	1430	1440	1431	1444	1456

Integration Time [sec] 0.1

Resolution/Axis



US EPA Tune Check Report

Mass	Peak Height	Axis	Axis (Required)	Axis (Flag)
7	1794.04	7.00	6.90 - 7.10	
89	3956.19	89.10	88.90 - 89.10	
205	1057.51	205.00	204.90 - 205.10	
70	66.66	70.10	-	
156	6.60	155.95	-	
220	1.85	219.85	-	
140	2749.44	140.05	-	

Mass	W-50%	W-10%	W-10% (Required)	W-10% (Flag)
7	0.65	0.770	0.800	
89	0.58	0.728	0.800	
205	0.56	0.749	0.800	
70	0.60	0.720		
156	0.60	0.896		
220	1.19	2.275		
140	0.54	0.715		

Integration Time [sec]	0.1
Acquisition Time [sec]	260.3
Y Axis	Linear

Tune Parameters

Plasma Parameters

Plasma Mode	---	Nebulizer Gas	0.25 L/min	Dilution Gas	0.70 L/min
RF Power	1600 W	Option Gas	---	Auxiliary Gas	0.90 L/min
RF Matching	1.60 V	Nebulizer Pump	0.10 rps	Plasma Gas	15.0 L/min
Sample Depth	10.0 mm	S/C Temp	20 °C		

Lens Parameters

Extract 1	0.0 V	Omega Lens	4.1 V	Deflect	12.6 V
Extract 2	-100.0 V	Cell Entrance	-32 V	Plate Bias	-20 V
Omega Bias	-75 V	Cell Exit	-59 V		

Cell Parameters

Use Gas	No	3rd Gas Flow	---	Energy Discrimination	5.0 V
He Flow	0.0 mL/min	OctP Bias	-8.0 V		
H2 Flow	0.0 mL/min	OctP RF	180 V		

QP Parameters

Mass Gain	122	Axis Gain	0.9986	QP Bias	-3.0 V
Mass Offset	126	Axis Offset	0.06		

Hardware Settings

Torch

Torch H	1.0 mm	Torch V	-1.5 mm		

EM

Discriminator	4.5 mV	Analog HV	1742 V	Pulse HV	1501 V

US EPA Tune Check Report

Operator Name	US19_USR_INS14259
Acq/Data Batch	C:\Agilent\ICPMH\1\DATA\~EPATUNEaa.b
Acq. Date-Time	12/22/2018 2:01:38 PM
Report Comment	ICP-MS #19204 (E05) Daily Tune Check
Instrument Name	G3281A JP12071581

[No Gas]

Sensitivity

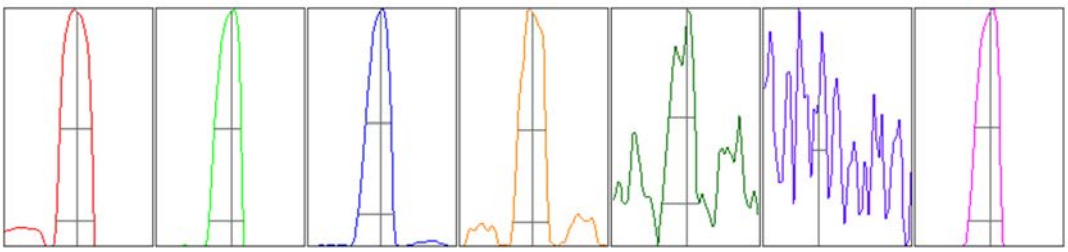
Mass	Conc. [ug/l]	Count	CPS	Resp (Required) [cps/ug/l]	Resp (Flag)	RSD%	RSD% (Required)
7	10.00	524	5239.81			1.984	5.000
89	10.00	2047	20466.68			1.246	5.000
205	10.00	555	5551.34			2.454	5.000
70	1.00	28	279.02	0.00		4.224	
156	1.00	4	40.60	0.00		13.917	
220	1.00	2	20.80	0.00		31.508	
140	10.00	1374	13737.25	0.00		0.757	

Mass	RSD% (Flag)
7	
89	
205	
70	
156	
220	
140	

Mass	Rep#1 Count	Rep#2 Count	Rep#3 Count	Rep#4 Count	Rep#5 Count
7	533	533	524	522	508
89	2063	2080	2042	2015	2034
205	566	573	546	546	544
70	28	27	30	27	28
156	5	4	4	4	4
220	1	2	2	2	3
140	1386	1383	1368	1362	1369

Integration Time [sec] 0.1

Resolution/Axis



US EPA Tune Check Report

Mass	Peak Height	Axis	Axis (Required)	Axis (Flag)
7	836.64	7.00	6.90 - 7.10	
89	3871.53	89.05	88.90 - 89.10	
205	1092.74	205.00	204.90 - 205.10	
70	50.70	70.00	-	
156	7.35	156.05	-	
220	2.50	219.65	-	
140	2774.67	140.05	-	

Mass	W-50%	W-10%	W-10% (Required)	W-10% (Flag)
7	0.65	0.764	0.800	
89	0.55	0.694	0.800	
205	0.51	0.720	0.800	
70	0.58	0.726		
156	0.52	0.749		
220	0.28			
140	0.51	0.690		

Integration Time [sec]	0.1
Acquisition Time [sec]	260.3
Y Axis	Linear

Tune Parameters

Plasma Parameters

Plasma Mode	---	Nebulizer Gas	0.25 L/min	Dilution Gas	0.70 L/min
RF Power	1600 W	Option Gas	---	Auxiliary Gas	0.90 L/min
RF Matching	1.60 V	Nebulizer Pump	0.10 rps	Plasma Gas	15.0 L/min
Sample Depth	10.0 mm	S/C Temp	20 °C		

Lens Parameters

Extract 1	0.0 V	Omega Lens	5.5 V	Deflect	13.8 V
Extract 2	-105.0 V	Cell Entrance	-32 V	Plate Bias	-20 V
Omega Bias	-85 V	Cell Exit	-59 V		

Cell Parameters

Use Gas	No	3rd Gas Flow	---	Energy Discrimination	5.0 V
He Flow	0.0 mL/min	OctP Bias	-8.0 V		
H2 Flow	0.0 mL/min	OctP RF	190 V		

QP Parameters

Mass Gain	123	Axis Gain	0.9989	QP Bias	-3.0 V
Mass Offset	126	Axis Offset	0.01		

Hardware Settings

Torch

Torch H	1.2 mm	Torch V	-2.0 mm

EM

Discriminator	4.5 mV	Analog HV	1741 V	Pulse HV	1505 V

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ62

Instrument ID: 11332
Run Name: 1835407E03

Start Date: 12/20/2018
End Date: 12/20/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-1-115	AS,MO	TB-1-159	CD,PB

Lab Sample ID	Time	Internal Standards %RI For: Element IN-1-115	Q	Element TB-1-159	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	17:59	100		100											
S	18:00	106		108											
ICV	18:02	112		109											
ICB	18:04	98		97											
LLC	18:05	102		100											
ICSA	18:07	106		102											
LRS2	18:08	107		111											
LRS3	18:10	112		111											
CCS	18:12	97		94											
CCS	18:13	95		93											
CCV	18:15	104		99											
CCB	18:16	91		91											
P35104BB	18:18	100		100											
P35104BQ	18:19	102		101											
P35104BY	18:21	106		102											
*31001BKG	18:23	94		95											
ZZZZZZ	18:24														
*31001L	18:26	104		101											
ZZZZZZ	18:27														
ZZZZZZ	18:29														
ZZZZZZ	18:31														
CCV	18:32	103		98											
CCB	18:34	98		94											
ZZZZZZ	18:35														
ZZZZZZ	18:37														
ZZZZZZ	18:38														
ZZZZZZ	18:40														
ZZZZZZ	18:42														
ZZZZZZ	18:43														
ZZZZZZ	18:45														
9931021	18:46	106		102											
9931023	18:48														
9931023	18:50														

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ62

Instrument ID: 11332
Run Name: 1835407E03

Start Date: 12/20/2018
End Date: 12/20/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-1-115	AS,MO	TB-1-159	CD,PB

Lab Sample ID	Time	Internal Standards %RI For: Element IN-1-115	Q	Element TB-1-159	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
CCV	18:51	104		102											
CCB	18:53	96		93											
9931022	18:54	102		100											
9931023	18:56	105		102											
9931024	18:58	97		95											
9931025	18:59	106		104											
9931025	19:01														
9931027	19:02	101		98											
CCV	19:04	98		97											
CCB	19:05	94		91											

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ62

Instrument ID: 19204
Run Name: 1835503E05

Start Date: 12/21/2018
End Date: 12/21/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-3-115	SB	SC-1-45	BE

Lab Sample ID	Time	Internal Standards %RI For: Element SC-1-45	Q	Element IN-3-115	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	08:16	100		100											
S	08:18	100		98											
ICV	08:21	101		96											
ICB	08:24	102		93											
LLC	08:26	102		98											
ICSA	08:28	103		90											
LRS2	08:31	105		93											
LRS3	08:33	103		90											
CCS	08:36	99		93											
CCS	08:38	99		88											
CCV	08:40	101		93											
CCB	08:43	101		93											
P35104BB	08:45	99		93											
ZZZZZZ	08:48														
ZZZZZZ	08:50														
P35104BY	08:53	100		89											
P35104BY	08:55	100		99											
*31001BKG	08:57	100		85											
ZZZZZZ	09:00														
*31001L	09:02	111		99											
ZZZZZZ	09:05														
CCV	09:07	110		100											
CCB	09:09	106		96											
ZZZZZZ	09:12														
ZZZZZZ	09:14														
ZZZZZZ	09:17														
ZZZZZZ	09:19														
ZZZZZZ	09:21														
ZZZZZZ	09:24														
ZZZZZZ	09:26														
ZZZZZZ	09:29														
9931021	09:31	111		100											
9931027	09:34	110		98											

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ62

Instrument ID: 19204
Run Name: 1835503E05

Start Date: 12/21/2018
End Date: 12/21/2018

Standard	Elements Applies to	Standard	Elements Applies to
IN-3-115	SB	SC-1-45	BE

Lab Sample ID	Time	Internal Standards %RI For: Element SC-1-45	Q	Element IN-3-115	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
CCV	09:36	109		104											
CCB	09:38	109		99											
P35104BQ	09:41	111		103											
P35104BQ	09:43	109		101											
9931022	09:46	108		101											
9931023	09:48	107		97											
9931024	09:50	106		101											
9931025	09:53	106		95											
9931025	09:55														
CCV	09:58	105		94											
CCB	10:00	104		100											

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ62

Instrument ID: 11332
Run Name: 1835603E03

Start Date: 12/22/2018
End Date: 12/23/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-1-209	PB	IN-1-115	MO,SB

Lab Sample ID	Time	Internal Standards %RI For: Element IN-1-115	Q	Element BI-1-209	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	21:20	100		100											
S	21:22	99		103											
ICV	21:24	100		103											
ICB	21:25	95		100											
LLC	21:27	100		104											
ICSA	21:28	95		95											
ICSAB	21:30	94		92											
LRS2	21:32	95		95											
LRS3	21:33	96		98											
CCS	21:35	97		100											
CCS	21:36	97		101											
CCV	21:38	101		104											
CCB	21:39	100		101											
ZZZZZZ	21:41														
ZZZZZZ	21:43														
ZZZZZZ	21:44														
ZZZZZZ	21:46														
ZZZZZZ	21:48														
ZZZZZZ	21:50														
ZZZZZZ	21:51														
ZZZZZZ	21:53														
ZZZZZZ	21:55														
ZZZZZZ	21:56														
CCV	21:58	102		100											
CCB	21:59	103		102											
ZZZZZZ	22:01														
ZZZZZZ	22:02														
ZZZZZZ	22:04														
ZZZZZZ	22:06														
ZZZZZZ	22:07														
ZZZZZZ	22:09														
ZZZZZZ	22:10														
ZZZZZZ	22:12														

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ62

Instrument ID: 11332
Run Name: 1835603E03

Start Date: 12/22/2018
End Date: 12/23/2018

Standard	Elements Applies to	Standard	Elements Applies to
BI-1-209	PB	IN-1-115	MO,SB

Lab Sample ID	Time	Internal Standards %RI For: Element IN-1-115	Q	Element BI-1-209	Q	Element	Q	Element	Q	Element	Q	Element	Q	Element	Q
ZZZZZZ	22:14														
CCV	22:15	105		104											
CCB	22:17	96		95											
P35504HB	22:18	99		100											
P35504HQ	22:20	96		99											
P35504HY	22:23	99		102											
9931026BKG	22:25	101		99											
9931026A	22:27	96		95											
9931026L	22:28	98		99											
CCV	22:30	94		100											
CCB	22:32	94		92											
LLC	22:33	98		100											
ICSA	22:35	93		89											
ICSAB	22:36	94		94											
ZZZZZZ	22:38														
CCV	22:39	99		99											
CCB	22:41	97		100											

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike

FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

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QUALITY ASSURANCE SUMMARY
FORM 16
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
SDG No.: GEJ62

Instrument ID: 19204
Run Name: 1835702E05

Start Date: 12/23/2018
End Date: 12/23/2018

Standard	Elements Applies to	Standard	Elements Applies to
GE-3-72	AS	IN-3-115	CD
SC-1-45	BE		

Lab Sample ID	Time	Internal Standards %RI For: Element SC-1-45	Q	Element GE-3-72	Q	Element IN-3-115	Q	Element	Q	Element	Q	Element	Q	Element	Q
S0	12:28	100		100		100									
S	12:31	99		101		105									
ICV	12:34	99		97		101									
ICB	12:36	100		97		100									
LLC	12:39	101		100		100									
ICSA	12:41	99		92		95									
ICSAB	12:43	101		93		95									
LRS2	12:46	102		99		92									
LRS3	12:48	103		97		95									
CCS	12:51	102		96		100									
CCS	12:53	100		96		93									
CCV	12:55	104		96		94									
CCB	12:58	97		94		90									
P35504HB	13:00	98		98		93									
P35504HQ	13:03	99		99		93									
P35504HY	13:05	103		100		99									
9931026BKG	13:07	96		100		104									
9931026A	13:10	106		101											
9931026L	13:12	103		97		100									
CCV	13:15	102		100		96									
CCB	13:17	99		97		96									

LEGEND:
BKG = Background
DUP = Duplicate
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
FLAG:
R = Internal Standard Relative Intensity OOS

INTERNAL STANDARD ELEMENTS:
BE = Beryllium
BI = Bismuth
GE = Germanium
HO = Holmium
IN = Indium
LI = Lithium
SC = Scandium
TB = Terbium
Y = Yttrium

Preparation and Run Logs

Metals in Liquid

Method: P
Batch Number: 183481404402

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9931021	12/17/2018	50.00	50
9931022	12/17/2018	50.00	50
9931023	12/17/2018	50.00	50
9931024	12/17/2018	50.00	50
9931025	12/17/2018	50.00	50
9931027	12/17/2018	50.00	50
9931026BKG	12/17/2018	50.00	50
9931026DUP	12/17/2018	50.00	50
9931026MSD	12/17/2018	50.00	50
9931026MS	12/17/2018	50.00	50
P34804BB	12/17/2018	50.00	50
P34804BQ	12/17/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: MS
Batch Number: 183511404702

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9931021	12/18/2018	50.00	50
9931022	12/18/2018	50.00	50
9931023	12/18/2018	50.00	50
9931024	12/18/2018	50.00	50
9931025	12/18/2018	50.00	50
9931027	12/18/2018	50.00	50
*31001BKG	12/18/2018	50.00	50
P35104BB	12/18/2018	50.00	50
P35104BQ	12/18/2018	1.00	1
P35104BY	12/18/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: MS
Batch Number: 183551404708

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9931026BKG	12/21/2018	50.00	50
P35504HB	12/21/2018	50.00	50
P35504HQ	12/21/2018	1.00	1
P35504HY	12/21/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Method: CV
Batch Number: 183470571303

Lab Sample ID	Date	Initial Volume(ml)	Final Volume(ml)
9931021	12/14/2018	40.00	40
9931022	12/14/2018	40.00	40
9931023	12/14/2018	40.00	40
9931024	12/14/2018	40.00	40
9931025	12/14/2018	40.00	40
9931026	12/14/2018	40.00	40
9931027	12/14/2018	40.00	40
*31001BKG	12/14/2018	40.00	40
P34771CB	12/14/2018	40.00	40
P34771CQ	12/14/2018	1.00	1

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: P
Instrument ID: 11016
Run Name: 1835202T70

Run Start Date: 12/18/2018
Run End Date: 12/18/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: P
Instrument ID: 11016
Run Name: 1835202T70

Run Start Date: 12/18/2018
Run End Date: 12/18/2018

Lab Sample ID	D/F	Time	Analytes																																			
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																						
CCV	1.00	08:16			X				X	X			X			X																							
CCB	1.00	08:19			X				X	X			X			X																							
9931023	1.00	08:22			X				X	X			X			X																							
9931024	1.00	08:25			X				X	X			X			X																							
9931025	1.00	08:28			X				X	X			X			X																							
9931027	1.00	08:31			X				X	X			X			X																							
ZZZZZZ	1.00	08:34																																				
ZZZZZZ	1.00	08:36																																				
CCV	1.00	08:39			X				X	X			X			X																							
CCB	1.00	08:42			X				X	X			X			X																							

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: P
Instrument ID: 16417
Run Name: 1835208T72

Run Start Date: 12/18/2018
Run End Date: 12/19/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: P
Instrument ID: 16417
Run Name: 1835208T72

Run Start Date: 12/18/2018
Run End Date: 12/19/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
CCV	1.00	00:00					X				X						X																								
CCB	1.00	00:04					X				X						X																								
9931022	1.00	00:07					X				X						X																								
9931023	1.00	00:10					X										X																								
9931024	1.00	00:14					X				X						X																								
9931025	1.00	00:17					X				X						X																								
9931027	1.00	00:20					X				X						X																								
CCV	1.00	00:24					X				X						X																								
CCB	1.00	00:27					X				X						X																								

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: P
Instrument ID: 11016
Run Name: 1835402T70

Run Start Date: 12/20/2018
Run End Date: 12/20/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: P
Instrument ID: 11016
Run Name: 1835402T70

Run Start Date: 12/20/2018
Run End Date: 12/20/2018

Lab Sample ID	D/F	Time	Analytes																																			
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																						
ZZZZZZ	1.00	12:47																																					
ZZZZZZ	1.00	12:50																																					
ZZZZZZ	1.00	12:54																																					
9931021	1.00	12:57									X																												
9931023	1.00	13:00									X																												
CCV	1.00	13:03									X																												
CCB	1.00	13:06									X																												

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: MS
Instrument ID: 11332
Run Name: 1835407E03

Run Start Date: 12/20/2018
Run End Date: 12/20/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: MS
Instrument ID: 11332
Run Name: 1835407E03

Run Start Date: 12/20/2018
Run End Date: 12/20/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
9931025	1.00	18:59		X				X				X			X																										
9931025	20.00	19:01																																						
9931027	1.00	19:02		X				X				X			X																										
CCV	1.00	19:04		X				X				X			X																										
CCB	1.00	19:05		X				X				X			X																										

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: MS
Instrument ID: 19204
Run Name: 1835503E05

Run Start Date: 12/21/2018
Run End Date: 12/21/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
S0	1.00	08:16	X			X																																			
S	1.00	08:18	X			X																																			
ICV	1.00	08:21	X			X																																			
ICB	1.00	08:24	X			X																																			
LLC	1.00	08:26	X			X																																			
ICSA	1.00	08:28	X			X																																			
LRS2	1.00	08:31	X			X																																			
LRS3	1.00	08:33	X			X																																			
CCS	1.00	08:36	X			X																																			
CCS	1.00	08:38	X			X																																			
CCV	1.00	08:40	X			X																																			
CCB	1.00	08:43	X			X																																			
P35104BB	1.00	08:45	X			X																																			
ZZZZZZ	1.00	08:48																																							
ZZZZZZ	1.00	08:50																																							
P35104BY	1.00	08:53	X			X																																			
P35104BY	1.00	08:55																																							
*31001BKG	1.00	08:57	X			X																																			
ZZZZZZ	1.00	09:00																																							
*31001L	5.00	09:02	X			X																																			
ZZZZZZ	1.00	09:05																																							
CCV	1.00	09:07	X			X																																			
CCB	1.00	09:09	X			X																																			
ZZZZZZ	1.00	09:12																																							
ZZZZZZ	1.00	09:14																																							
ZZZZZZ	1.00	09:17																																							
ZZZZZZ	1.00	09:19																																							
ZZZZZZ	1.00	09:21																																							
ZZZZZZ	1.00	09:24																																							
ZZZZZZ	1.00	09:26																																							
ZZZZZZ	1.00	09:29																																							
9931021	1.00	09:31	X			X																																			
9931027	1.00	09:34	X			X																																			
CCV	1.00	09:36	X			X																																			
CCB	1.00	09:38	X			X																																			
P35104BQ	1.00	09:41	X			X																																			
P35104BQ	1.00	09:43																																							
9931022	1.00	09:46	X			X																																			

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: MS
Instrument ID: 19204
Run Name: 1835503E05

Run Start Date: 12/21/2018
Run End Date: 12/21/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
9931023	1.00	09:48	X			X																																			
9931024	1.00	09:50	X			X																																			
9931025	1.00	09:53	X			X																																			
9931025	20.00	09:55																																							
CCV	1.00	09:58	X			X																																			
CCB	1.00	10:00	X			X																																			

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: MS
Instrument ID: 11332
Run Name: 1835603E03

Run Start Date: 12/22/2018
Run End Date: 12/23/2018

| Lab Sample ID | D/F | Time | Analytes | | |

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: MS
Instrument ID: 11332
Run Name: 1835603E03

Run Start Date: 12/22/2018
Run End Date: 12/23/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
P35504HY	1.00	22:23	X									X			X																										
9931026BKG	1.00	22:25	X									X			X																										
9931026A	1.00	22:27																																						
9931026L	5.00	22:28	X									X			X																										
CCV	1.00	22:30	X									X			X																										
CCB	1.00	22:32	X									X			X																										
LLC	1.00	22:33	X									X			X																										
ICSA	1.00	22:35	X									X			X																										
ICSAB	1.00	22:36	X									X			X																										
ZZZZZZ	1.00	22:38																																						
CCV	1.00	22:39	X									X			X																										
CCB	1.00	22:41	X									X			X																										

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: MS
Instrument ID: 19204
Run Name: 1835702E05

Run Start Date: 12/23/2018
Run End Date: 12/23/2018

Lab Sample ID	D/F	Time	Analytes																																				
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																							
S0	1.00	12:28		X		X		X																															
S	1.00	12:31		X		X		X																															
ICV	1.00	12:34		X		X		X																															
ICB	1.00	12:36		X		X		X																															
LLC	1.00	12:39		X		X		X																															
ICSA	1.00	12:41		X		X		X																															
ICSAB	1.00	12:43		X		X		X																															
LRS2	1.00	12:46		X		X		X																															
LRS3	1.00	12:48		X		X		X																															
CCS	1.00	12:51		X		X		X																															
CCS	1.00	12:53		X		X		X																															
CCV	1.00	12:55		X		X		X																															
CCB	1.00	12:58		X		X		X																															
P35504HB	1.00	13:00		X		X		X																															
P35504HQ	1.00	13:03		X		X		X																															
P35504HY	1.00	13:05		X		X		X																															
9931026BKG	1.00	13:07		X		X		X																															
9931026A	1.00	13:10																																					
9931026L	5.00	13:12		X		X		X																															
CCV	1.00	13:15		X		X		X																															
CCB	1.00	13:17		X		X		X																															

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: CV
Instrument ID: 23283
Run Name: 1834901M09

Run Start Date: 12/15/2018
Run End Date: 12/15/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
S0	1.00	06:21												X																											
S0.2	1.00	06:23												X																											
S0.5	1.00	06:25												X																											
S1.0	1.00	06:27												X																											
S2.5	1.00	06:29												X																											
S5.0	1.00	06:31												X																											
ICV	1.00	06:33												X																											
ICB	1.00	06:35												X																											
CRA	1.00	06:37												X																											
CCV	1.00	06:39												X																											
CCB	1.00	06:41												X																											
ZZZZZZ	1.00	06:43																																							
ZZZZZZ	1.00	06:45																																							
ZZZZZZ	1.00	06:47																																							
ZZZZZZ	1.00	06:49																																							
ZZZZZZ	1.00	06:51																																							
ZZZZZZ	1.00	06:53																																							
ZZZZZZ	1.00	06:55																																							
ZZZZZZ	1.00	06:57																																							
ZZZZZZ	1.00	06:59																																							
ZZZZZZ	1.00	07:01																																							
CCV	1.00	07:04												X																											
CCB	1.00	07:06												X																											
ZZZZZZ	1.00	07:08																																							
ZZZZZZ	1.00	07:10																																							
ZZZZZZ	1.00	07:12																																							
ZZZZZZ	1.00	07:14																																							
ZZZZZZ	1.00	07:16																																							
ZZZZZZ	1.00	07:18																																							
ZZZZZZ	1.00	07:20																																							
ZZZZZZ	1.00	07:22																																							
ZZZZZZ	1.00	07:24																																							
ZZZZZZ	1.00	07:26																																							
CCV	1.00	07:28												X																											
CCB	1.00	07:30												X																											
ZZZZZZ	1.00	07:32																																							
ZZZZZZ	1.00	07:34																																							
ZZZZZZ	1.00	07:36																																							

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: CV
Instrument ID: 23283
Run Name: 1834901M09

Run Start Date: 12/15/2018
Run End Date: 12/15/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
ZZZZZZ	1.00	07:38																																							
ZZZZZZ	1.00	07:40																																							
ZZZZZZ	1.00	07:42																																							
ZZZZZZ	1.00	07:44																																							
ZZZZZZ	1.00	07:46																																							
ZZZZZZ	1.00	07:48																																							
ZZZZZZ	1.00	07:50																																							
CCV	1.00	07:52												X																											
CCB	1.00	07:54												X																											
ZZZZZZ	1.00	07:56																																							
ZZZZZZ	1.00	07:59																																							
ZZZZZZ	1.00	08:01																																							
ZZZZZZ	1.00	08:03																																							
ZZZZZZ	1.00	08:05																																							
ZZZZZZ	1.00	08:07																																							
ZZZZZZ	1.00	08:09																																							
ZZZZZZ	1.00	08:11																																							
ZZZZZZ	1.00	08:13																																							
ZZZZZZ	1.00	08:15																																							
CCV	1.00	08:17												X																											
CCB	1.00	08:19												X																											
ZZZZZZ	1.00	08:21																																							
ZZZZZZ	1.00	08:23																																							
ZZZZZZ	1.00	08:25																																							
ZZZZZZ	1.00	08:27																																							
ZZZZZZ	1.00	08:29																																							
ZZZZZZ	1.00	08:31																																							
P34771CB	1.00	08:33												X																											
P34771CQ	1.00	08:35												X																											
P34771CQ	1.00	08:37																																							
*31001BKG	1.00	08:39												X																											
CCV	1.00	08:41												X																											
CCB	1.00	08:43												X																											
ZZZZZZ	1.00	08:46																																							
ZZZZZZ	1.00	08:48																																							
ZZZZZZ	1.00	08:50																																							
ZZZZZZ	1.00	08:52																																							
ZZZZZZ	1.00	08:54																																							

METHODS:
- P = ICP Atomic Emission Spectrometer
- MS = ICP Mass Spectrometry
- CV = Cold Vapor
- AF = Cold Vapor Atomic Fluorescence

LEGEND:
- BKG = Background
- DUP = Duplicate
- MS = Matrix Spike
- MSD = Matrix Spike Duplicate
- A = Post Digest Spike
- L = Serial Dilution
- B = Blank
- Q = Laboratory Control Sample
- Y = Laboratory Control Sample Duplicate

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QUALITY ASSURANCE SUMMARY
FORM 14
ANALYSIS RUN LOG
SDG No.: GEJ62

Method: CV
Instrument ID: 23283
Run Name: 1834901M09

Run Start Date: 12/15/2018
Run End Date: 12/15/2018

Lab Sample ID	D/F	Time	Analytes																																					
			SB	AS	BA	BE	B	CD	CA	CR	CO	PB	LI	HG	MO	SE	TL																								
ZZZZZZ	1.00	08:56																																							
ZZZZZZ	1.00	08:58																																							
ZZZZZZ	1.00	09:00																																							
ZZZZZZ	1.00	09:02																																							
ZZZZZZ	1.00	09:04																																							
CCV	1.00	09:06												X																											
CCB	1.00	09:08												X																											
ZZZZZZ	1.00	09:11																																							
ZZZZZZ	1.00	09:13																																							
9931021	1.00	09:15												X																											
9931022	1.00	09:17												X																											
9931023	1.00	09:19												X																											
9931024	1.00	09:21												X																											
9931025	1.00	09:23												X																											
9931026	1.00	09:25												X																											
9931027	1.00	09:27												X																											
CRA	1.00	09:29												X																											
CCV	1.00	09:31												X																											
CCB	1.00	09:33												X																											

METHODS:
P = ICP Atomic Emission Spectrometer
MS = ICP Mass Spectrometry
CV = Cold Vapor
AF = Cold Vapor Atomic Fluorescence

LEGEND:
BKG = Background
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
A = Post Digest Spike
L = Serial Dilution
B = Blank
Q = Laboratory Control Sample
Y = Laboratory Control Sample Duplicate

Instrumental Wet Chemistry Data

Case Narrative/Conformance Summary

Instrumental Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

Sample #	Client ID	Matrix Liquid	Solid	Comments
9931021	MW-1	X		
9931022	MW-2	X		
9931023	MW-3	X		
9931024	MW-4	X		
9931025	MW-5	X		
9931026	MW-6	X		
9931027	FB-20181206	X		Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

SAMPLE ANALYSIS:

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

Samples	Chloride	Fluoride	Sulfate
9931021	DF50	DF5	DF50
9931022	DF5	DF5	DF5
9931023	DF50	DF5	DF5
9931024	DF5	DF5	DF5
9931025	DF50	DF5	DF50
9931026	DF50	DF5	DF5
9931027	DF1	DF1	DF1

No problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

Quality Control and Calibration Summary Forms

Instrumental Wet Chemistry

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Quality Control Reference List
Instrumental Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

Fraction: Instrumental Wet Chemistry

Batch Number	Sample Number	Analysis Date	Chloride	Fluoride	Sulfate
18348120215A	P34820OB	12/15/2018 12:55:00	X	X	X
	P34820OQ	12/15/2018 12:39:00	X		X
	P34820OQ	12/17/2018 18:36:00		X	
18348120215B	9931025	12/15/2018 22:44:00	X		X
	9931025	12/17/2018 22:26:00		X	
	9931026	12/15/2018 23:01:00		X	X
	9931026	12/15/2018 23:17:00	X		
	9931027	12/15/2018 23:34:00	X	X	X
18348120315A	P34820OB	12/14/2018 13:54:00	X	X	X
	P34820OQ	12/14/2018 13:37:00	X		X
	P34820OQ	12/17/2018 19:11:00		X	
18348120315B	9931021	12/15/2018 00:28:00		X	
	9931021	12/15/2018 00:45:00	X		X
	9931022	12/15/2018 01:01:00	X		X
	9931022	12/17/2018 21:50:00		X	
	9931023	12/15/2018 02:08:00		X	X
	9931023	12/15/2018 02:25:00	X		
	9931024	12/15/2018 02:42:00	X	X	X

Quality Control Summary
Method Blank
Instrumental Water Quality
SDG: GEJ62
Matrix: LIQUID

Fraction: Instrumental Wet Chemistry

18348120215A / P34820OB Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Chloride	IC	12/15/18	N.D.	mg/l	0.20	0.40
Fluoride	IC	12/15/18	N.D.	mg/l	0.050	0.10
Sulfate	IC	12/15/18	N.D.	mg/l	0.30	1.0

18348120315A / P34820OB Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Chloride	IC	12/14/18	N.D.	mg/l	0.20	0.40
Fluoride	IC	12/14/18	N.D.	mg/l	0.050	0.10
Sulfate	IC	12/14/18	N.D.	mg/l	0.30	1.0

Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ62
Matrix: LIQUID

Instrumental Water Quality

Fraction: Instrumental Wet Chemistry

LCS: P34820OQ	Batch: **18348120215B** (Sample number(s): 9931025-9931027)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	3.00	3.09	NA	103	NA	90-110	NA	NA
Fluoride	IC	0.750	0.692	NA	92	NA	90-110	NA	NA
Sulfate	IC	7.50	7.88	NA	105	NA	90-110	NA	NA

LCS: P34820OQ	Batch: **18348120315B** (Sample number(s): 9931021-9931024)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Chloride	IC	3.00	3.06	NA	102	NA	90-110	NA	NA
Fluoride	IC	0.750	0.704	NA	94	NA	90-110	NA	NA
Sulfate	IC	7.50	7.76	NA	104	NA	90-110	NA	NA

Quality Control Summary
Initial And Continuing Calibration
Instrumental Analysis/Anion Scan

SDG: GEJ62

Instrument ID: 18919
Calibration Date: 12/04/2018

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	0.281281	1.033924	2.520746	5.109426	7.804229	0.9992	0.9996
Fluoride	0.064926	0.430258	1.142152	2.445807	3.872725	0.9993	0.9997
Sulfate	0.172605	0.618016	1.598239	3.329984	5.119110	0.9996	0.9998

Concentration units: mg/L

Batch Numbers: 18348120215B, 18348120315B
Run Start Dates: 12/15/2018, 12/14/2018
Run Names: 1834901D12, 1834801D12

	Chloride			Sulfate			Fluoride		
Sample	True	Result	%Rec	True	Result	%Rec	True	Result	%Rec
ICV	3	3.0060	100	7.5	7.5930	101	0.75	0.8225	110
ICB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.0660	102	7.5	7.8296	104	0.75	0.7905	105
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.1346	104	7.5	7.9526	106	0.75	0.8737	116
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.0576	102	7.5	7.8194	104	0.75	0.7961	106
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.0908	103	7.5	7.9170	106	0.75	0.8759	117
CCB	0	ND	NA	0	ND	NA	0	ND	NA

* = Out of Specifications

Instrument ID: 12115
Calibration Date: 12/10/2018

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Chloride	1.030185	2.165587	5.258500	10.990816	16.706969	0.9990	0.9995
Fluoride	0.167108	0.632801	1.681146	3.645534	5.913734	0.9987	0.9993
Sulfate	0.631483	1.341601	3.279257	6.951146	10.853394	0.9994	0.9997

Concentration units: mg/L

Batch Numbers: 18348120215B, 18348120315B
Run Start Dates: 12/14/2018
Run Names: 1834801D15

	Chloride			Sulfate			Fluoride		
Sample	True	Result	%Rec	True	Result	%Rec	True	Result	%Rec
ICV	3	2.7175	91	7.5	6.9813	93	0.75	0.7137	95
ICB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.1346	104	7.5	8.1077	108	0.75	0.8544	114
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	2.9915	100	7.5	7.7740	104	0.75	0.8273	110
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.1712	106	7.5	8.1649	109	0.75	0.8590	115
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.1597	105	7.5	8.1747	109	0.75	0.8478	113
CCB	0	ND	NA	0	ND	NA	0	ND	NA
CCV2	3	3.1877	106	7.5	8.2821	110	0.75	0.8519	114
CCB	0	ND	NA	0	ND	NA	0	ND	NA

* = Out of Specifications

Instrument ID: 17694
Calibration Date: 12/13/2018

Analysis	AUTO CAL1	AUTO CAL2	AUTO CAL3	AUTO CAL4	AUTO CAL5	R^2	CC
Fluoride	0.086588	0.309096	0.877335	1.942084	3.111997	0.9998	0.9999

Acceptance Range:
ICV/CCV: 90%-110%
ICB/CCB: < MDL

Concentration units: mg/L

Batch Numbers: 18348120215B, 18348120315B
Run Start Dates: 12/17/2018
Run Names: 1835101D09

	Fluoride		
Sample	True	Result	%Rec
ICV	0.75	0.7353	98
ICB	0	ND	NA
CCV2	0.75	0.7092	95
CCB	0	ND	NA
CCV2	0.75	0.7442	99
CCB	0	ND	NA
CCV2	0.75	0.7055	94
CCB	0	ND	NA

* = Out of Specifications

Fraction: Instrumental Wet Chemistry

00224: Chloride Analyte Name	Default MDL	Default LOQ	Units
Chloride	0.20	0.40	mg/l

01504: Fluoride Analyte Name	Default MDL	Default LOQ	Units
Fluoride	0.050	0.10	mg/l

00228: Sulfate Analyte Name	Default MDL	Default LOQ	Units
Sulfate	0.30	1.0	mg/l

Wet Chemistry Data

Case Narrative/Conformance Summary

Wet Chemistry

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

Water Quality

Fraction: Wet Chemistry

Sample #	Client ID	Matrix Liquid	Matrix Solid	DF	Comments
9931021	MW-1	X		1	
9931022	MW-2	X		1	
9931023	MW-3	X		1	
9931024	MW-4	X		1	
9931025	MW-5	X		1	
9931026	MW-6	X		1	
9931027	FB-20181206	X		1	Field Blank

See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

Sample Duplicate

Method defined actions are taken for any failed matrix QC.

Batch#: 18346921202A (Sample number(s): 9931023-9931026, UNSPK: 9931026, BKG: 9931026)
The duplicate RPD for the following analyte(s) is outside the acceptance window: Total Dissolved Solids

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Case Narrative/Conformance Summary

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

Water Quality

Fraction: Wet Chemistry

SAMPLE ANALYSIS:

(Sample number(s): 9931021-9931027: Analysis: 12152)
The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

No other problems were encountered with the analysis of the samples.

Abbreviation Key

U = Unspiked (for MS/MSD)	LOQ = Limit of Quantitation
R = Matrix Spike (MS)	MDL = Method Detection Limit
M = Matrix Spike Duplicate (MSD)	ND = Not Detected
BKG = Background (for Duplicate)	J = Estimated Value
D = Duplicate (DUP)	NA = Not Applicable
HS = High Spike	ME = Method
LS = Low Spike	CO = Colorimetric
SS = Soluble Spike	G = Gravimetric
IS = Insoluble Spike	IR = Infrared Spectrophotometry
ISD = Insoluble Spike Duplicate	MTR = Meter
PDS = Post Digestion Spike	OD = Oven Dried
* = Out of Specification	TI = Titration
V = Visual	TOC = Total Organic Carbon
AK = Alpkem	IC = Ion Chromatography
TC = Total Carbon	RA = Rapid Analyzer

QC Summary

Wet Chemistry

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

Fraction: Wet Chemistry

Analysis	Batch Number	Sample Number	Analysis Date
Total Dissolved Solids	18346921201A	B346871B	12/12/2018 10:37
		L346871Q	12/12/2018 10:37
		9931021	12/12/2018 10:36
		9931022	12/12/2018 10:37
		9931027	12/12/2018 10:37
Total Dissolved Solids	18346921202A	B346872B	12/12/2018 12:51
		L346872Q	12/12/2018 12:51
		9931023	12/12/2018 10:41
		9931024	12/12/2018 10:41
		9931025	12/12/2018 10:41
		9931026	12/12/2018 10:42
		9931026 UNSPK/BKG,MS,DUP	12/12/2018 12:51

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Quality Control Reference List
Water Quality

CLIENT: GEI Consultants, Inc.
SDG: GEJ62

Fraction: Wet Chemistry

Batch Number	Sample Number	Analysis Date	pH	Temperature of pH
18344003101A	9931021	12/10/2018 21:05:00	X	X
	9931022	12/10/2018 20:39:00	X	X
	9931023	12/10/2018 20:48:00	X	X
	9931024	12/10/2018 20:30:00	X	X
	9931026	12/10/2018 21:01:00	X	X
	9931027	12/10/2018 20:52:00	X	X
	P003101Q	12/10/2018 19:22:00	X	
18344003102A	9931025	12/10/2018 21:37:00	X	X
	P003102Q	12/10/2018 21:14:00	X	

Quality Control Summary
Method Blank
Water Quality
SDG: GEJ62
Matrix: LIQUID

Fraction: Wet Chemistry

18346921201A / B346871B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	12/12/18	N.D.	mg/l	20.0	60.0

18346921202A / B346872B Parameter	ME	Analysis Date	Blank Results	Units	MDL	LOQ
Total Dissolved Solids	G	12/12/18	N.D.	mg/l	20.0	60.0

Water Quality
Fraction: Wet Chemistry

UNSPK: 9931026 MS: 9931026	Batch: **18346921202A** (Sample number(s): 9931023-9931026)									
Parameter	**ME**	**Spike Added mg/l**	**Unspiked Conc mg/l**	**MS Conc mg/l**	**MSD Conc mg/l**	**MS %Rec**	**MSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	800	504.	1318.	NA	102	NA	62-127	NA	NA

Comments:
(2) The unspiked sample result is greater than four times the spike added.
* = Out of Specification

Results are being reported on an as received basis.

Water Quality
Fraction: Wet Chemistry

BKG: 9931026 DUP: 9931026 **Parameter**	Batch: **18346921202A** (Sample number(s): 9931023-9931026) **ME**	**Unspiked Conc mg/l**	**DUP Conc mg/l**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	504.	560.	11* (1)	5

Comments:
(1) The sample and/or duplicate result is less than five times the LOQ.
* = Out of Specification

Results are being reported on an as received basis.

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Quality Control Summary
Laboratory Control Standard (LCS)
Laboratory Control Standard Duplicate(LCSD)

SDG: GEJ62
Matrix: LIQUID

Water Quality
Fraction: Wet Chemistry

LCS: P003101Q	Batch: **18344003101A** (Sample number(s): 9931021-9931024, 9931026-9931027)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	7.00	NA	100	NA	95-105	NA	NA

LCS: P003102Q	Batch: **18344003102A** (Sample number(s): 9931025)								
Parameter	**ME**	**Spike Added Std. Units**	**LCS Conc Std. Units**	**LCSD Conc Std. Units**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
pH	MTR	7.00	7.01	NA	100	NA	95-105	NA	NA

LCS: L346871Q	Batch: **18346921201A** (Sample number(s): 9931021-9931022, 9931027)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	199	NA	100	NA	62-127	NA	NA

LCS: L346872Q	Batch: **18346921202A** (Sample number(s): 9931023-9931026)								
Parameter	**ME**	**Spike Added mg/l**	**LCS Conc mg/l**	**LCSD Conc mg/l**	**LCS %Rec**	**LCSD %Rec**	**%Rec Limits**	**%RPD**	**%RPD Limits**
Total Dissolved Solids	G	200	193	NA	97	NA	62-127	NA	NA

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LOQ/MDL Summary
Water Quality

SDG: GEJ62

Fraction: Wet Chemistry

12152: pH Analyte Name	Default MDL	Default LOQ	Units
pH	0.010	0.010	Std. Units

12151: Temperature of pH Analyte Name	Default MDL	Default LOQ	Units
Temperature of pH	0.010	0.010	Degrees C

00212: Total Dissolved Solids Analyte Name	Default MDL	Default LOQ	Units
Total Dissolved Solids	20.0	60.0	mg/l

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

January 04, 2019

Ms. Hannah Cottman
Eurofins Lancaster Laboratories
2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994

Re: NJ Radiochemistry Analyses
Work Order: 466633

Dear Ms. Cottman:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 11, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Taylor Cannon for
Julie Robinson
Project Manager

Chain of Custody: 2016609
Enclosures

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Case Narrative

Receipt Narrative
for
Eurofins Lancaster Laboratories
SDG: 466633

January 04, 2019

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on December 11, 2018 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

Laboratory ID	Client ID
466633001	MW-1
466633002	MW-2
466633003	MW-3
466633004	MW-4
466633005	MW-5
466633006	MW-6
466633007	FB-20181206

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Taylor Cannon for
Julie Robinson
Project Manager

Chain of Custody and Supporting Documentation

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

466633

Acct. # _____ Group # 2016609 Sample # 9931028-34

Subcontractor:	GEL		
Project Name/#:	2016609	Site ID #:	
Requestor	Hannah Cottman	P.O. #:	NA
Sampler:		PWSID #:	
Phone #:	717-556-7383	Quote #:	
State where samples were collected:	NJ	For Compliance: Yes ☑ No ☐	

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil ☐ Sediment ☐ Tissue ☐ / Water ☑ Potable ☐ Ground ☐ NPDES ☐ Surface ☐ / Other:	Total # of Containers	Analyses Requested: Preservation and Filtration Codes: Radium-226 (EPA 903.1)	Radium-228 (EPA 904.0 mod)
							1	1
MW-1	12/6/2018	1010	X		X	2	X	X
MW-2	12/6/2018	1010	X		X	2	X	X
MW-3	12/6/2018	1330	X		X	2	X	X
MW-4	12/6/2018	1135	X		X	2	X	X
MW-5	12/6/2018	1240	X		X	2	X	X
MW-6	12/6/2018	1420	X		X	2	X	X
FB-20181206	12/6/2018	1200	X		X	2	X	X

For Lab Use Only

SF #: _____

SCR #: _____

Preservation Codes

H = HCl T = Thiosulfate
N = HNO_3 B = NaOH
S = H_2SO_4 P = H_3PO_4
F = Field Filtered O = Other

Remarks
9931028
9931029
9931030
9931031
9931032
9931033
9931034

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed: **Preservation Needed**

Rush results requested by(please check): E-Mail ☐ Phone ☐

E-mail Address: ELLE_Subcontracting@EurofinsUS.com

Phone: 717-556-7383

Data Package Options (please check if required)

		Level IV DOD	☐
Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☑	NYSDEC Category	☐ A or ☐ B

EDD Required? Yes ☑ No ☐ If yes, format: Hazsite

Relinquished by:	Date	Time	Received by:	Date	Time
Hannah Cott	12-10-18	1703	Stacy L Boon	12-11-18	950
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Relinquished by Commercial Carrier:

UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: LANC	SDG/AR/COC/Work Order: 416633
Received By: STACY BOONE	Date Received: 12/11/18 JR
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 5035 4245 5798 - 6c 5035 4245 5802 - 6c

Suspected Hazard Information	Yes	No	
			*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: Wet Ice Ice Packs Dry Ice None Other: *all temperatures are recorded in Celsius TEMP: slcp above
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR3-17 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	✓			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials TMC Date 12/12/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

Laboratory Certifications

There are no "Data Exception Reports" associated with this analytical report.

List of current GEL Certifications as of 04 January 2019

State	Certification
Alaska	17−018
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA024
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122019−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−27
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Eurofins Lancaster Laboratories (LANC)
SDG #: 466633

Product: **GFPC, Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 2
Analytical Batch: 1830755

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
466633001	MW-1
466633002	MW-2
466633003	MW-3
466633004	MW-4
466633005	MW-5
466633006	MW-6
466633007	FB-20181206
1204178239	Method Blank (MB)
1204178240	466630008(MW-8) Sample Duplicate (DUP)
1204178241	466630008(MW-8) Matrix Spike (MS)
1204178242	466630008(MW-8) Matrix Spike Duplicate (MSD)
1204178243	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 1204178241 (MW-8MS) was recounted due to low recovery. The recount is reported. Sample 1204178240 (MW-8DUP) was recounted due to high relative percent difference/relative error ratio. The recount is reported.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204178241 (MW-8MS) and 1204178242 (MW-8MSD), aliquots were reduced to conserve sample volume.

Product: **Lucas Cell, Ra226, liquid**
Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 1830869

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
466633001	MW-1
466633002	MW-2
466633003	MW-3
466633004	MW-4
466633005	MW-5
466633006	MW-6
466633007	FB-20181206
1204178462	Method Blank (MB)
1204178463	466633007(FB-20181206) Sample Duplicate (DUP)
1204178464	466633007(FB-20181206) Matrix Spike (MS)
1204178465	466633007(FB-20181206) Matrix Spike Duplicate (MSD)
1204178466	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Duplication Criteria between MS and MSD
The Matrix Spike and Matrix Spike Duplicate (See Below) do not meet the duplication requirement; however, they both meet the spiked recovery requirement.

Sample	Analyte	Value
1204178464MS and 1204178465MSD (FB-20181206)	Radium-226	RPD 28* (0%-20%)

Technical Information

Recounts
Samples were degassed and recounted due to low recovery. Recounts are reported.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1204178464 (FB-20181206MS) and 1204178465 (FB-20181206MSD), aliquots were reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the

requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report
for

LANC006 Eurofins Lancaster Laboratories

Client SDG: 466633 GEL Work Order: 466633

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria
** Analyte is a Tracer compound
U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Heather McCarty **Name: Heather McCarty**

Date: 04 JAN 2019 **Title: Analyst II**

Sample Data Summary

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: January 4, 2019
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-1
Sample ID: 466633001
Matrix: Water
Collect Date: 06-DEC-18
Receive Date: 11-DEC-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.777	+/-0.757	1.24	+/-0.786	3.00	pCi/L			JXC9	12/27/18	1139	1830755	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.213	+/-0.286	0.492	+/-0.290	1.00	pCi/L			PCW	12/23/18	0435	1830869	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1830755	89	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: January 4, 2019
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-2
Sample ID: 466633002
Matrix: Water
Collect Date: 06-DEC-18
Receive Date: 11-DEC-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.581	+/-0.690	1.16	+/-0.708	3.00	pCi/L			JXC9	12/27/18	1139	1830755	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.220	+/-0.239	0.387	+/-0.242	1.00	pCi/L			PCW	12/23/18	0435	1830869	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1830755	98.9	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike

Lancaster, Pennsylvania 17601-5994

Report Date: January 4, 2019

Contact: Ms. Hannah Cottman

Project: NJ Radiochemistry Analyses

Client Sample ID: MW-3
Sample ID: 466633003
Matrix: Water
Collect Date: 06-DEC-18
Receive Date: 11-DEC-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	-0.521	+/-0.857	1.68	+/-0.857	3.00	pCi/L			JXC9	12/27/18	1139	1830755	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.530	+/-0.430	0.659	+/-0.437	1.00	pCi/L			PCW	12/23/18	0435	1830869	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1830755	102	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: January 4, 2019
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-4
Sample ID: 466633004
Matrix: Water
Collect Date: 06-DEC-18
Receive Date: 11-DEC-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.552	+/-0.636	1.07	+/-0.653	3.00	pCi/L			JXC9	12/27/18	1138	1830755	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	0.148	+/-0.153	0.226	+/-0.156	1.00	pCi/L			PCW	12/23/18	0510	1830869	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1830755	102	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike
Lancaster, Pennsylvania 17601-5994
Report Date: January 4, 2019
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-5
Sample ID: 466633005
Matrix: Water
Collect Date: 06-DEC-18
Receive Date: 11-DEC-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228		2.40	+/-1.10	1.58	+/-1.28	3.00	pCi/L			JXC9	12/27/18	1138	1830755	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.699	+/-0.309	0.291	+/-0.327	1.00	pCi/L			PCW	12/23/18	0510	1830869	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1830755	89.8	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

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Lancaster, Pennsylvania 17601-5994
Report Date: January 4, 2019
Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: MW-6
Sample ID: 466633006
Matrix: Water
Collect Date: 06-DEC-18
Receive Date: 11-DEC-18
Collector: Client

Project: LANC00115
Client ID: LANC006

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.657	+/-0.609	0.983	+/-0.635	3.00	pCi/L			JXC9	12/27/18	1138	1830755	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226		0.824	+/-0.484	0.666	+/-0.522	1.00	pCi/L			PCW	12/23/18	0510	1830869	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1830755	103	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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Certificate of Analysis

Company : Eurofins Lancaster Laboratories
Address : 2425 New Holland Pike

Lancaster, Pennsylvania 17601-5994 Report Date: January 4, 2019

Contact: Ms. Hannah Cottman
Project: NJ Radiochemistry Analyses

Client Sample ID: FB-20181206 Project: LANC00115
Sample ID: 466633007 Client ID: LANC006
Matrix: Water
Collect Date: 06-DEC-18
Receive Date: 11-DEC-18
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC, Ra228, Liquid "As Received"														
Radium-228	U	0.654	+/-0.986	1.69	+/-1.00	3.00	pCi/L			JXC9	12/27/18	1138	1830755	1
Rad Radium-226														
Lucas Cell, Ra226, liquid "As Received"														
Radium-226	U	-0.0946	+/-0.138	0.388	+/-0.138	1.00	pCi/L			PCW	12/23/18	0510	1830869	2

The following Analytical Methods were performed

Method	Description
1	EPA 904.0/SW846 9320 Modified
2	EPA 903.1 Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"	1830755	98	(15%-125%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

Quality Control Summary

QC Summary

Client : **Eurofins Lancaster Laboratories**
2425 New Holland Pike
Lancaster, Pennsylvania
Contact: **Ms. Hannah Cottman**
Workorder: **466633**

Report Date: January 4, 2019

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 1830755										
QC1204178240 466630008 DUP										
Radium-228	U	0.530	U	0.550	pCi/L	0		N/A	JXC9	12/27/1813:37
	Uncert:	+/-0.916		+/-1.02						
	TPU:	+/-0.928		+/-1.03						
QC1204178243 LCS										
Radium-228	16.8			19.8	pCi/L		118	(75%-125%)	JXC9	12/27/1811:38
	Uncert:			+/-2.21						
	TPU:			+/-5.83						
QC1204178239 MB										
Radium-228			U	0.715	pCi/L				JXC9	12/27/1811:38
	Uncert:			+/-0.988						
	TPU:			+/-1.01						
QC1204178241 466630008 MS										
Radium-228	50.7 U	0.530		41.1	pCi/L		81.1	(75%-125%)	JXC9	12/27/1813:37
	Uncert:	+/-0.916		+/-6.10						
	TPU:	+/-0.928		+/-12.7						
QC1204178242 466630008 MSD										
Radium-228	50.7 U	0.530		45.2	pCi/L	9.4	89.1	(0%-20%)	JXC9	12/27/1811:38
	Uncert:	+/-0.916		+/-6.11						
	TPU:	+/-0.928		+/-13.8						
Rad Ra-226										
Batch 1830869										
QC1204178463 466633007 DUP										
Radium-226	U	-0.0946	U	0.0943	pCi/L	0		N/A	PCW	12/23/1805:10
	Uncert:	+/-0.138		+/-0.163						
	TPU:	+/-0.138		+/-0.164						
QC1204178466 LCS										
Radium-226	26.0			23.1	pCi/L		88.8	(75%-125%)	PCW	12/23/1805:40
	Uncert:			+/-1.62						
	TPU:			+/-5.60						
QC1204178462 MB										
Radium-226			U	-0.0927	pCi/L				PCW	12/23/1805:10
	Uncert:			+/-0.160						
	TPU:			+/-0.160						
QC1204178464 466633007 MS										
Radium-226	130 U	-0.0946		147	pCi/L		113	(75%-125%)	PCW	12/23/1805:10
	Uncert:	+/-0.138		+/-9.78						
	TPU:	+/-0.138		+/-35.6						
QC1204178465 466633007 MSD										
Radium-226	130 U	-0.0946		111	pCi/L	28*	85.5	(0%-20%)	PCW	12/23/1805:10
	Uncert:	+/-0.138		+/-8.31						

QC Summary

Workorder: **466633**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Ra-226										
Batch 1830869										
				TPU:	+/-0.138		+/-20.2			

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 1830755 Check-list

This check-list was completed on 28-DEC-18 by Nat Long

This batch was reviewed by Nat Long on 28-DEC-18 and Kenshalla Oston on 02-JAN-19.

Batch ID:	**Product:**	**Description:** Gas Flow Radium 228
1830755	GFC28RAL	GL-RAD-A-009

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?	Yes		
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium−228 in Liquid

Batch ID: **1830755**
Analyst: Jasmine Conley (JXC9)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL−RAD−A−063 REV# 2
Instrument: GFC−51204863

Due Dates for Lab: 06−JAN−2019 **Package: 08−JAN−2019** **SDG: 10−JAN−2019**

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1204178243	Radium−228 SPIKE	1810−A	.1	mL
MS	1204178241	Radium−228 SPIKE	1810−A	.1	mL
MSD	1204178242	Radium−228 SPIKE	1810−A	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Aliquot (mL)	Ac−228 Ingrow (date)	Ac−228 Separation (date)
1	466630001	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
2	466630002	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
3	466630003	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
4	466630004	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
5	466630005	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
6	466630006	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
7	466630007	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
8	466630008	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
9	466630009	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
10	466630010	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
11	466633001	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
12	466633002	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
13	466633003	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
14	466633004	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
15	466633005	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
16	466633006	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
17	466633007	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
18	1204178239 MB	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
19	1204178240 DUP (466630008)	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46
20	1204178241 MS (466630008)	19−DEC−2018	3	100	12/20/18 13:45	12/27/18 09:46
21	1204178242 MSD (466630008)	19−DEC−2018	3	100	12/20/18 13:45	12/27/18 09:46
22	1204178243 LCS	19−DEC−2018	3	300	12/20/18 13:45	12/27/18 09:46

Reagent/Solvent Lot ID	Description	Amount
REGNT 2571685.11	2mL Cartridges	2 mL
REGNT 2662327.1	cerium 500 mg/L in 2%HCI	.2 mL
REGNT 2672182	RGF−1.5 Ammonium Sulfate	10 mL
REGNT 2832199.3	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL
REGNT 2832891.12	Hydrofluoric Acid Poly Bottle	3 mL
REGNT 2840709	RGF−16mg/mL Barium Chloride	1 mL
REGNT 2843889	RGF−1M Citric Acid	5 mL
REGNT 2861465	RGF−7M Nitric Acid	25 mL
REGNT 2869507	RGF−2M Hydrochloric Acid	20 mL
REGNT 2871623.21	16M	5 mL
REGNT 2873262	RGF−50% Potassium Carbonate	2 mL
WORK 0487−D	Barium−133 TRACER	.1 mL

Comments:

Pipet Id: RAD−GFC−1795419
Data Entry Date2: 19−DEC−2018 00:00

Radium-228 Liquid

Filename : RA228.XLS
File type : Excel
Version # : 1.4.2

Tracer S/N : 0487-D
Tracer Exp Date : 10/10/2019
Tracer Volume Added: 0.10

Batch : 1830755
Analyst : JAS02031
Prep Date : 12/19/2018
Ra-228 Method Uncertainty : 0.1268

Geometry: CeF on 25mm Filter

Procedure Code : GFC28RAL
Parmname : Radium-228
Required MDA : 3 pCi/L
Ra-228 Abundance : 1.00
Halflife of Ra-228 : 5.75 years
Halflife of Ac-228 : 6.15 hours

Sample Characteristics					**Tracer Calculations**					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	466630001.1	0.3000	1.8459E-05	12/3/2018 11:15	172.7	7.61%	143.7	8.34%	0.1	0.000200
2	466630002.1	0.3000	1.8459E-05	12/3/2018 12:40	172.7	7.61%	168.3	7.71%	0.1	0.000200
3	466630003.1	0.3000	1.8459E-05	12/3/2018 11:20	172.7	7.61%	162.0	7.86%	0.1	0.000200
4	466630004.1	0.3000	1.8459E-05	12/3/2018 13:05	172.7	7.61%	157.6	7.97%	0.1	0.000200
5	466630005.1	0.3000	1.8459E-05	12/4/2018 9:55	172.7	7.61%	172.8	7.61%	0.1	0.000200
6	466630006.1	0.3000	1.8459E-05	12/4/2018 10:35	172.7	7.61%	167.7	7.72%	0.1	0.000200
7	466630007.1	0.3000	1.8459E-05	12/4/2018 13:55	172.7	7.61%	144.8	8.31%	0.1	0.000200
8	466630008.1	0.3000	1.8459E-05	12/4/2018 12:30	172.7	7.61%	166.9	7.74%	0.1	0.000200
9	466630009.1	0.3000	1.8459E-05	12/4/2018 12:15	172.7	7.61%	162.0	7.86%	0.1	0.000200
10	466630010.1	0.3000	1.8459E-05	12/3/2018 12:00	172.7	7.61%	164.8	7.79%	0.1	0.000200
11	466633001.1	0.3000	1.8459E-05	12/6/2018 10:10	172.7	7.61%	153.8	8.06%	0.1	0.000200
12	466633002.1	0.3000	1.8459E-05	12/6/2018 10:10	172.7	7.61%	170.9	7.65%	0.1	0.000200
13	466633003.1	0.3000	1.8459E-05	12/6/2018 13:30	172.7	7.61%	175.8	7.54%	0.1	0.000200
14	466633004.1	0.3000	1.8459E-05	12/6/2018 11:35	172.7	7.61%	176.0	7.54%	0.1	0.000200
15	466633005.1	0.3000	1.8459E-05	12/6/2018 12:40	172.7	7.61%	155.1	8.03%	0.1	0.000200
16	466633006.1	0.3000	1.8459E-05	12/6/2018 14:20	172.7	7.61%	178.0	7.50%	0.1	0.000200
17	466633007.1	0.3000	1.8459E-05	12/6/2018 12:00	172.7	7.61%	169.2	7.69%	0.1	0.000200
18	1204178239.1	0.3000	1.8459E-05	12/19/2018 0:00	172.7	7.61%	158.5	7.94%	0.1	0.000200
19	1204178240.1	0.3000	1.8459E-05	12/4/2018 12:30	172.7	7.61%	151.6	8.12%	0.1	0.000200
20	1204178241.1	0.1000	1.1370E-05	12/4/2018 12:30	172.7	7.61%	166.2	7.76%	0.1	0.000200
21	1204178242.1	0.1000	1.1370E-05	12/4/2018 12:30	172.7	7.61%	170.9	7.65%	0.1	0.000200
22	1204178243.1	0.3000	1.8459E-05	12/19/2018 0:00	172.7	7.61%	147.6	8.23%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-063
Instrument SOP: GL-RAD-I-016

Count raw Data

Pos.	Detector ID	Counting Time (min.)	Gross Counts Alpha	Gross Counts Beta	Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
1	1A	60	20	81	1.350	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	83.2%	5.65%
2	1B	60	8	130	2.167	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	97.4%	5.42%
3	1C	60	7	29	0.483	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	93.8%	5.48%
4	1D	60	15	66	1.100	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	91.3%	5.52%
5	2A	60	12	34	0.567	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	100%	5.39%
6	2B	60	10	67	1.117	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	97.1%	5.43%
7	2C	60	35	77	1.283	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	83.8%	5.64%
8	9A	60	9	49	0.817	12/27/2018 13:37	12/20/2018 13:45	12/27/2018 9:46	0.992	0.648	1.000	1.057	96.6%	5.43%
9	4D	60	13	30	0.500	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	93.8%	5.48%
10	5A	60	14	23	0.383	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.992	0.808	1.000	1.057	95.4%	5.45%
11	5B	60	12	43	0.717	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.993	0.808	1.000	1.057	89.0%	5.55%
12	5C	60	14	46	0.767	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.993	0.807	1.000	1.057	98.9%	5.40%
13	5D	60	8	71	1.183	12/27/2018 11:39	12/20/2018 13:45	12/27/2018 9:46	0.993	0.807	1.000	1.057	102%	5.36%
14	11A	60	10	41	0.683	12/27/2018 11:38	12/20/2018 13:45	12/27/2018 9:46	0.993	0.809	1.000	1.057	102%	5.36%
15	11B	60	9	97	1.617	12/27/2018 11:38	12/20/2018 13:45	12/27/2018 9:46	0.993	0.809	1.000	1.057	89.8%	5.54%
16	11C	60	1	38	0.633	12/27/2018 11:38	12/20/2018 13:45	12/27/2018 9:46	0.993	0.809	1.000	1.057	103%	5.35%
17	11D	60	17	94	1.567	12/27/2018 11:38	12/20/2018 13:45	12/27/2018 9:46	0.993	0.809	1.000	1.057	98.0%	5.42%
18	12A	60	9	82	1.367	12/27/2018 11:38	12/20/2018 13:45	12/27/2018 9:46	0.997	0.810	1.000	1.057	91.7%	5.51%
19	9B	60	3	50	0.833	12/27/2018 13:37	12/20/2018 13:45	12/27/2018 9:46	0.992	0.648	1.000	1.057	87.8%	5.57%
20	9C	60	12	235	3.917	12/27/2018 13:37	12/20/2018 13:45	12/27/2018 9:46	0.992	0.648	1.000	1.057	96.2%	5.44%
21	12D	60	14	385	6.417	12/27/2018 11:38	12/20/2018 13:45	12/27/2018 9:46	0.992	0.810	1.000	1.057	98.9%	5.40%
22	13A	60	9	365	6.083	12/27/2018 11:38	12/20/2018 13:45	12/27/2018 9:46	0.997	0.809	1.000	1.057	85.5%	5.61%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2017	5/31/2019	0.6430	0.00738	0.470	12/21/2018 17:38	500
2	PIC	6/1/2017	5/31/2019	0.6519	0.00711	1.258	12/21/2018 17:38	500
3	PIC	6/1/2017	5/31/2019	0.6443	0.00847	0.426	12/21/2018 17:38	500
4	PIC	6/1/2017	5/31/2019	0.6504	0.00692	1.218	12/21/2018 17:38	500
5	PIC	6/1/2017	5/31/2019	0.6444	0.01914	0.358	12/21/2018 17:38	500
6	PIC	6/1/2017	5/31/2019	0.6448	0.02111	0.646	12/21/2018 17:38	500
7	PIC	6/1/2017	5/31/2019	0.6389	0.01274	0.496	12/21/2018 17:38	500
8	PIC	6/1/2017	5/31/2019	0.6688	0.00758	0.678	12/21/2018 17:37	500
9	PIC	6/1/2017	5/31/2019	0.6462	0.00773	0.704	12/21/2018 17:39	500
10	PIC	6/1/2017	5/31/2019	0.6766	0.00851	0.490	12/21/2018 17:39	500
11	PIC	6/1/2017	5/31/2019	0.6547	0.00426	0.488	12/21/2018 17:39	500
12	PIC	6/1/2017	5/31/2019	0.6704	0.00657	0.572	12/21/2018 17:39	500
13	PIC	6/1/2017	5/31/2019	0.6669	0.00925	1.362	12/21/2018 17:39	500
14	PIC	6/1/2017	5/31/2019	0.6648	0.01317	0.494	12/21/2018 17:33	500
15	PIC	6/1/2017	5/31/2019	0.6620	0.00697	0.894	12/21/2018 17:33	500
16	PIC	6/1/2017	5/31/2019	0.6578	0.01278	0.408	12/21/2018 17:33	500
17	PIC	6/1/2017	5/31/2019	0.6802	0.01068	1.346	12/21/2018 17:33	500
18	PIC	6/1/2017	5/31/2019	0.6732	0.01964	1.142	12/21/2018 17:33	500
19	PIC	6/1/2017	5/31/2019	0.6716	0.00754	0.702	12/21/2018 17:37	500
20	PIC	6/1/2017	5/31/2019	0.6373	0.00584	0.512	12/21/2018 17:37	500
21	PIC	6/1/2017	5/31/2019	0.6376	0.01845	1.608	12/21/2018 17:34	500
22	PIC	6/1/2017	5/31/2019	0.6527	0.00714	0.461	12/21/2018 17:33	1000

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

* - RPD changed to 0% due to sample & dup activity below MDA

Spike S/N : 1810-A
Spike Exp Date : 5/23/2019
Spike Activity (dpm/ml): 112.00
Spike Volume Added: 0.10

LCS S/N : 1810-A
LCS Exp Date : 5/23/2019
LCS Activity (dpm/ml): 112.00
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.8079	0.5704	3	1.3259	**3.2577**	18.31%	0.8800	0.1531	1.1109	1.4220		SAMPLE				
2	1.1128	0.7856	3	1.7271	**2.8319**	22.31%	0.9087	0.1965	1.2005	1.4244		SAMPLE				
3	0.6809	0.4807	3	1.1253	**0.1879**	164.71%	0.0573	0.0944	0.6062	0.6084		SAMPLE				
4	1.1721	0.8275	3	1.8219	**-0.3937**	122.26%	-0.1180	0.1441	0.9424	0.9425		SAMPLE				
5	0.5849	0.4130	3	0.9795	**0.6408**	48.64%	0.2087	0.1008	0.6067	0.6314		SAMPLE				
6	0.8091	0.5712	3	1.3005	**1.4883**	30.53%	0.4707	0.1411	0.8744	0.9645		SAMPLE				
7	0.8288	0.5852	3	1.3552	**2.9107**	19.86%	0.7873	0.1496	1.0840	1.3443		SAMPLE				
8	1.0017	0.7072	3	1.6055	**0.5299**	88.40%	0.1387	0.1223	0.9163	0.9275		SAMPLE				
9	0.8727	0.6161	3	1.3956	**-0.6665**	48.70%	-0.2040	0.0987	0.6320	0.6322		SAMPLE				
10	0.6838	0.4828	3	1.1190	**-0.3273**	80.67%	-0.1067	0.0858	0.5163	0.5165		SAMPLE				
11	0.7553	0.5333	3	1.2364	**0.7767**	50.02%	0.2287	0.1137	0.7567	0.7855		SAMPLE				
12	0.7188	0.5074	3	1.1642	**0.5811**	60.86%	0.1947	0.1180	0.6904	0.7081		SAMPLE				
13	1.0840	0.7653	3	1.6766	**-0.5213**	84.03%	-0.1787	0.1498	0.8568	0.8569		SAMPLE				
14	0.6525	0.4607	3	1.0672	**0.5522**	59.02%	0.1893	0.1113	0.6359	0.6533		SAMPLE				
15	1.0003	0.7062	3	1.5786	**2.4016**	24.11%	0.7227	0.1695	1.1041	1.2823		SAMPLE				
16	0.5926	0.4184	3	0.9825	**0.6567**	47.64%	0.2253	0.1066	0.6091	0.6346		SAMPLE				
17	1.0949	0.7730	3	1.6943	**0.6542**	77.11%	0.2207	0.1697	0.9862	1.0020		SAMPLE				
18	1.0832	0.7647	3	1.6887	**0.7153**	70.71%	0.2247	0.1583	0.9880	1.0072		MB				
19	1.1172	0.7887	3	1.7869	**0.5501**	94.33%	0.1313	0.1237	1.0152	1.0262	466630008.1	DUP	* 0.0%			
20	2.7518	1.9428	3	4.4897	**41.1312**	9.34%	3.4047	0.2575	6.0970	12.6939	466630008.1	MS			50.6933	81.1%
21	3.7936	2.6783	3	5.8265	**45.1904**	8.96%	4.8087	0.3319	6.1135	13.7507	466630008.1	MSD	9.4%		50.6933	89.1%
22	0.7414	0.5234	3	1.2231	**19.8226**	8.01%	5.6223	0.3191	2.2054	5.8279		LCS			16.8172	117.9%

1830755r1.xls

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
466630001	1A	60	20	81	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630002	1B	60	8	130	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630003	1C	60	7	29	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630004	1D	60	15	66	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630005	2A	60	12	34	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630006	2B	60	10	67	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630007	2C	60	35	77	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630008	9A	60	9	49	12/27/2018 13:37	12/27/2018 14:37	PIC	1830755
466630009	4D	60	13	30	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466630010	5A	60	14	23	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466633001	5B	60	12	43	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466633002	5C	60	14	46	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466633003	5D	60	8	71	12/27/2018 11:39	12/27/2018 12:39	PIC	1830755
466633004	11A	60	10	41	12/27/2018 11:38	12/27/2018 12:38	PIC	1830755
466633005	11B	60	9	97	12/27/2018 11:38	12/27/2018 12:38	PIC	1830755
466633006	11C	60	1	38	12/27/2018 11:38	12/27/2018 12:38	PIC	1830755
466633007	11D	60	17	94	12/27/2018 11:38	12/27/2018 12:38	PIC	1830755
1204178239	12A	60	9	82	12/27/2018 11:38	12/27/2018 12:38	PIC	1830755
1204178240	9B	60	3	50	12/27/2018 13:37	12/27/2018 14:37	PIC	1830755
1204178241	9C	60	12	235	12/27/2018 13:37	12/27/2018 14:37	PIC	1830755
1204178242	12D	60	14	385	12/27/2018 11:38	12/27/2018 12:38	PIC	1830755
1204178243	13A	60	9	365	12/27/2018 11:38	12/27/2018 12:38	PIC	1830755

ASSAY 20-Dec-18 15:37:11

Protocol id 8 Ba-133
Time limit
Count limit
Isotope Ba-133
Protocol date 12/20/2018
Run id. 2451

POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
1	97	1	180.04	603.6	172.73	7.61		03:37:11
2	97	2	180.04	516.34	143.65	8.34	83.16	03:40:24
3	97	3	180.06	590.43	168.32	7.71	97.45	03:43:38
4	97	4	180.06	571.43	161.99	7.86	93.78	03:46:52
5	97	5	180.04	558.28	157.63	7.97	91.26	03:50:06
1	94	1	180.06	603.88	172.81	7.61	100.05	03:53:42
2	94	2	180.04	588.6	167.73	7.72	97.11	03:56:56
3	94	3	180.04	519.77	144.79	8.31	83.82	04:00:10
4	94	4	180.04	586.19	166.93	7.74	96.64	04:03:24
5	94	5	180.04	571.48	162.02	7.86	93.80	04:06:37
1	76	1	180.04	579.94	164.84	7.79	95.43	04:10:25
2	76	2	180.06	546.79	153.78	8.06	89.03	04:13:39
3	76	3	180.04	598.05	170.88	7.65	98.93	04:16:53
4	76	4	180.03	612.65	175.76	7.54	101.75	04:20:07
5	76	5	180.04	613.34	175.97	7.54	101.88	04:23:20
1	53	1	180.04	550.65	155.09	8.03	89.79	04:27:08
2	53	2	180.05	619.43	177.99	7.5	103.05	04:30:22
3	53	3	180.05	593.14	169.24	7.69	97.98	04:33:36
4	53	4	180.04	560.77	158.45	7.94	91.73	04:36:50
5	53	5	180.05	540.31	151.63	8.12	87.78	04:40:03
1	92	1	180.04	584.05	166.22	7.76	96.23	04:43:51
2	92	2	180.04	598.11	170.9	7.65	98.94	04:47:05
3	92	3	180.04	528.31	147.64	8.23	85.47	04:50:19

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 27-Dec-2018

Detectors LB4100 A1 through J4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100B2	Above	Alpha bkg	27-Dec 10:59	60	0.367	-4.24E-2	0.351	+3.24
LB4100B2	Below	Alpha eff	27-Dec 09:21	5	7948	8083	10940	-3.28
LB4100B2	need 2nd	Alpha XTalk	27-Dec 09:21	5	0.289	0.207	0.293	+2.78
LB4100C1	need 2nd	Beta bkg	27-Dec 07:18	60	1.733	1.035	1.925	+1.71
LB4100E3	Above	Beta bkg	27-Dec 07:16	60	2.183	0.473	2.078	+3.39
LB4100F2	Above	Alpha bkg	27-Dec 07:16	60	0.283	-6.32E-2	0.279	+3.07
LB4100F2	need 2nd	Alpha XTalk	27-Dec 11:06	5	0.499	0.318	0.505	+2.80
LB4100G1	Above	Beta bkg	27-Dec 07:16	60	2.150	0.338	1.748	+4.71
LB4100I4	Above	Beta bkg	27-Dec 07:16	60	2.767	0.363	1.365	+11.39
LB4100J2	Above	Alpha bkg	27-Dec 07:16	60	0.383	-6.70E-2	0.379	+3.06
LB4100J4	Above	Alpha bkg	27-Dec 10:20	60	0.367	-4.35E-2	0.401	+2.54
PIC4A	Above	Alpha bkg	27-Dec 10:09	60	0.467	-4.12E-2	0.369	+4.42
PIC4A	need 2nd	Beta eff	27-Dec 09:48	5	52460	51390	55150	-1.29
PIC4C	Above	Alpha bkg	27-Dec 10:09	60	0.383	-7.27E-2	0.383	+3.00
PIC6B	Above	Alpha bkg	27-Dec 10:38	60	0.433	-2.58E-1	0.489	+2.55

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

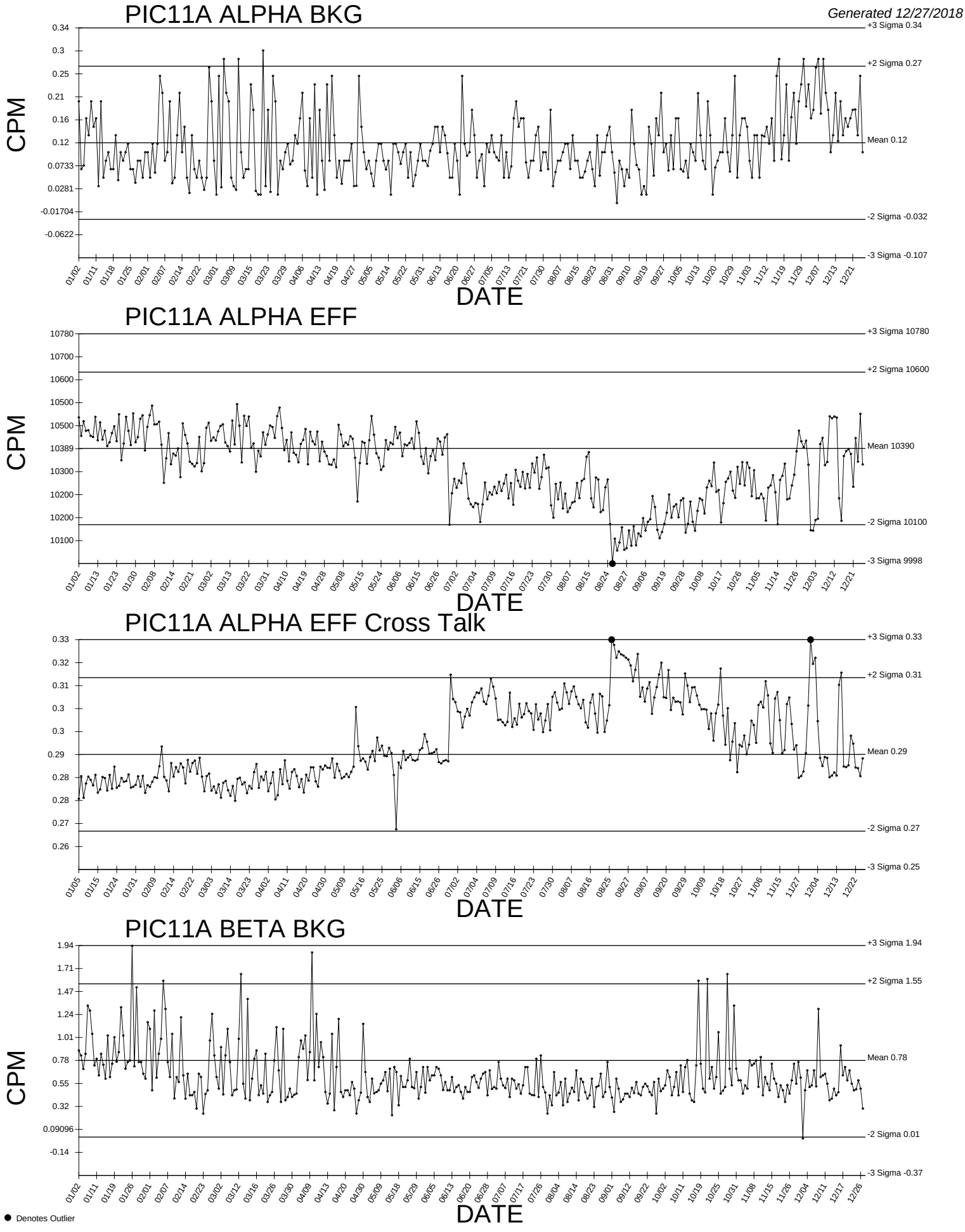
G5400W1W	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1X	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1Y	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
G5400W1Z	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100B3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC3A	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

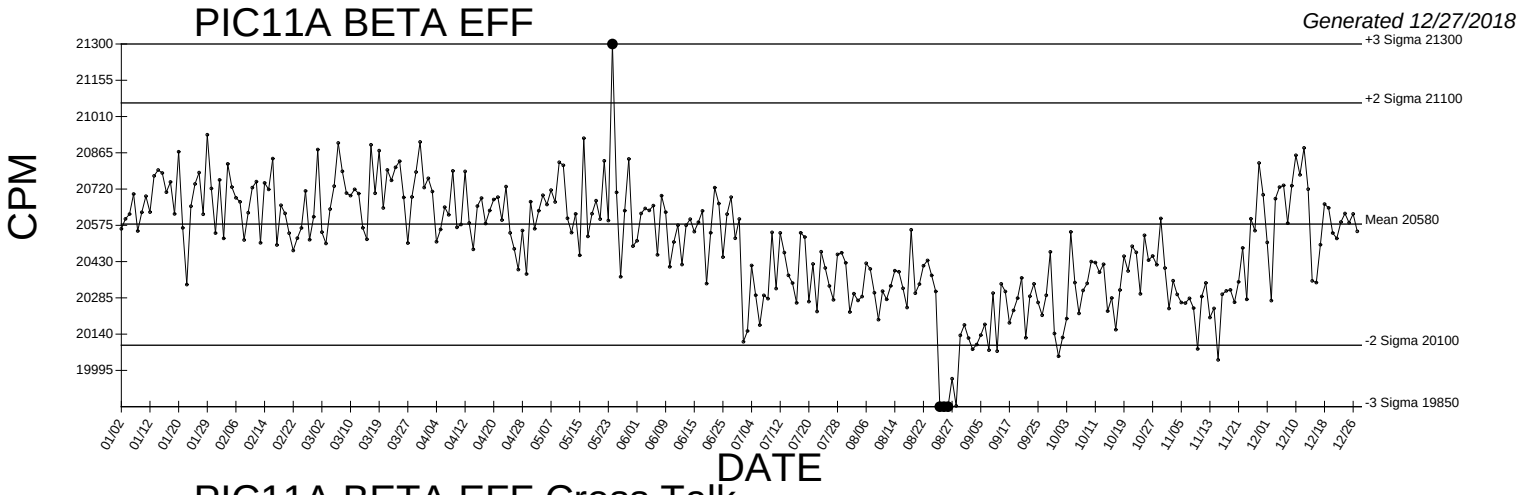
Reviewed by 

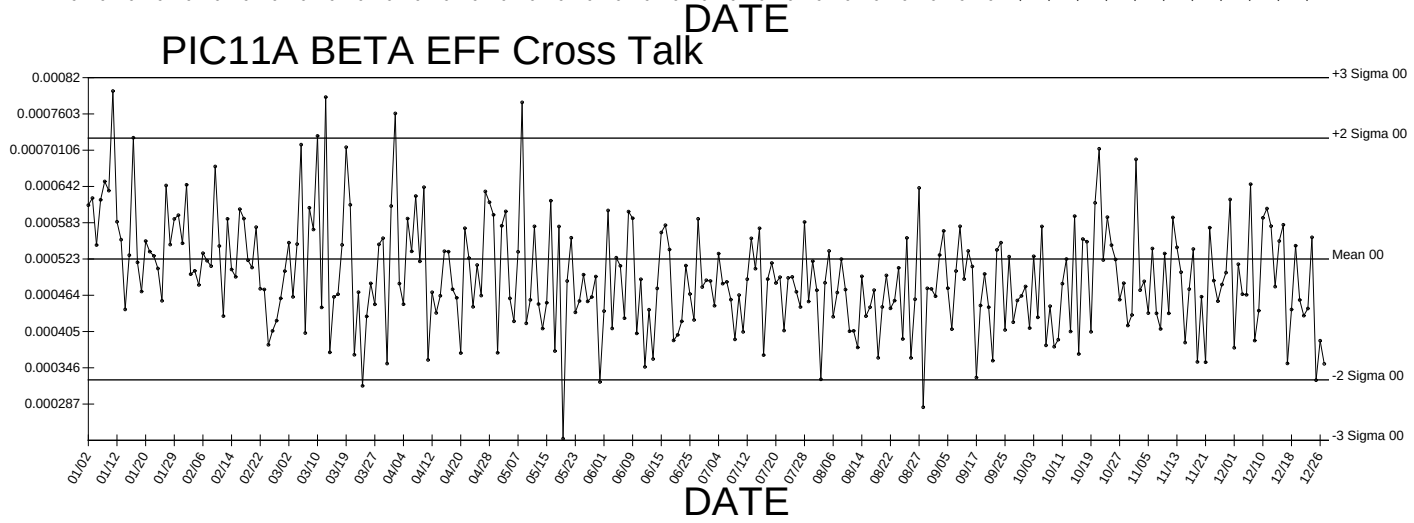
Date 12/27/18

GEL Laboratories LLC

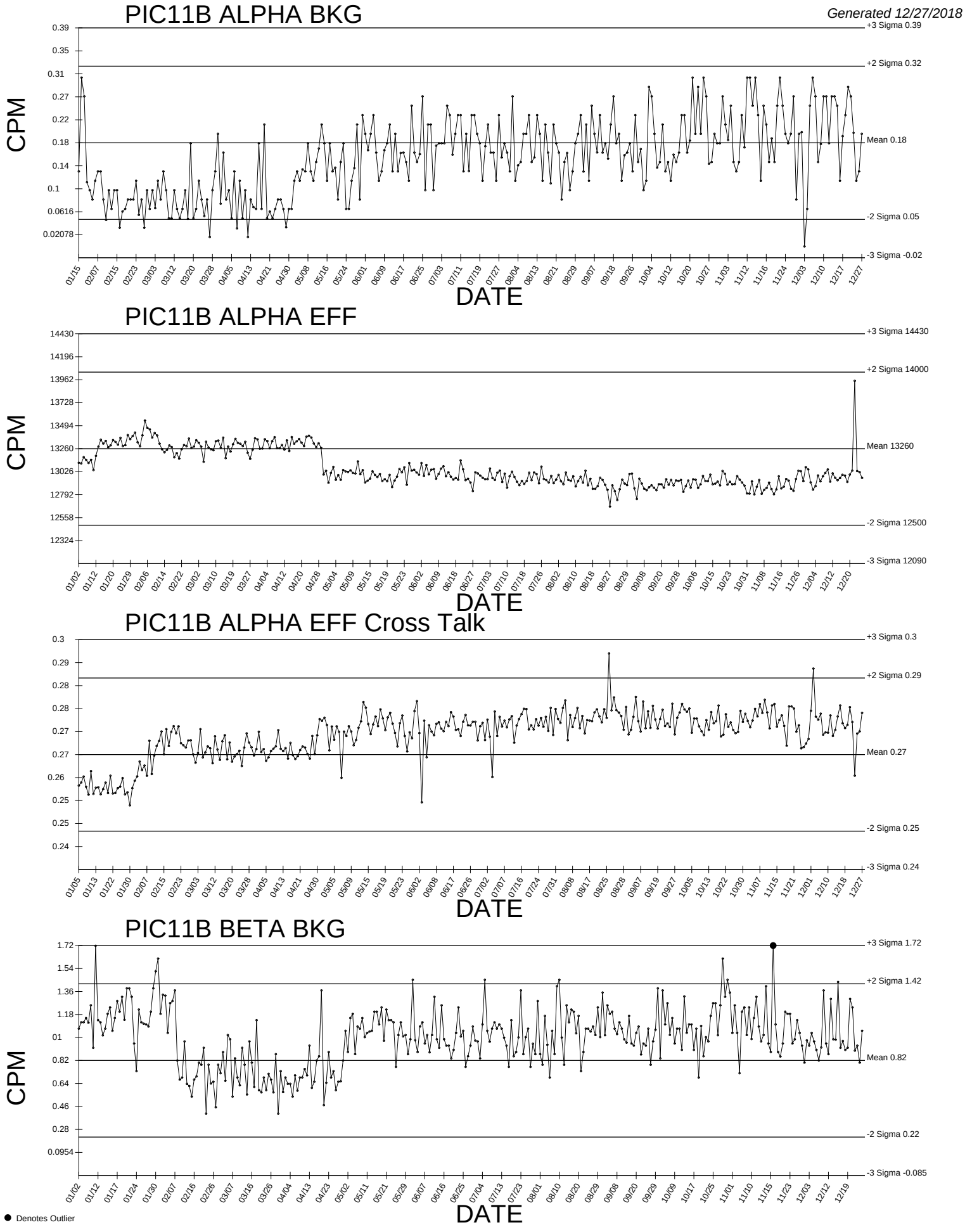
Background and Efficiency Data

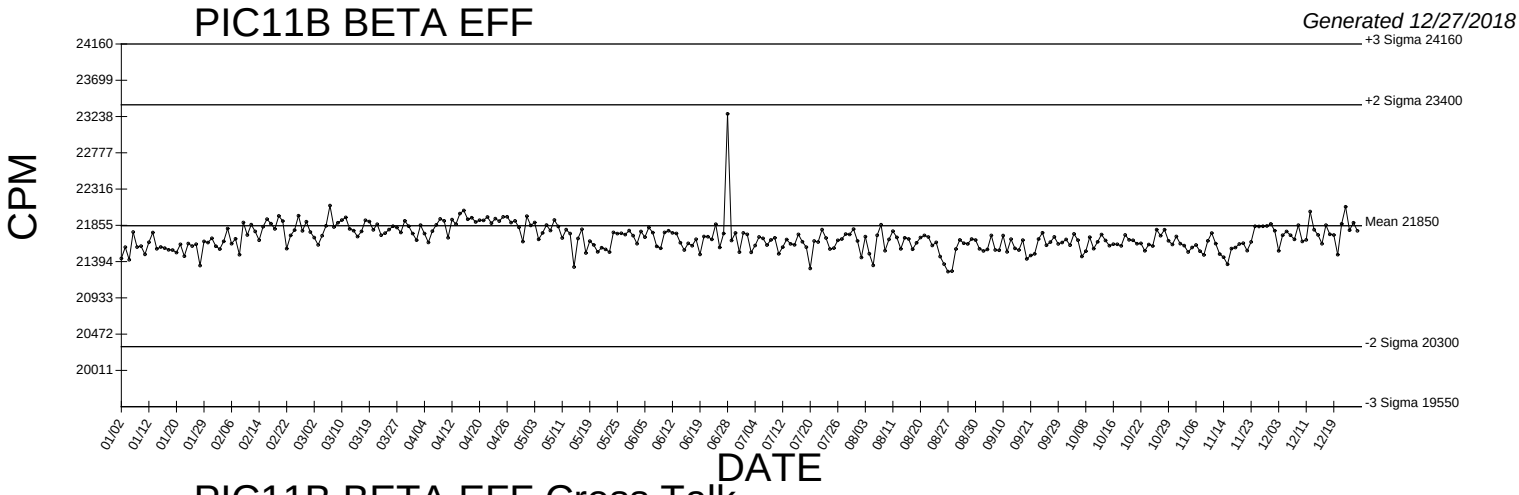

PIC11A ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.34
+2 Sigma 0.27
Mean 0.12
-2 Sigma -0.032
-3 Sigma -0.107
PIC11A ALPHA EFF
+3 Sigma 10780
+2 Sigma 10600
Mean 10390
-2 Sigma 10100
-3 Sigma 9998
PIC11A ALPHA EFF Cross Talk
+3 Sigma 0.33
+2 Sigma 0.31
Mean 0.29
-2 Sigma 0.27
-3 Sigma 0.25
PIC11A BETA BKG
+3 Sigma 1.94
+2 Sigma 1.55
Mean 0.78
-2 Sigma 0.01
-3 Sigma -0.37
● Denotes Outlier

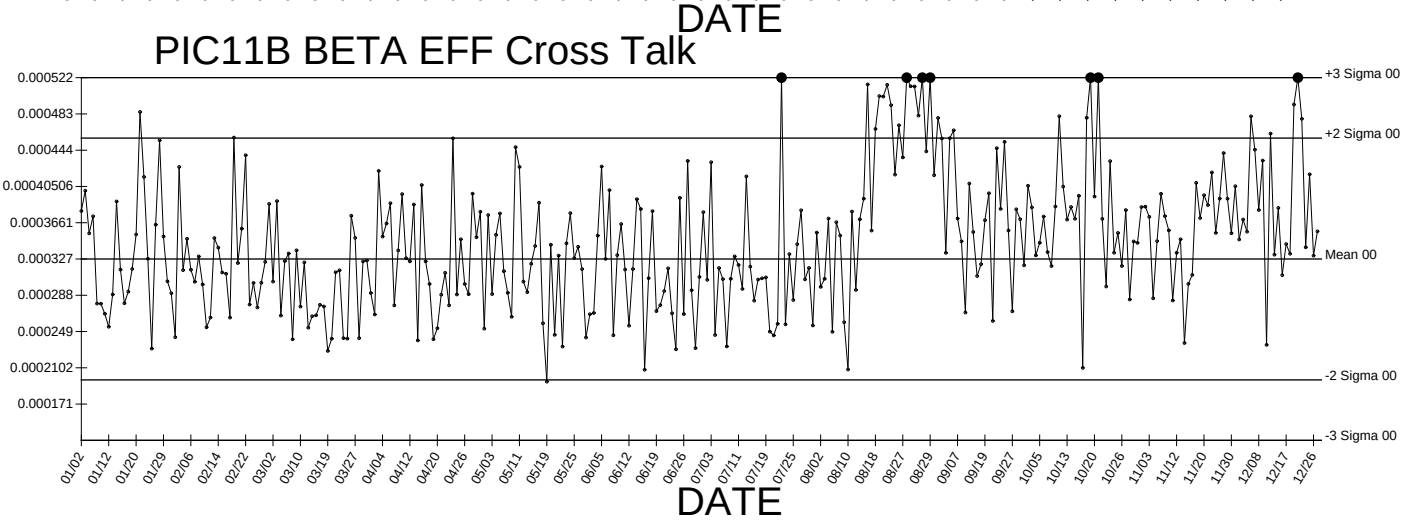




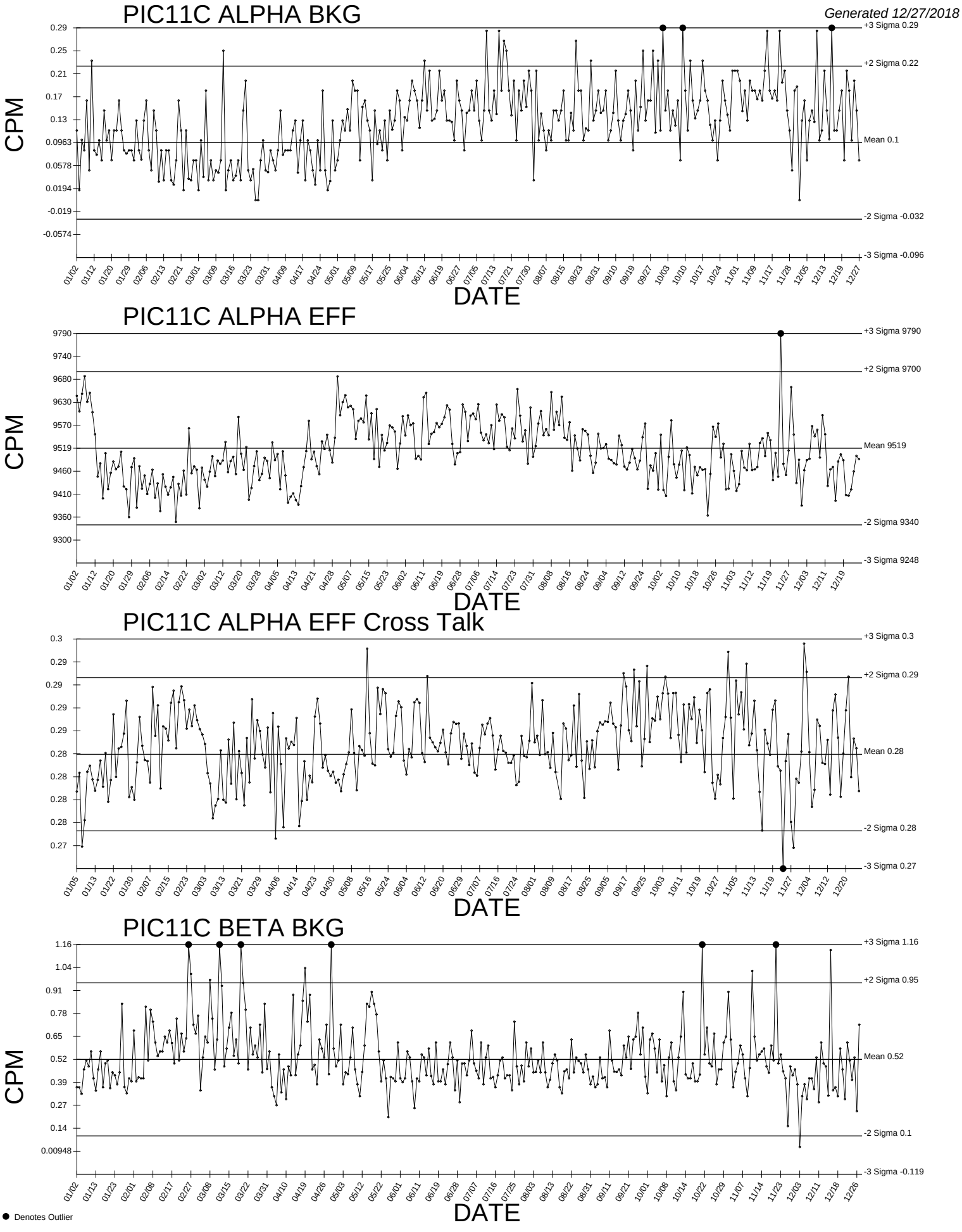
● Denotes Outlier

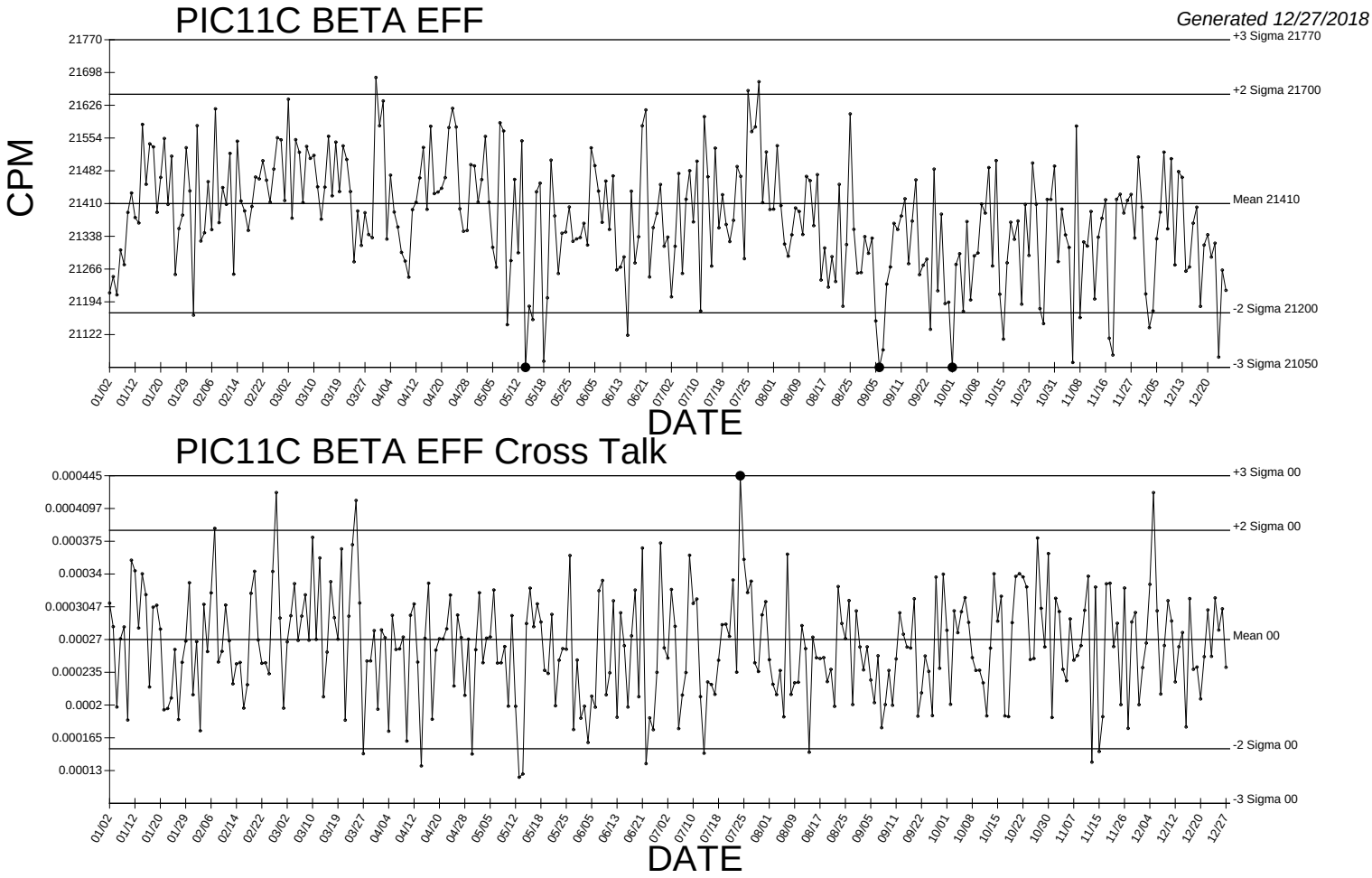

PIC11B ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.39
+2 Sigma 0.32
Mean 0.18
-2 Sigma 0.05
-3 Sigma -0.02
PIC11B ALPHA EFF
+3 Sigma 14430
+2 Sigma 14000
Mean 13260
-2 Sigma 12500
-3 Sigma 12090
PIC11B ALPHA EFF Cross Talk
+3 Sigma 0.3
+2 Sigma 0.29
Mean 0.27
-2 Sigma 0.25
-3 Sigma 0.24
PIC11B BETA BKG
+3 Sigma 1.72
+2 Sigma 1.42
Mean 0.82
-2 Sigma 0.22
-3 Sigma -0.085
Denotes Outlier



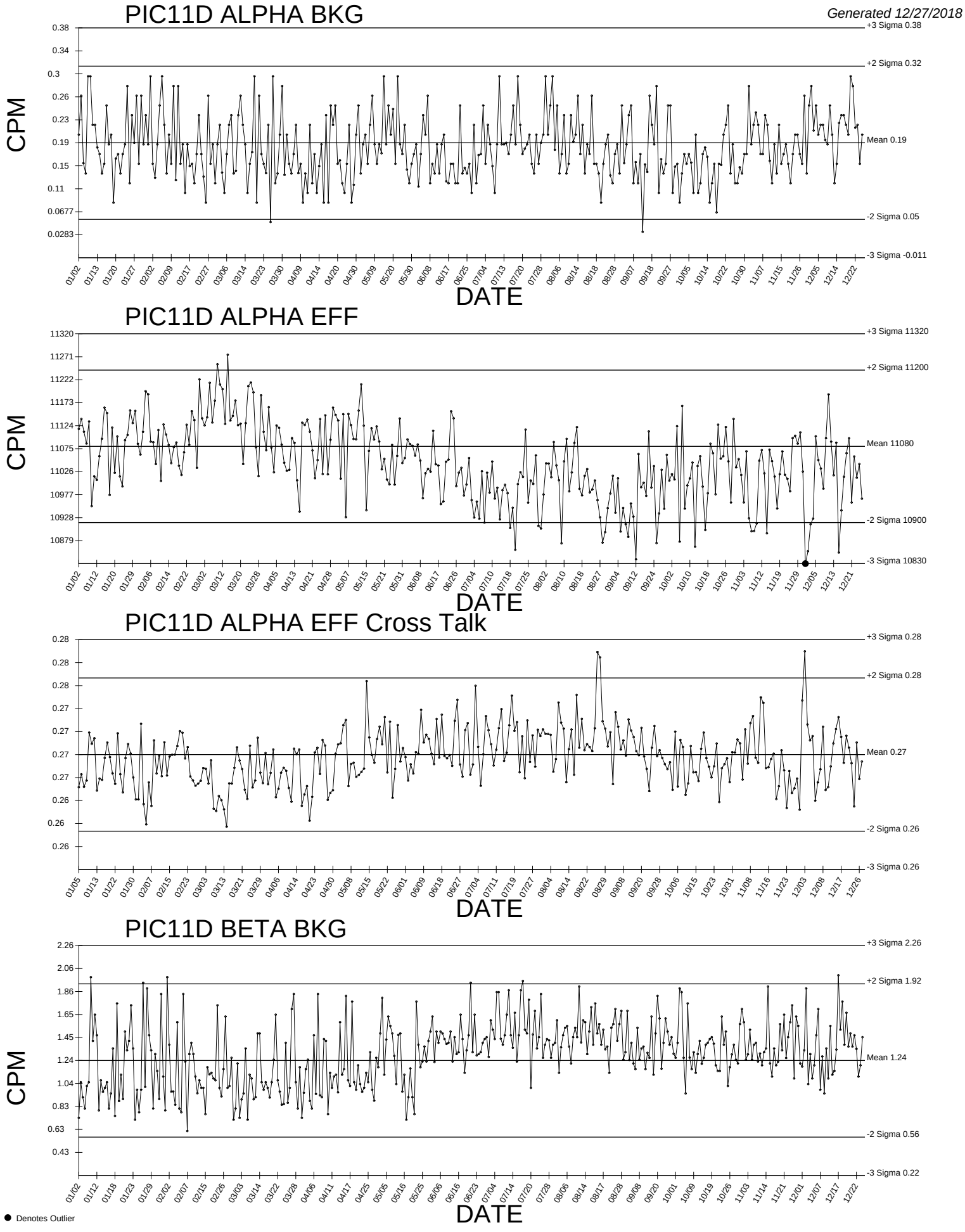


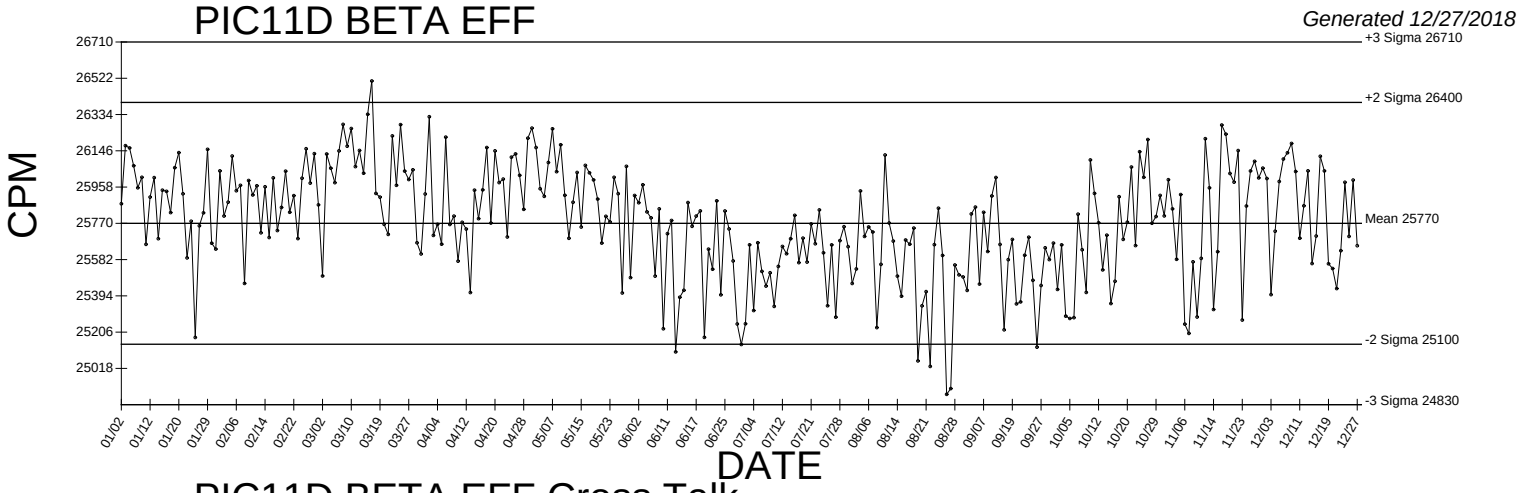
● Denotes Outlier

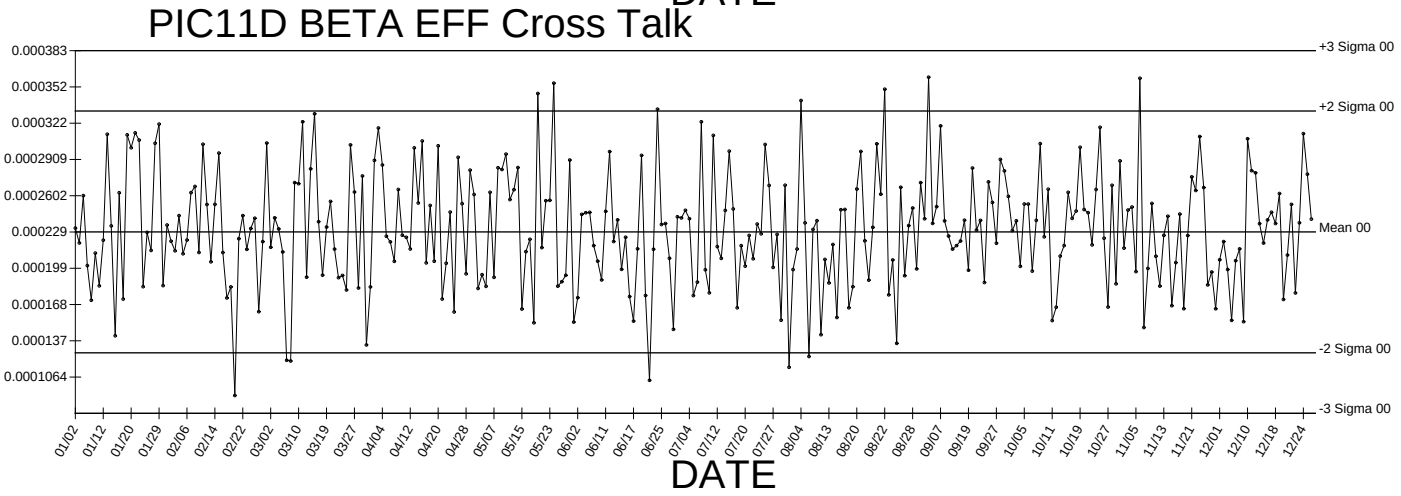

PIC11C ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.29
+2 Sigma 0.22
Mean 0.1
-2 Sigma -0.032
-3 Sigma -0.096
PIC11C ALPHA EFF
+3 Sigma 9790
+2 Sigma 9700
Mean 9519
-2 Sigma 9340
-3 Sigma 9248
PIC11C ALPHA EFF Cross Talk
+3 Sigma 0.3
+2 Sigma 0.29
Mean 0.28
-2 Sigma 0.28
-3 Sigma 0.27
PIC11C BETA BKG
+3 Sigma 1.16
+2 Sigma 0.95
Mean 0.52
-2 Sigma 0.1
-3 Sigma -0.119
Denotes Outlier



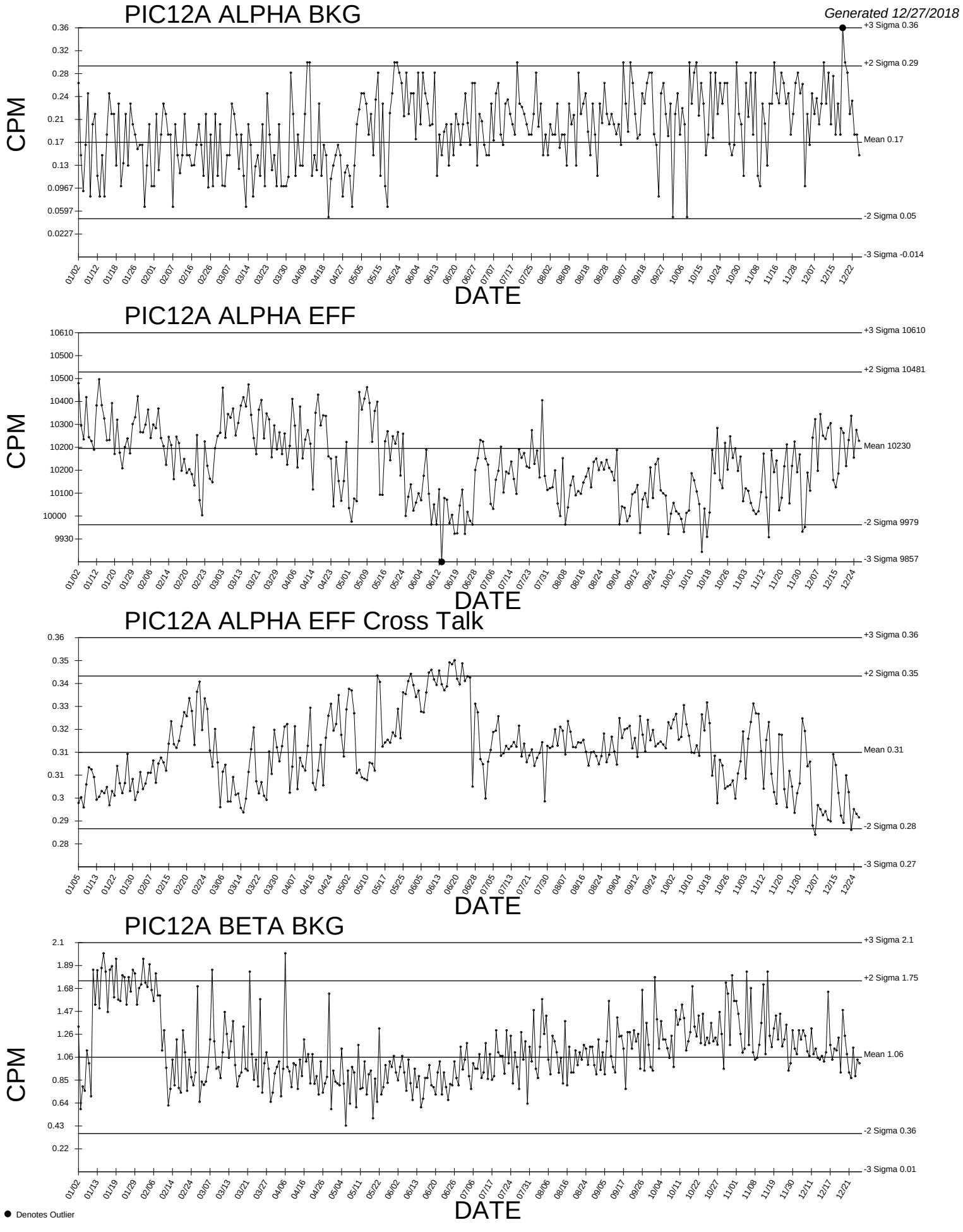
● Denotes Outlier

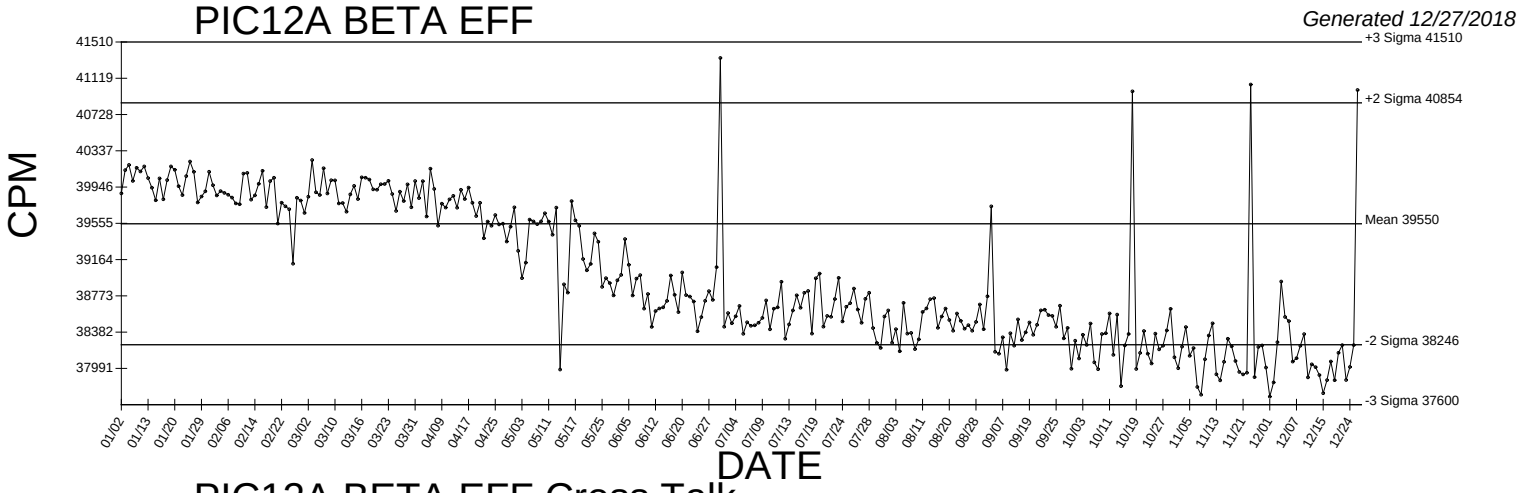

PIC11D ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.32
Mean 0.19
-2 Sigma 0.05
-3 Sigma -0.011
PIC11D ALPHA EFF
+3 Sigma 11320
+2 Sigma 11200
Mean 11080
-2 Sigma 10900
-3 Sigma 10830
PIC11D ALPHA EFF Cross Talk
+3 Sigma 0.28
+2 Sigma 0.28
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.26
PIC11D BETA BKG
+3 Sigma 2.26
+2 Sigma 1.92
Mean 1.24
-2 Sigma 0.56
-3 Sigma 0.22
● Denotes Outlier

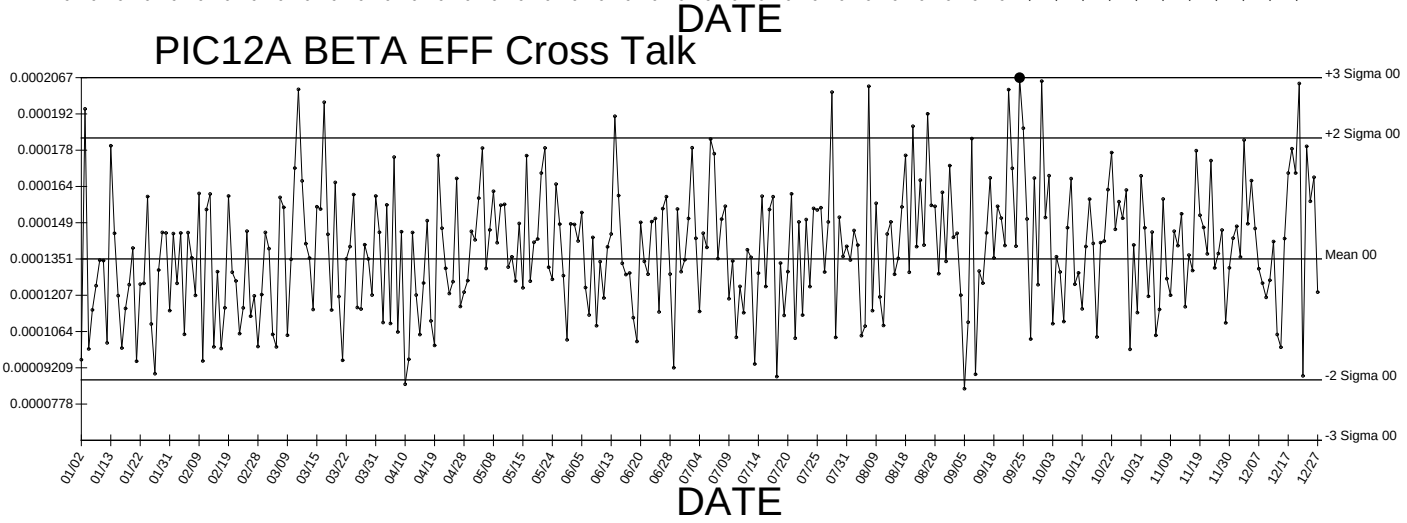




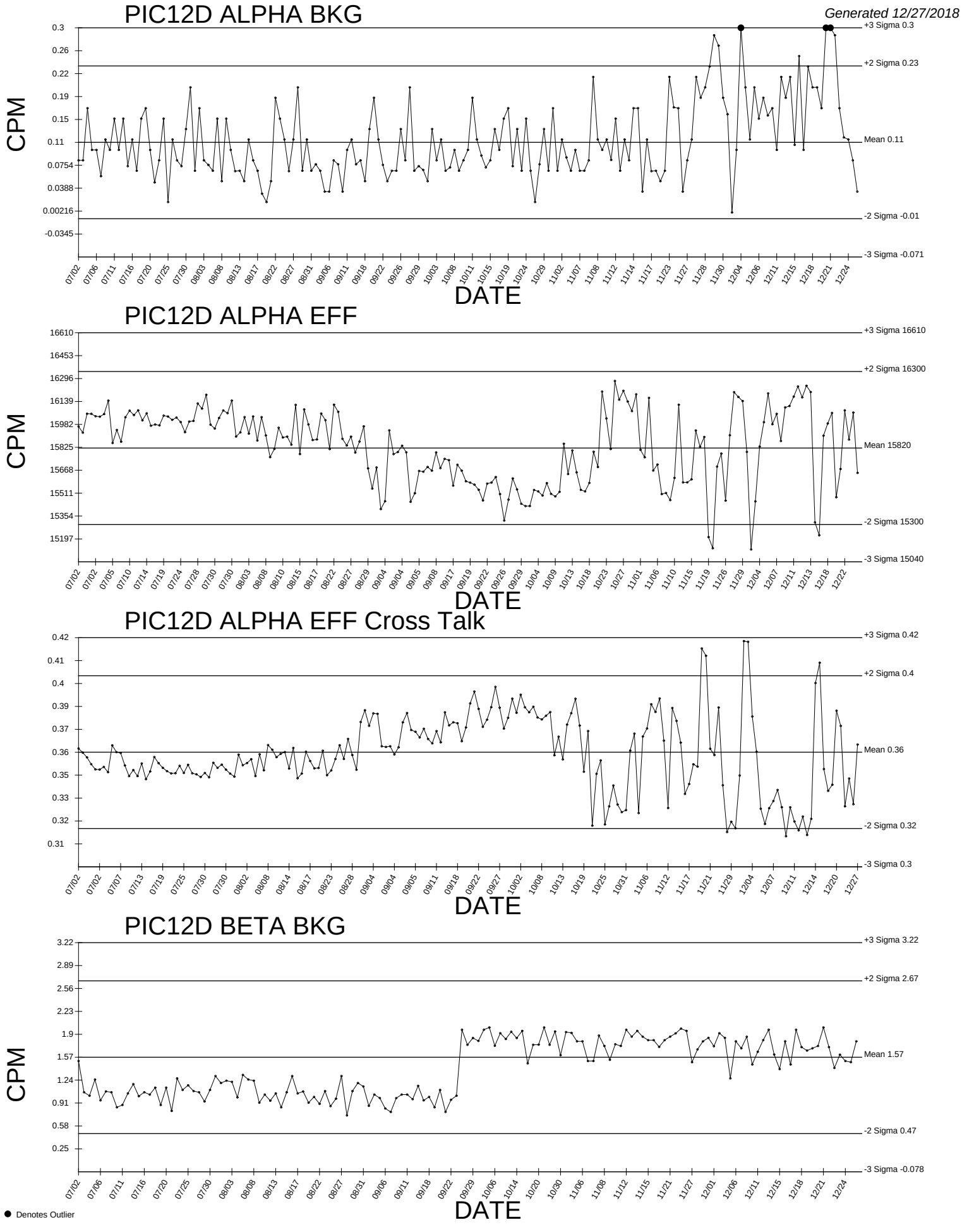
● Denotes Outlier

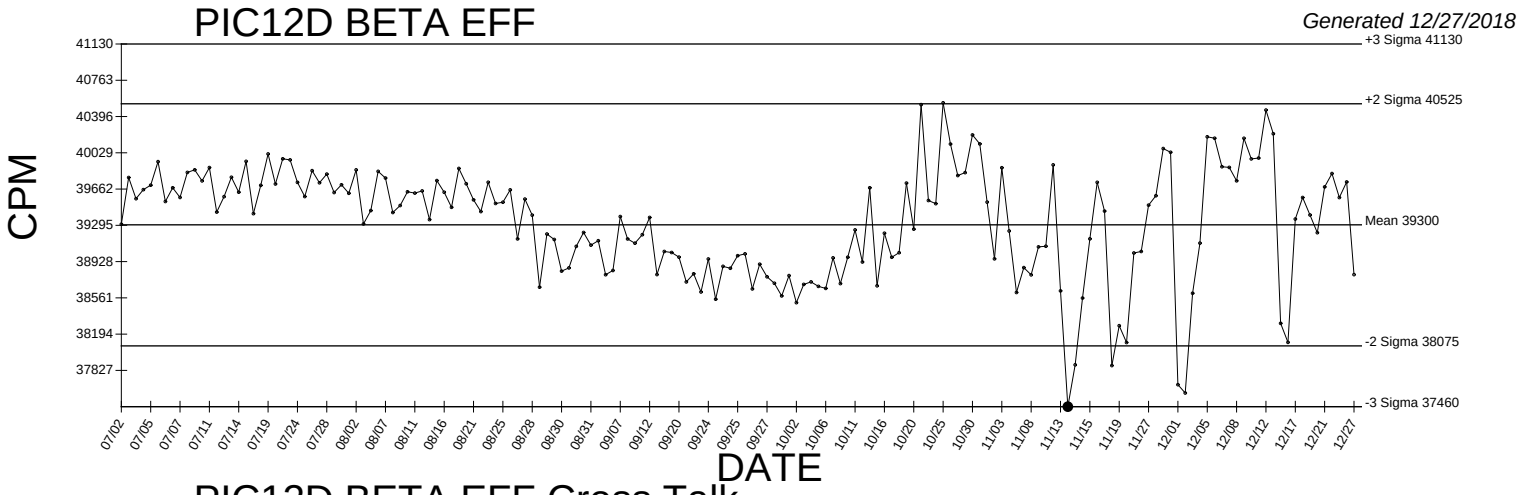

PIC12A ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.36
+2 Sigma 0.29
Mean 0.17
-2 Sigma 0.05
-3 Sigma -0.014
PIC12A ALPHA EFF
+3 Sigma 10610
+2 Sigma 10481
Mean 10230
-2 Sigma 9979
-3 Sigma 9857
PIC12A ALPHA EFF Cross Talk
+3 Sigma 0.36
+2 Sigma 0.35
Mean 0.31
-2 Sigma 0.28
-3 Sigma 0.27
PIC12A BETA BKG
+3 Sigma 2.1
+2 Sigma 1.75
Mean 1.06
-2 Sigma 0.36
-3 Sigma 0.01
Denotes Outlier

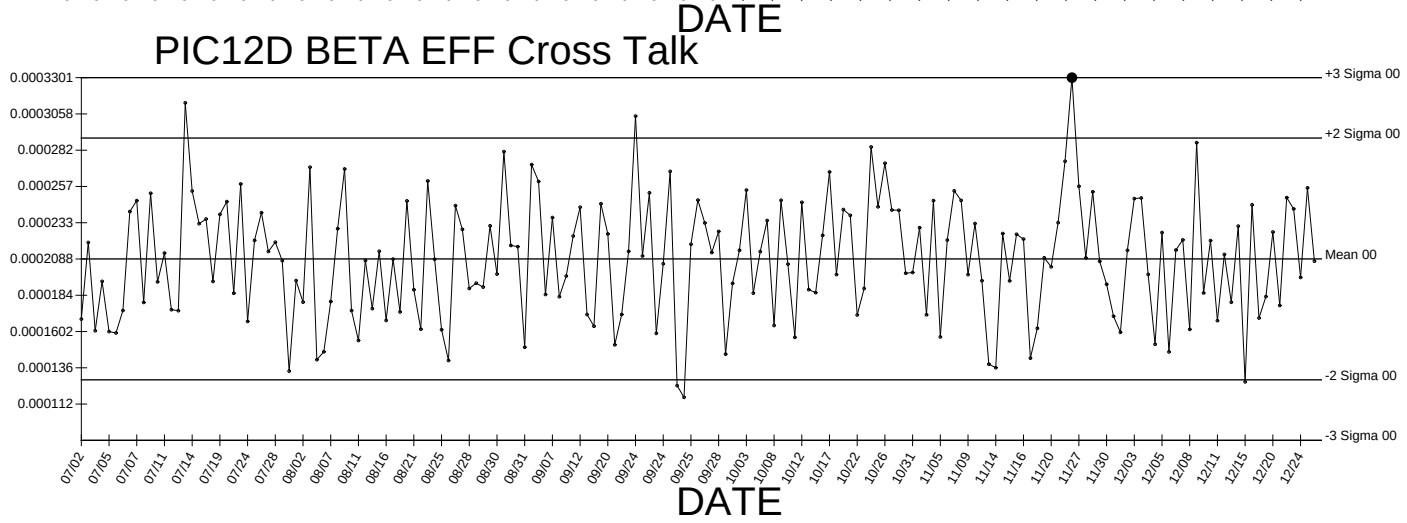




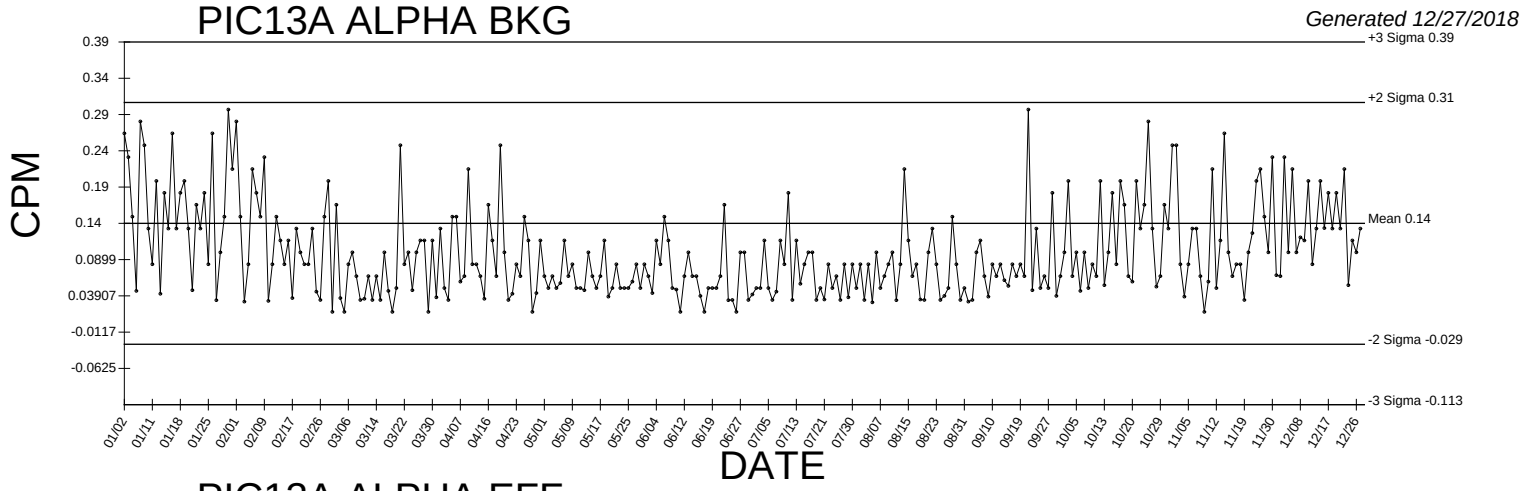
● Denotes Outlier

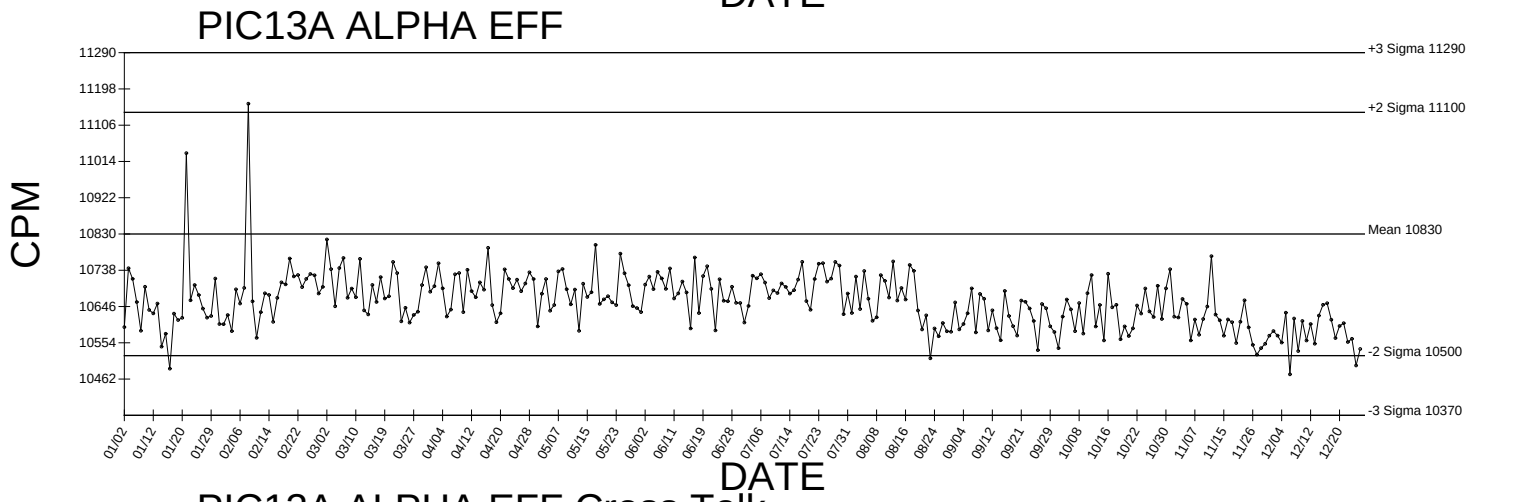

PIC12D ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.3
+2 Sigma 0.23
Mean 0.11
-2 Sigma -0.01
-3 Sigma -0.071
PIC12D ALPHA EFF
+3 Sigma 16610
+2 Sigma 16300
Mean 15820
-2 Sigma 15300
-3 Sigma 15040
PIC12D ALPHA EFF Cross Talk
+3 Sigma 0.42
+2 Sigma 0.4
Mean 0.36
-2 Sigma 0.32
-3 Sigma 0.3
PIC12D BETA BKG
+3 Sigma 3.22
+2 Sigma 2.67
Mean 1.57
-2 Sigma 0.47
-3 Sigma -0.078
Denotes Outlier

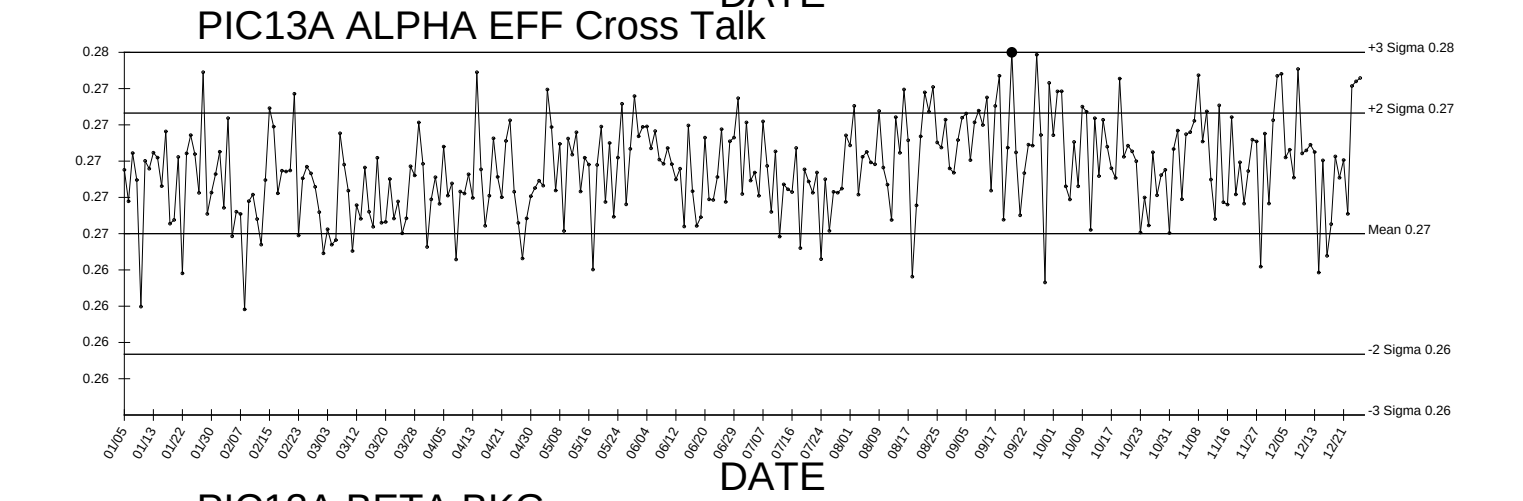


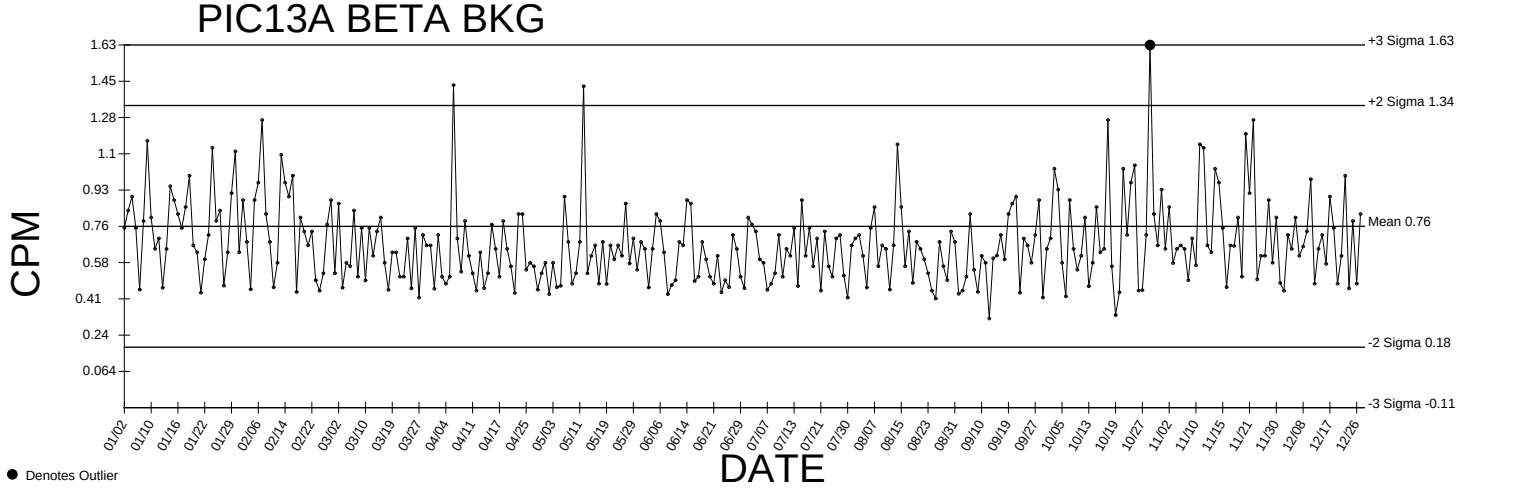


● Denotes Outlier

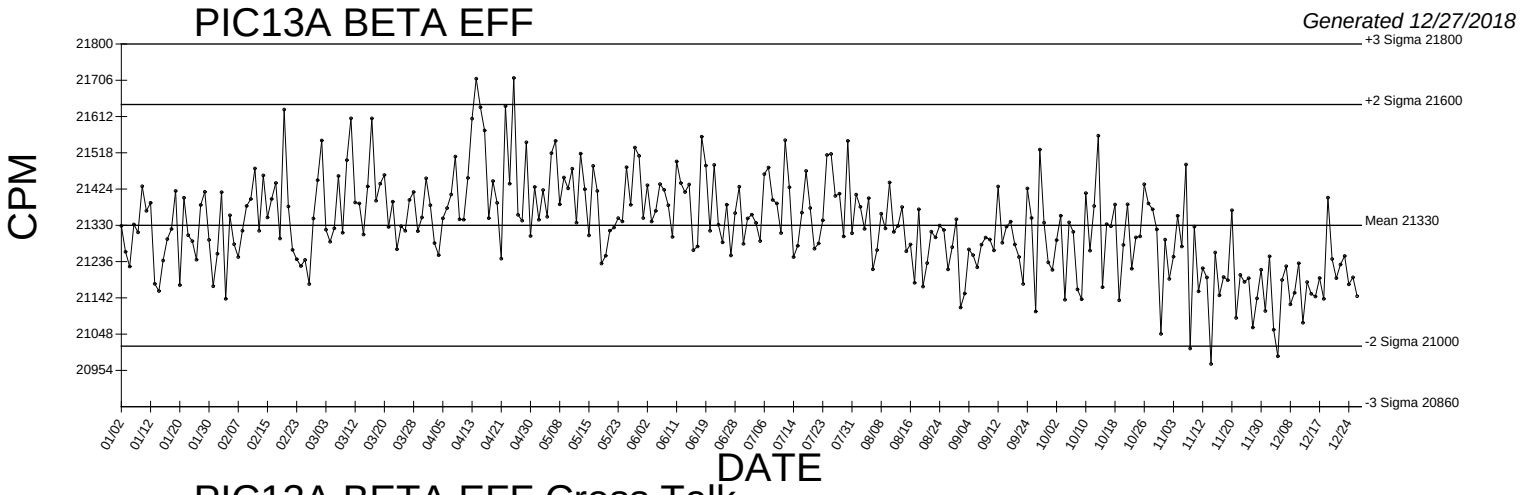


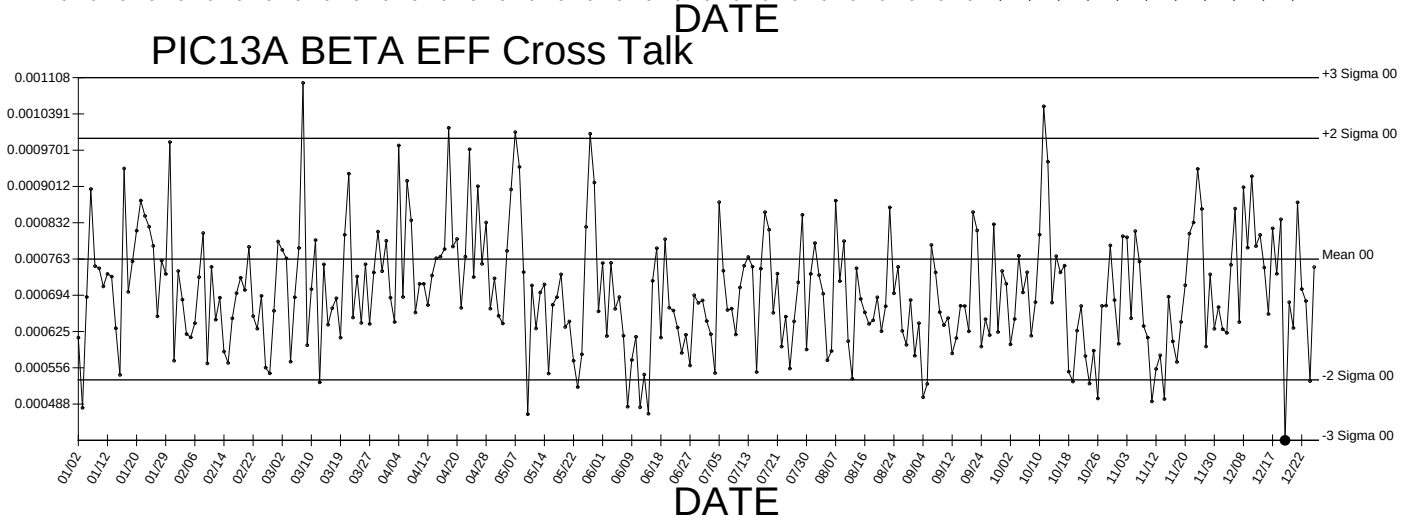




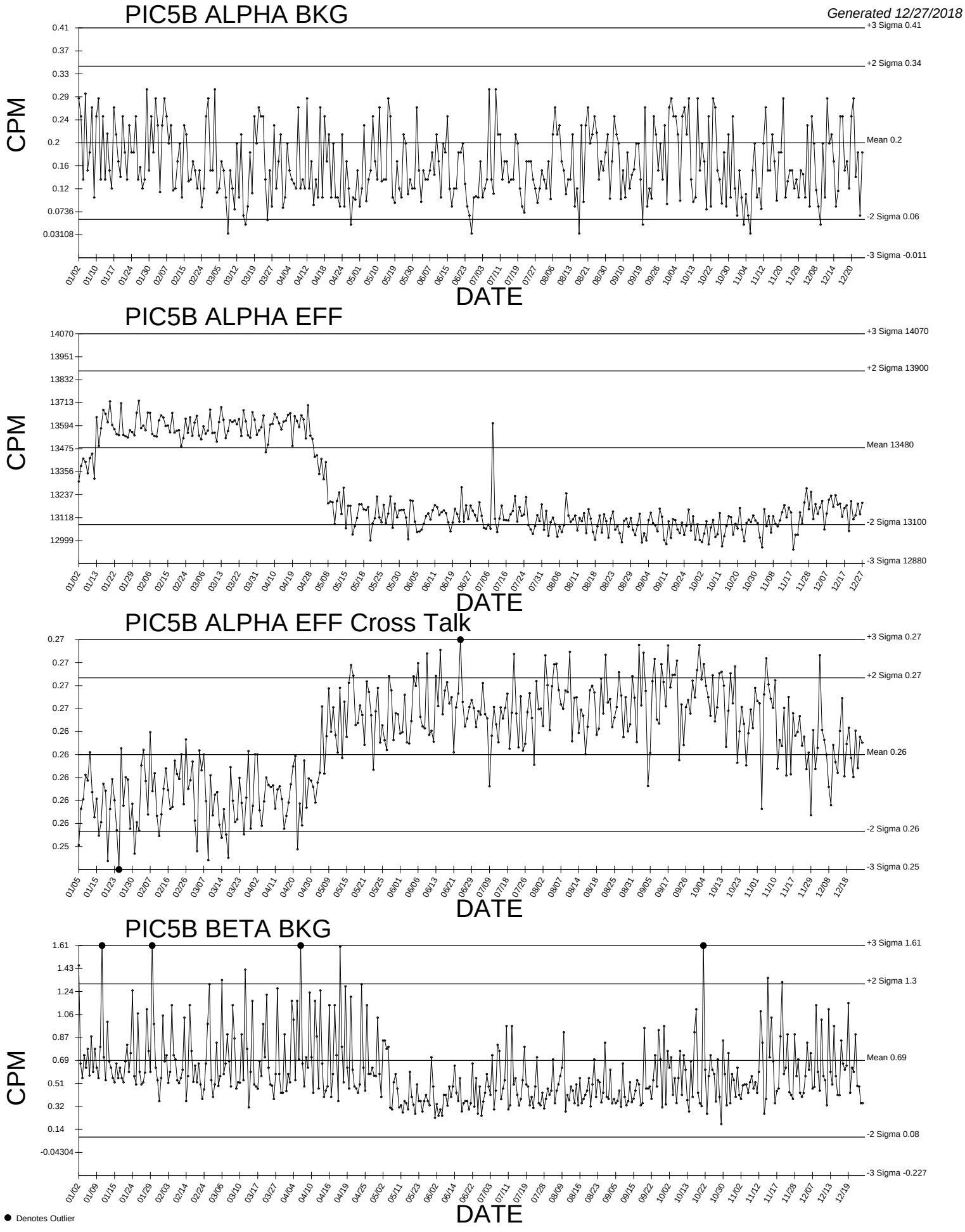


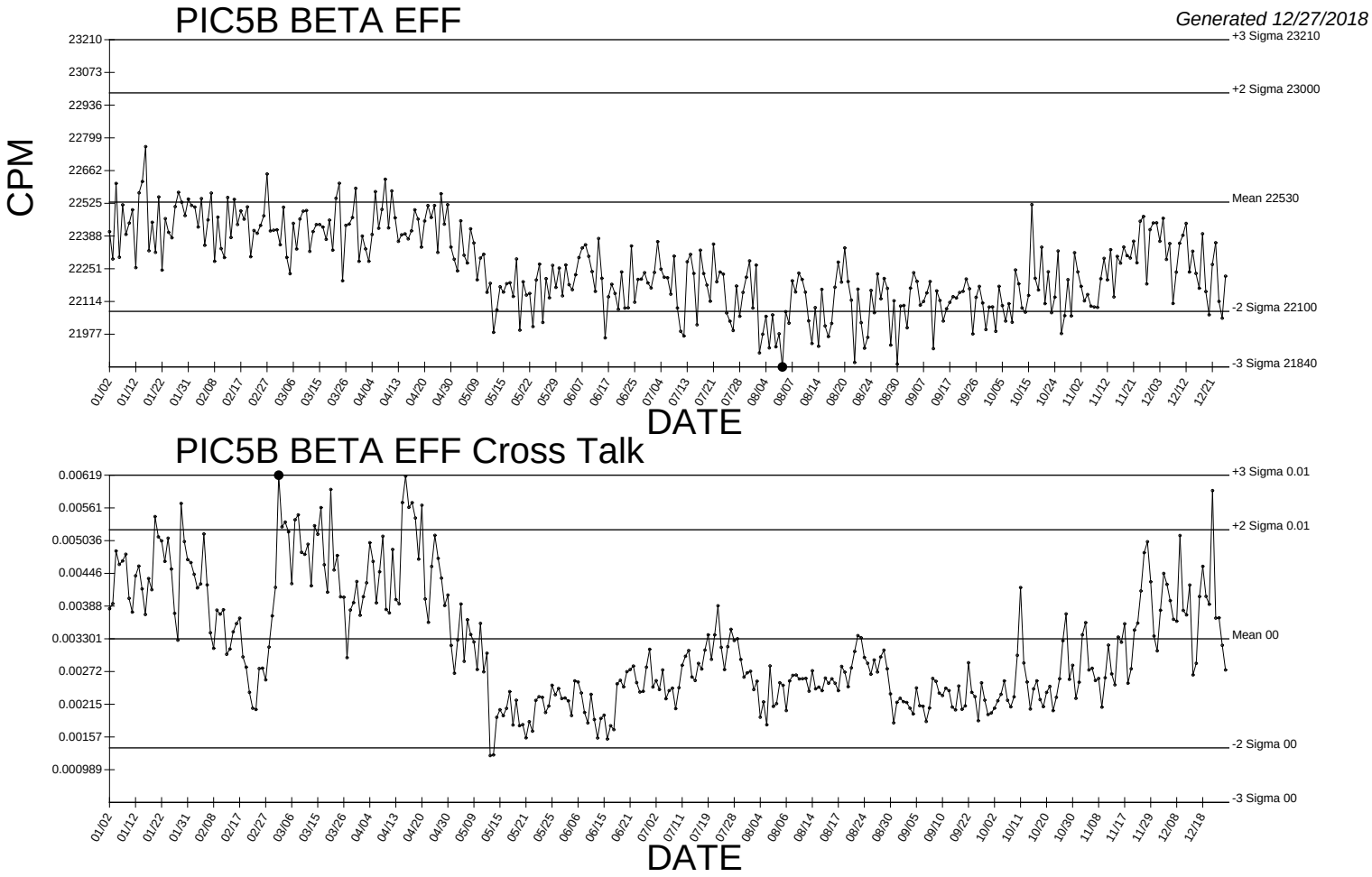
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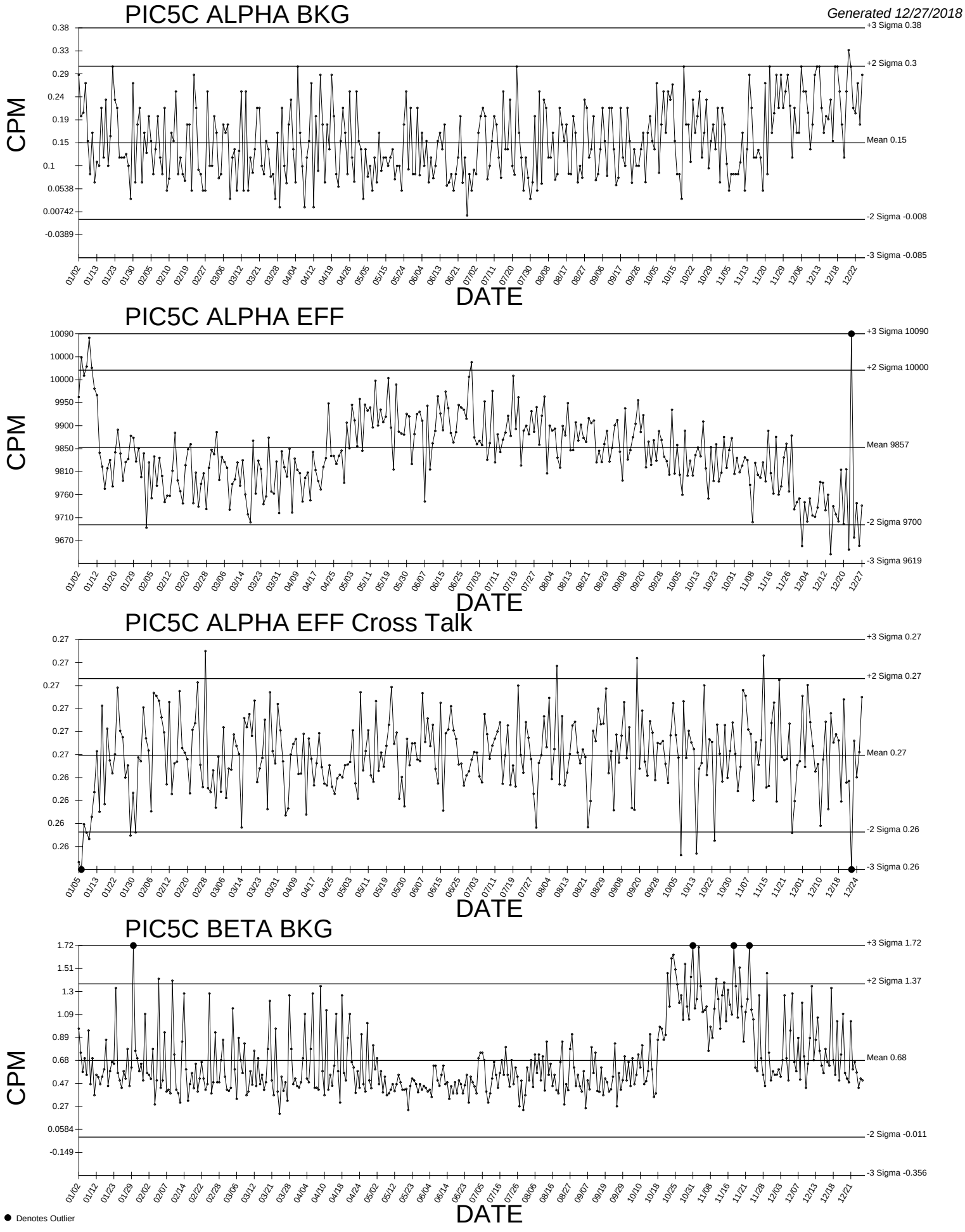


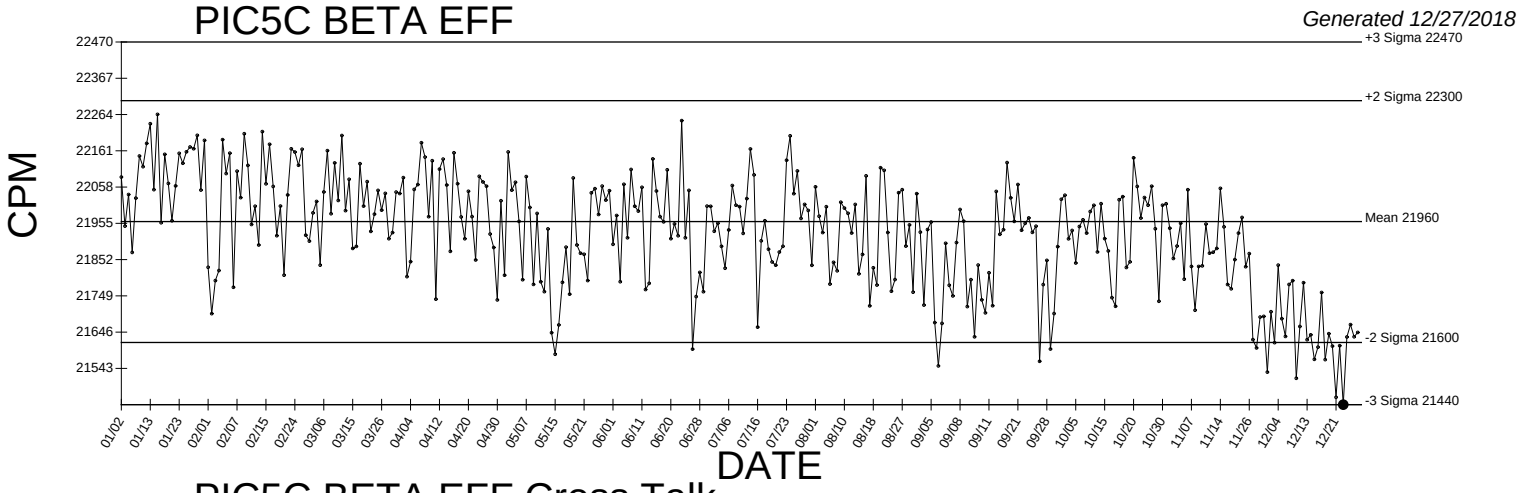
● Denotes Outlier

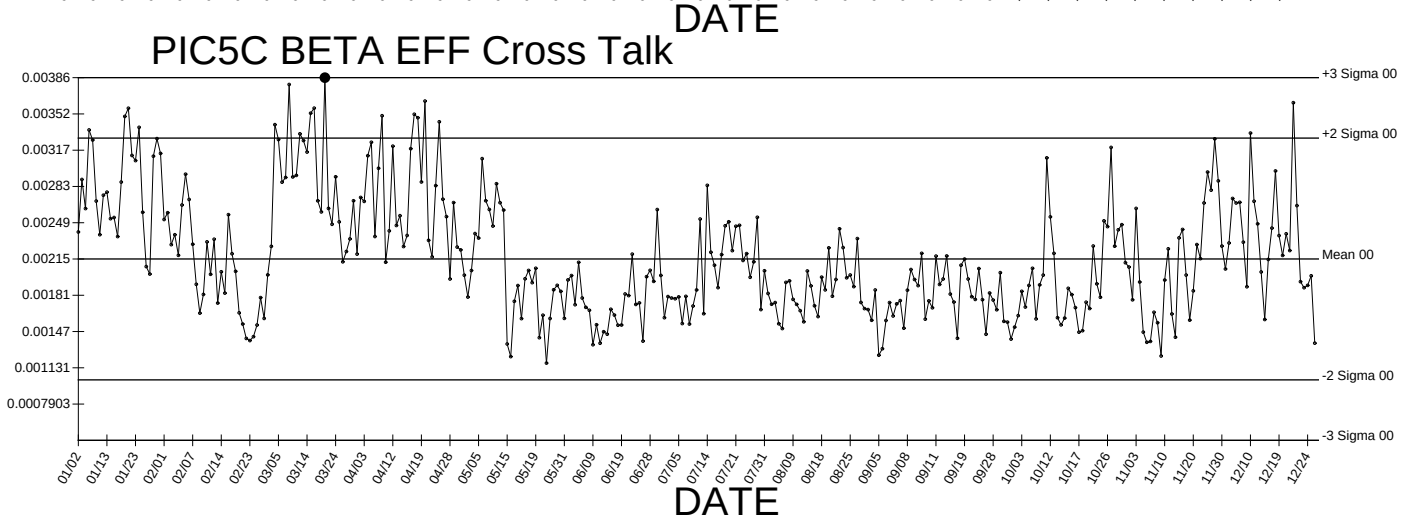

PIC5B ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.41
+2 Sigma 0.34
Mean 0.2
-2 Sigma 0.06
-3 Sigma -0.011
PIC5B ALPHA EFF
+3 Sigma 14070
+2 Sigma 13900
Mean 13480
-2 Sigma 13100
-3 Sigma 12880
PIC5B ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
PIC5B BETA BKG
+3 Sigma 1.61
+2 Sigma 1.3
Mean 0.69
-2 Sigma 0.08
-3 Sigma -0.227
Denotes Outlier



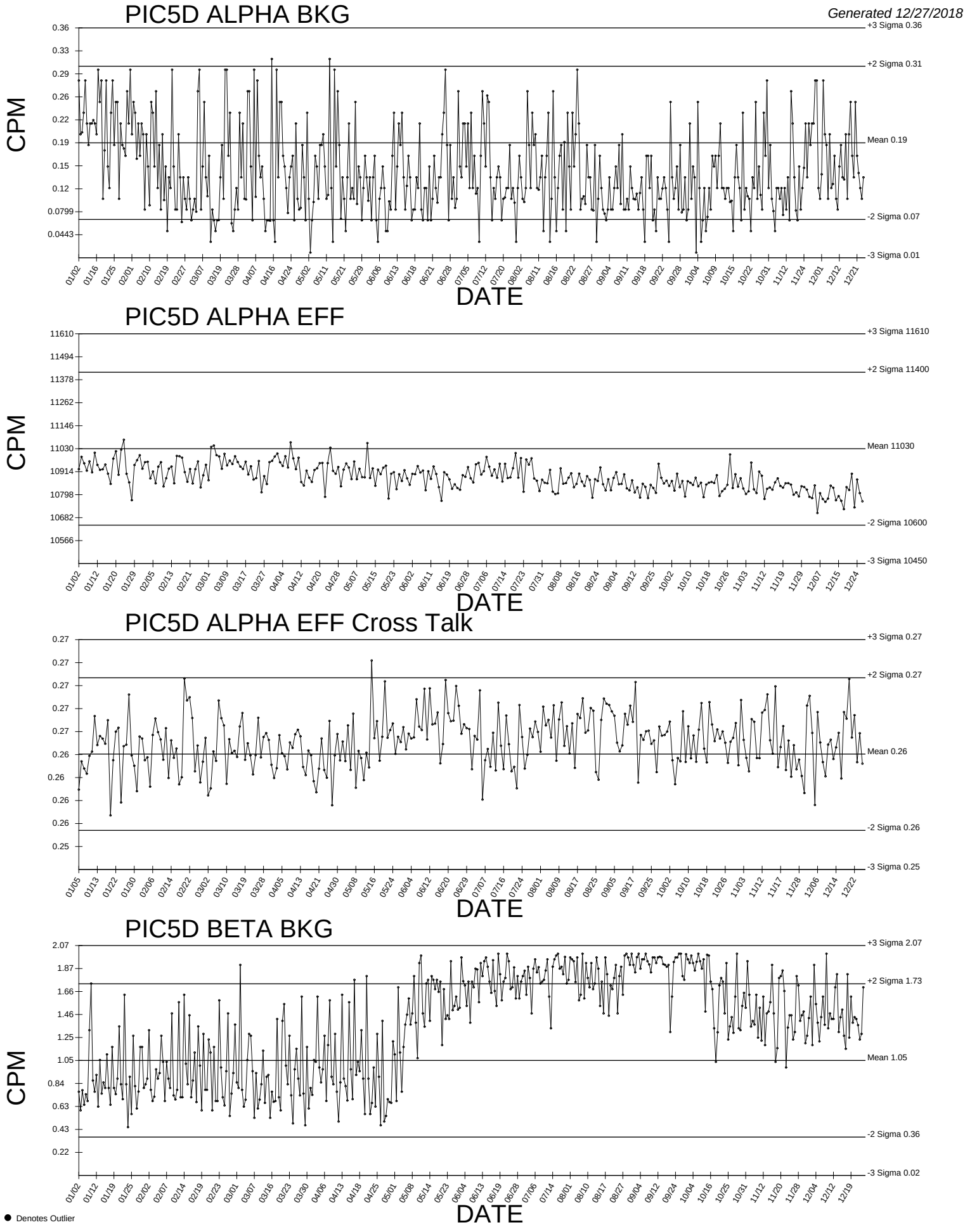
● Denotes Outlier

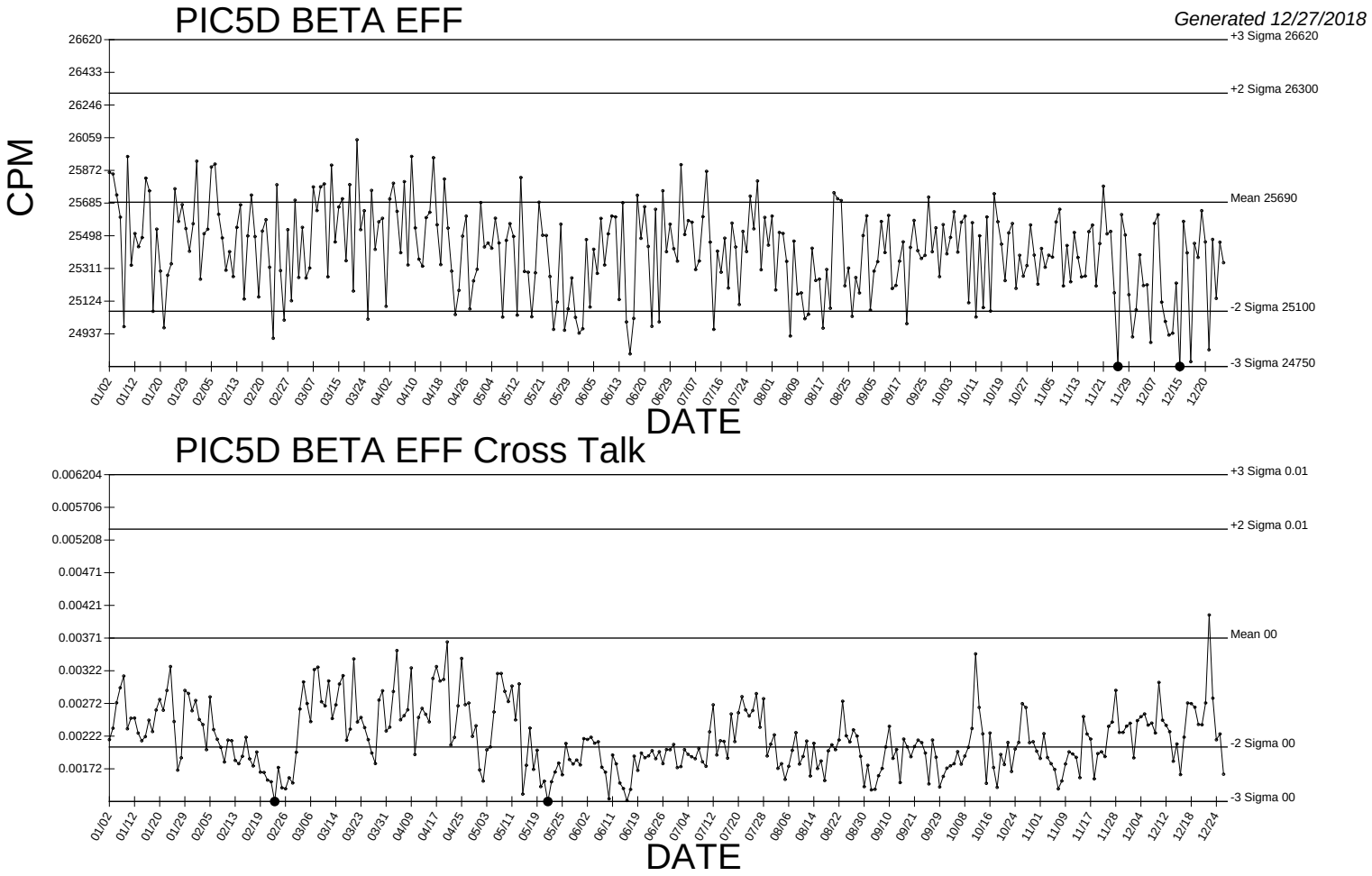

PIC5C ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.3
Mean 0.15
-2 Sigma -0.008
-3 Sigma -0.085
PIC5C ALPHA EFF
+3 Sigma 10090
+2 Sigma 10000
Mean 9857
-2 Sigma 9700
-3 Sigma 9619
PIC5C ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.27
-2 Sigma 0.26
-3 Sigma 0.26
PIC5C BETA BKG
+3 Sigma 1.72
+2 Sigma 1.37
Mean 0.68
-2 Sigma -0.011
-3 Sigma -0.356
Denotes Outlier



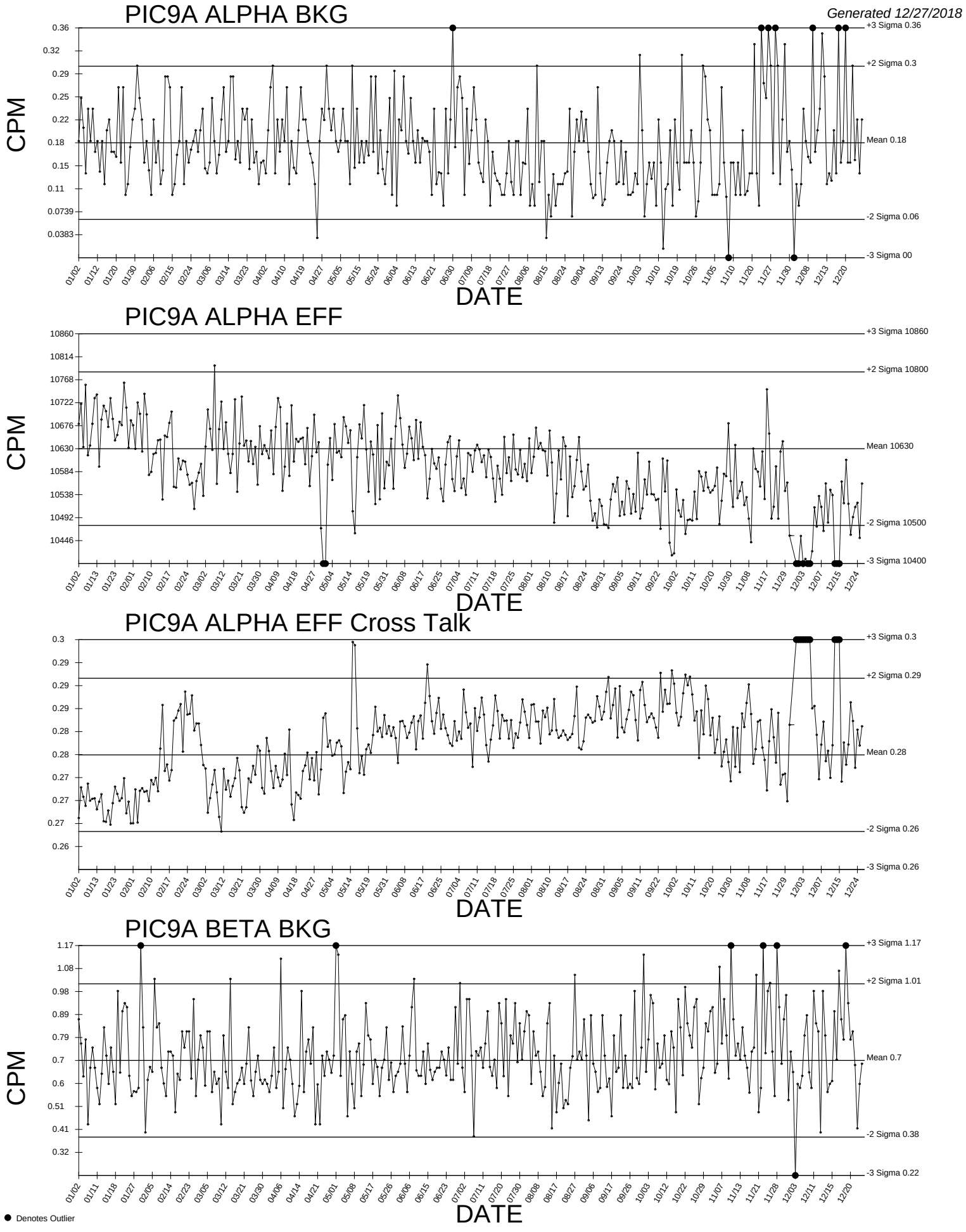


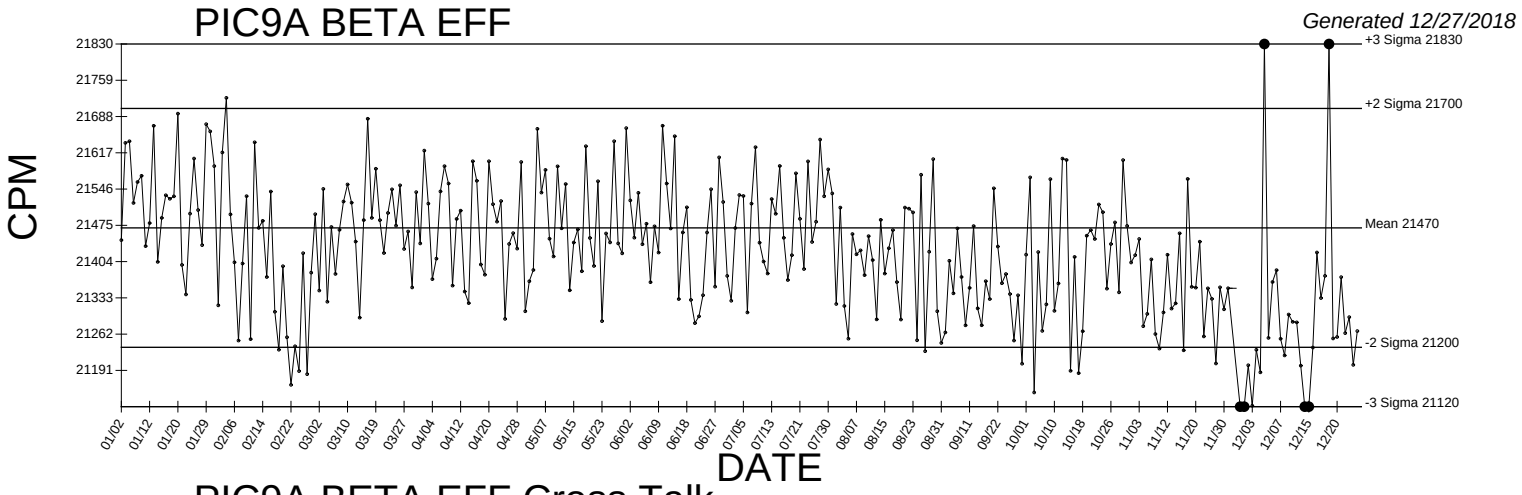
● Denotes Outlier

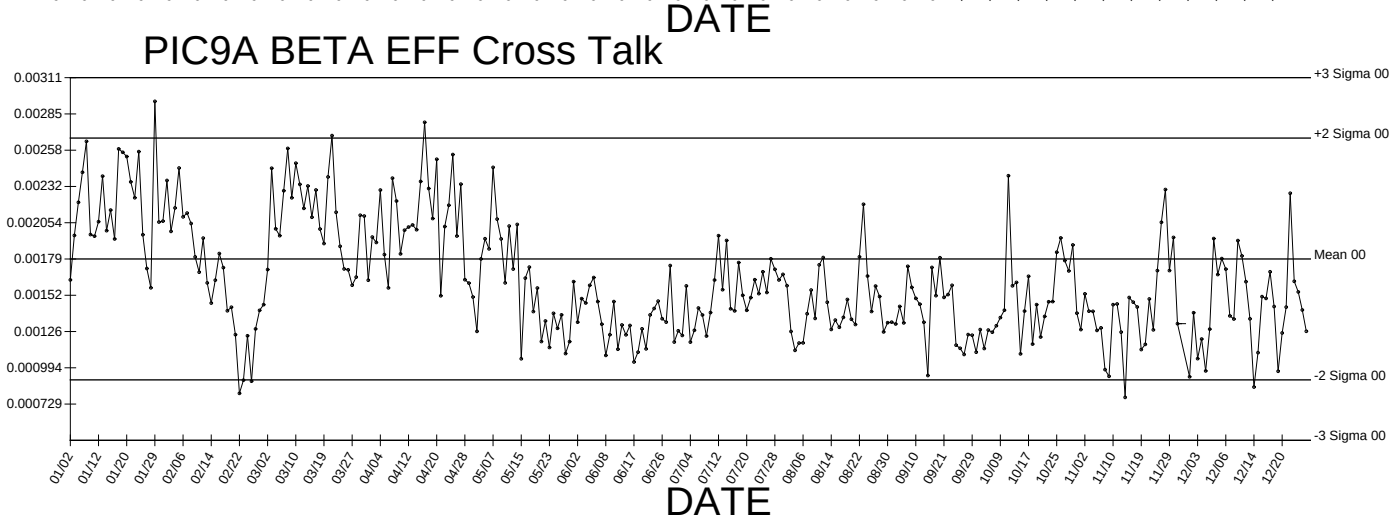

PIC5D ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.36
+2 Sigma 0.31
Mean 0.19
-2 Sigma 0.07
-3 Sigma 0.01
PIC5D ALPHA EFF
+3 Sigma 11610
+2 Sigma 11400
Mean 11030
-2 Sigma 10600
-3 Sigma 10450
PIC5D ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.27
Mean 0.26
-2 Sigma 0.26
-3 Sigma 0.25
PIC5D BETA BKG
+3 Sigma 2.07
+2 Sigma 1.73
Mean 1.05
-2 Sigma 0.36
-3 Sigma 0.02
Denotes Outlier



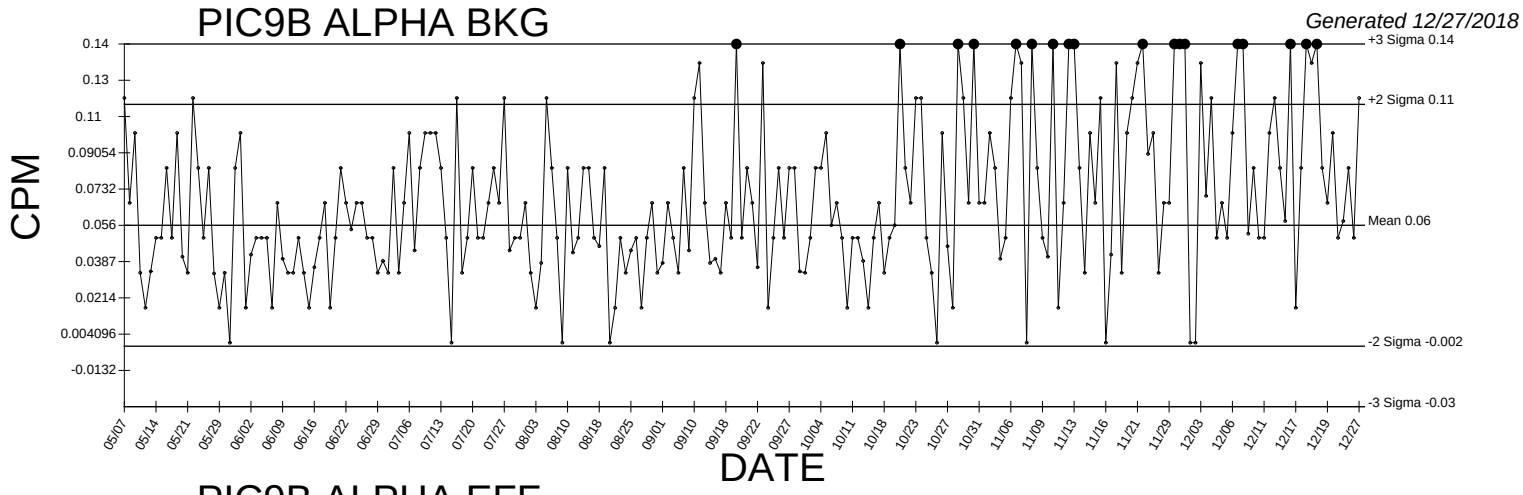
● Denotes Outlier

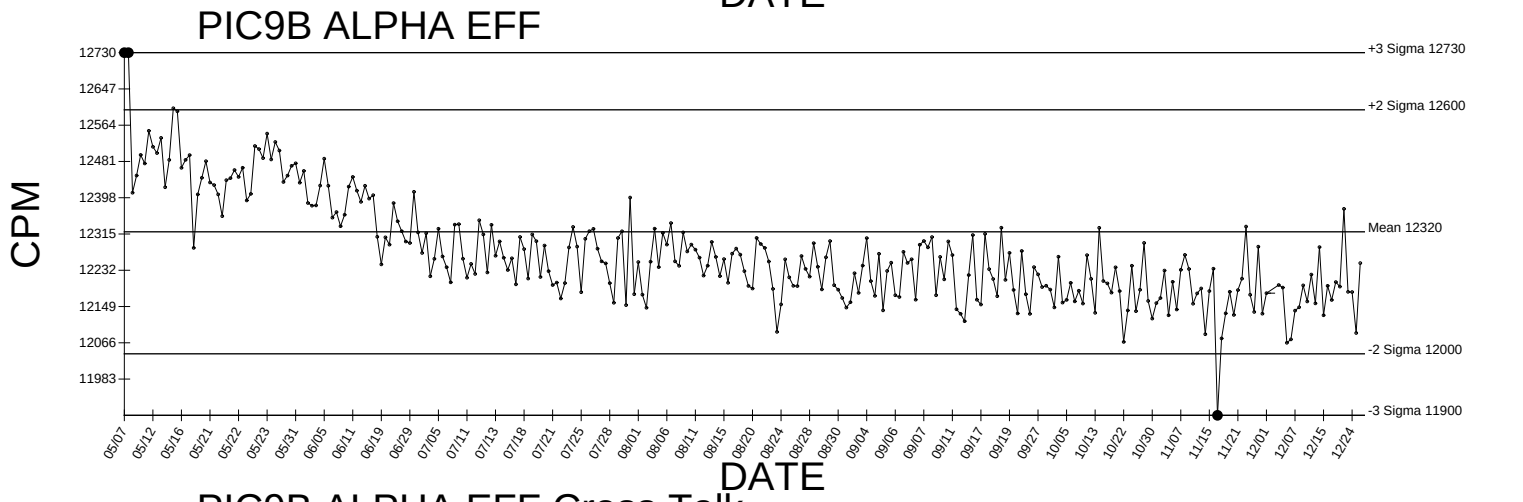

PIC9A ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.36
+2 Sigma 0.3
Mean 0.18
-2 Sigma 0.06
-3 Sigma 00
PIC9A ALPHA EFF
+3 Sigma 10860
+2 Sigma 10800
Mean 10630
-2 Sigma 10500
-3 Sigma 10400
PIC9A ALPHA EFF Cross Talk
+3 Sigma 0.3
+2 Sigma 0.29
Mean 0.28
-2 Sigma 0.26
-3 Sigma 0.26
PIC9A BETA BKG
+3 Sigma 1.17
+2 Sigma 1.01
Mean 0.7
-2 Sigma 0.38
-3 Sigma 0.22
Denotes Outlier

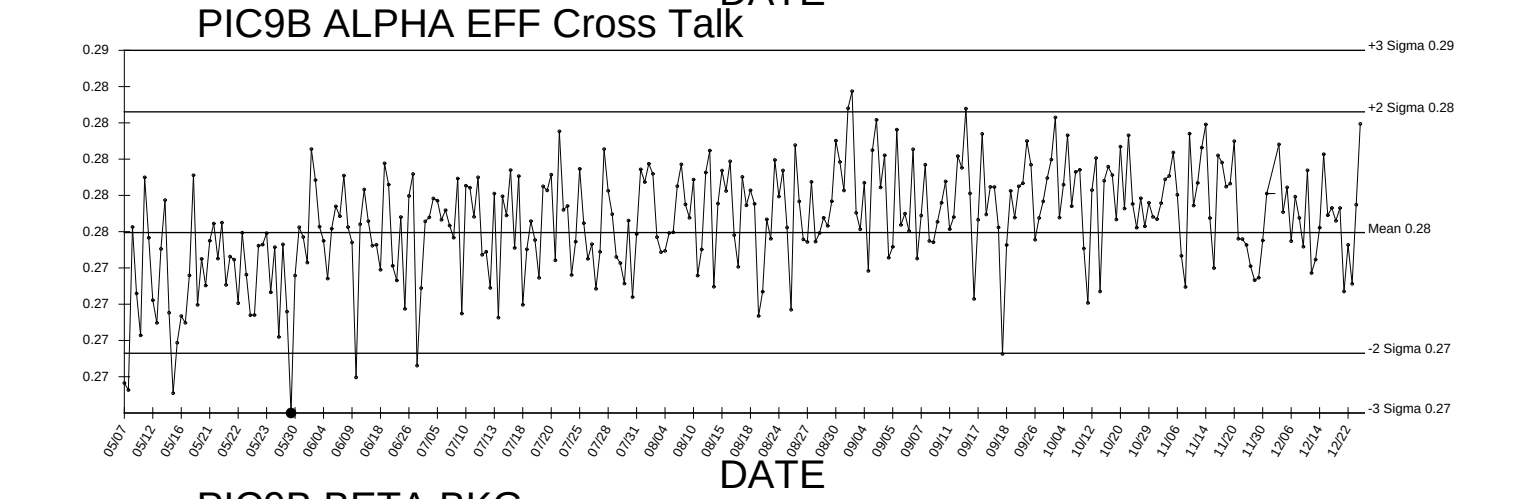


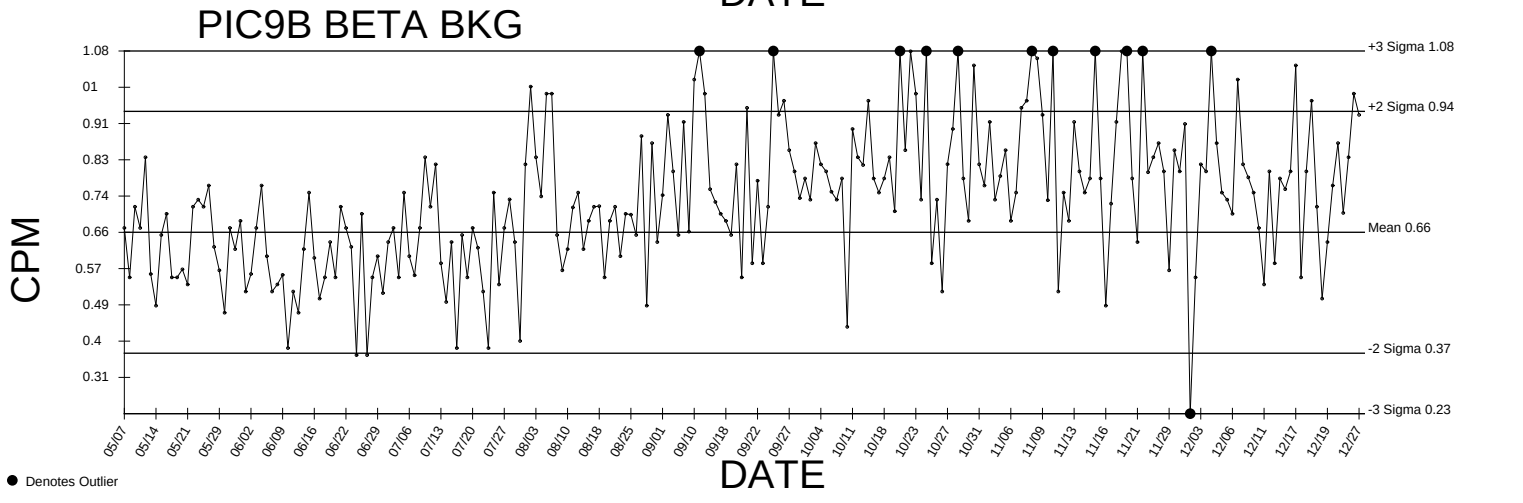


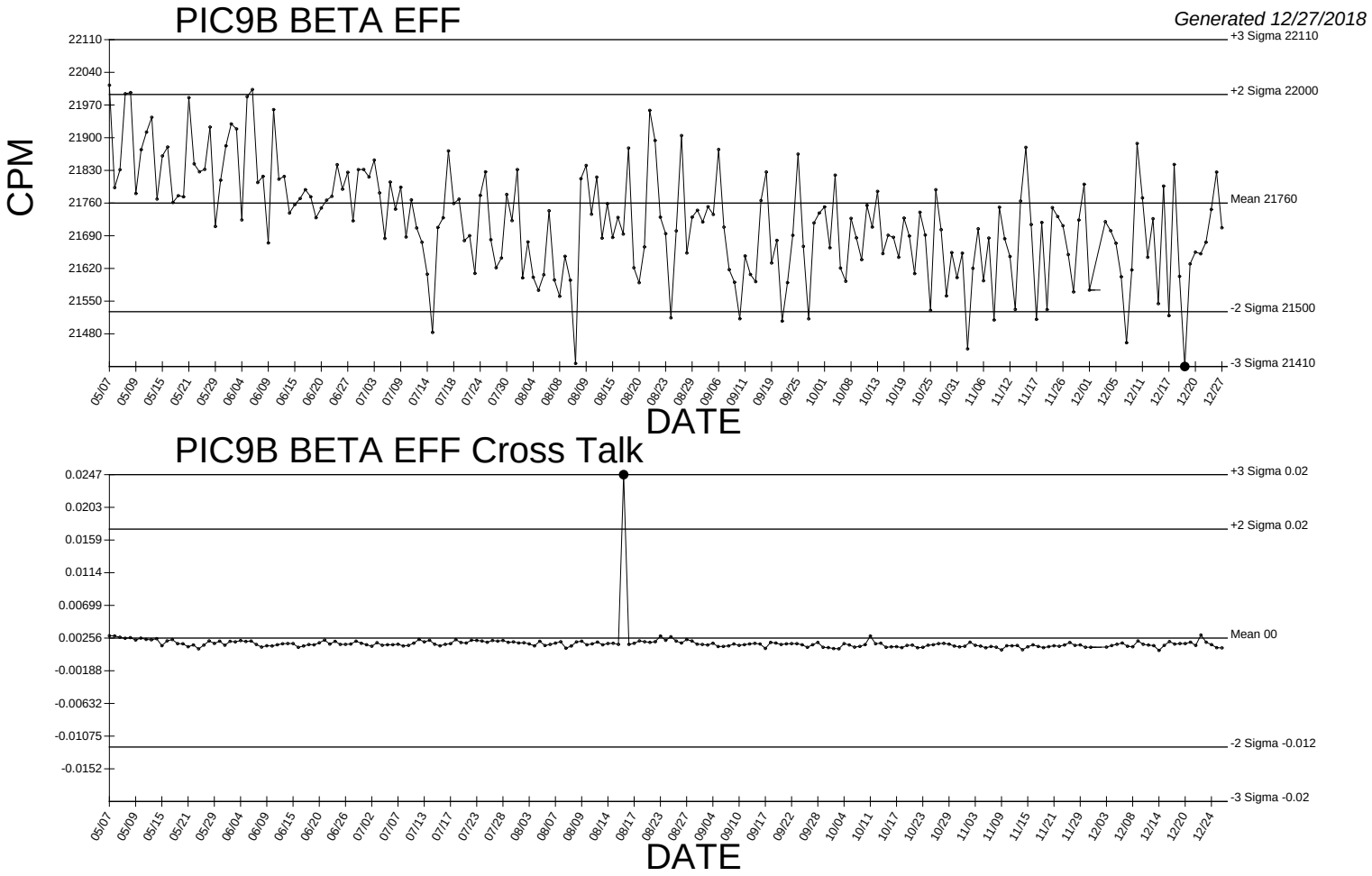
● Denotes Outlier


PIC9B ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.14
+2 Sigma 0.11
Mean 0.06
-2 Sigma -0.002
-3 Sigma -0.03

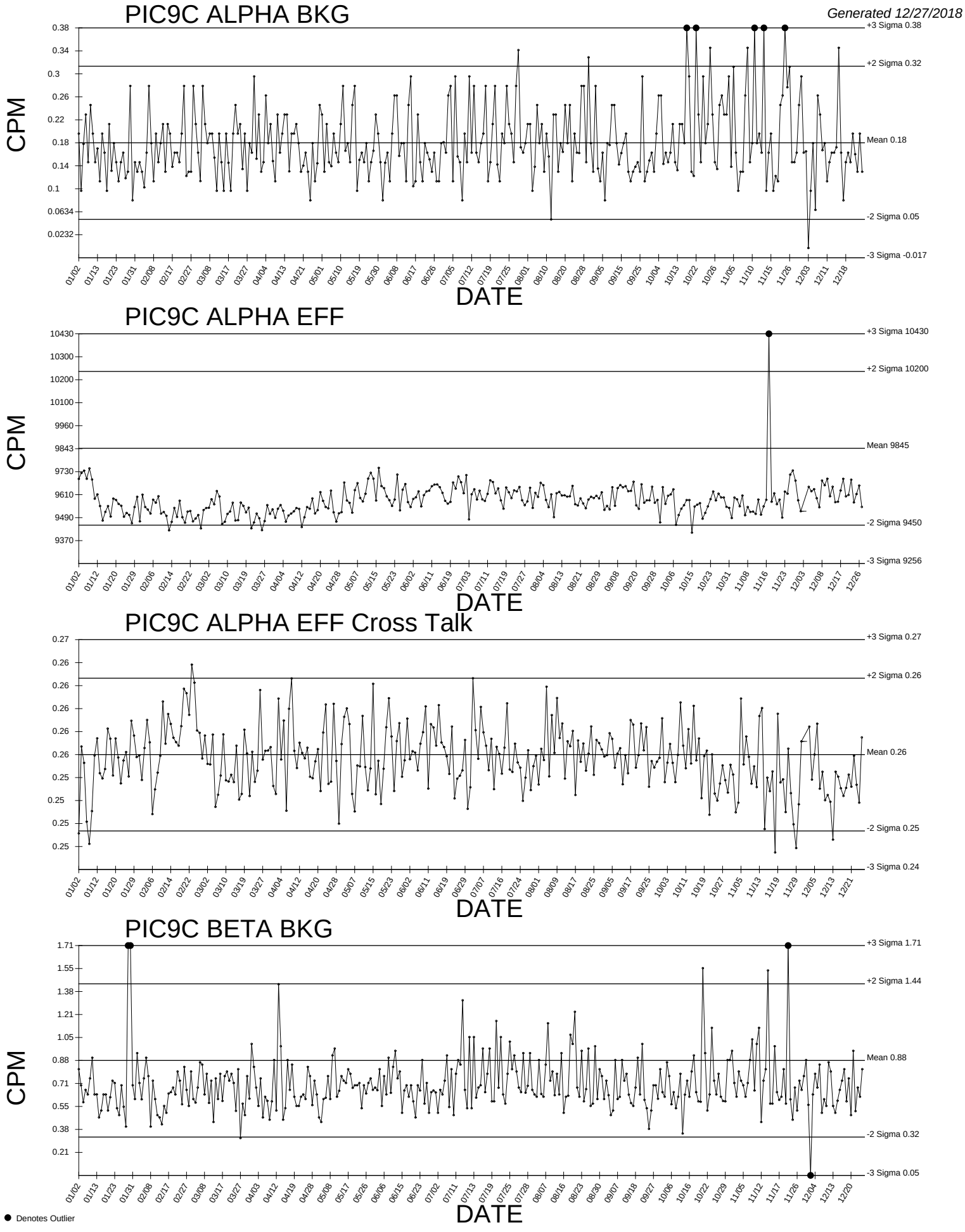

PIC9B ALPHA EFF
CPM
DATE
+3 Sigma 12730
+2 Sigma 12600
Mean 12320
-2 Sigma 12000
-3 Sigma 11900

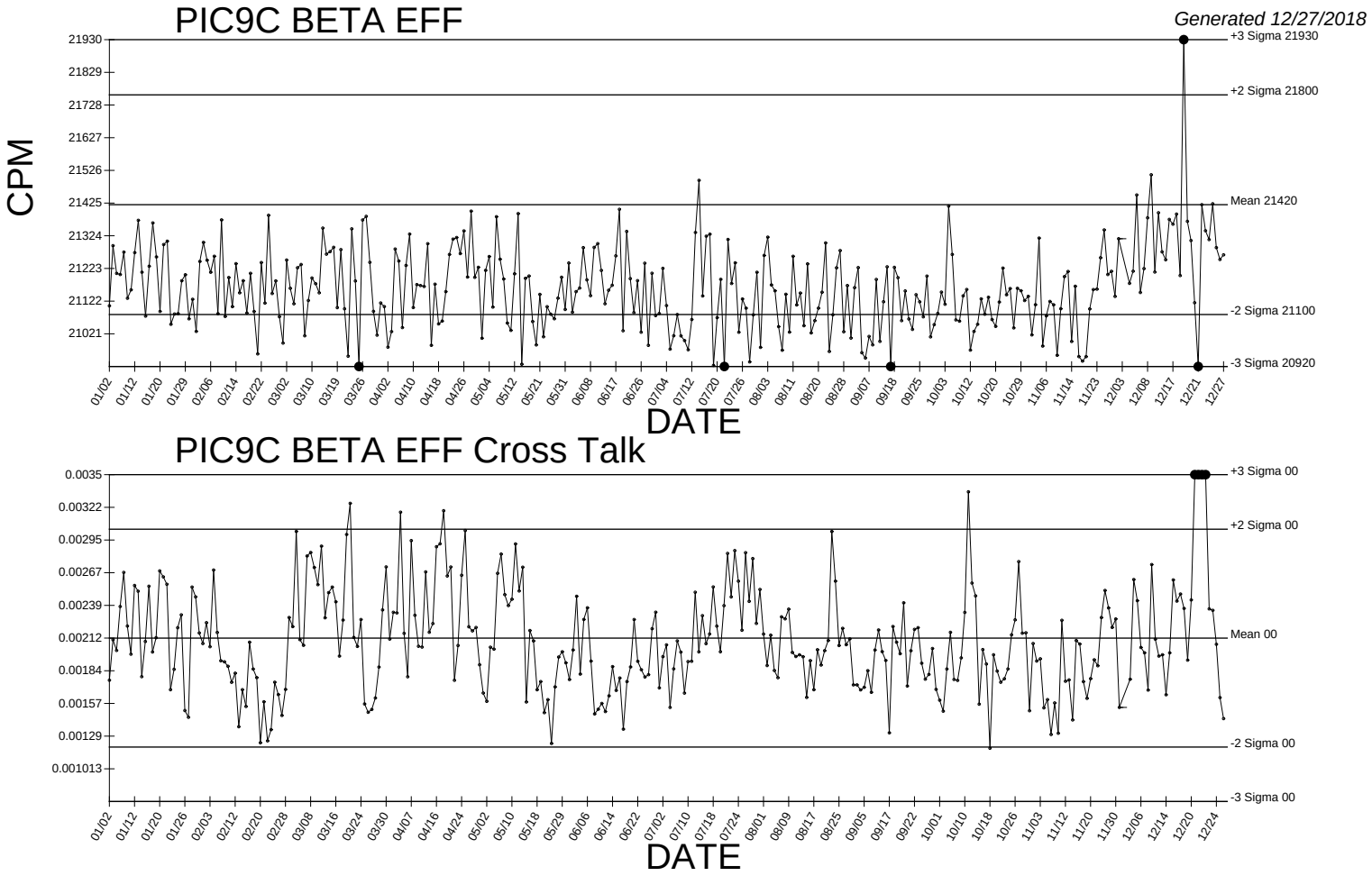

PIC9B ALPHA EFF Cross Talk
DATE
+3 Sigma 0.29
+2 Sigma 0.28
Mean 0.28
-2 Sigma 0.27
-3 Sigma 0.27


PIC9B BETA BKG
CPM
DATE
+3 Sigma 1.08
+2 Sigma 0.94
Mean 0.66
-2 Sigma 0.37
-3 Sigma 0.23
Denotes Outlier



● Denotes Outlier


PIC9C ALPHA BKG
Generated 12/27/2018
CPM
DATE
+3 Sigma 0.38
+2 Sigma 0.32
Mean 0.18
-2 Sigma 0.05
-3 Sigma -0.017
PIC9C ALPHA EFF
+3 Sigma 10430
+2 Sigma 10200
Mean 9845
-2 Sigma 9450
-3 Sigma 9256
PIC9C ALPHA EFF Cross Talk
+3 Sigma 0.27
+2 Sigma 0.26
Mean 0.26
-2 Sigma 0.25
-3 Sigma 0.24
PIC9C BETA BKG
+3 Sigma 1.71
+2 Sigma 1.44
Mean 0.88
-2 Sigma 0.32
-3 Sigma 0.05
Denotes Outlier



● Denotes Outlier

RAD Standards Traceability

0487

National Institute of Standards & Technology

0487

Certificate

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

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Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have an acid concentration and a carrier concentration comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

*Notes and references are on pages 5 and 6.

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PROPERTIES OF SRM 4251C
(Certified values are shown in bold type)

Source identification number	NIST SRM 4251C		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution density	**(1.015 ± 0.002) g•mL^{-1} at 22.1 °C [b]***		
Solution mass	**(5.054 ± 0.001) g [b]**		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol•L^{-1})	Mass Fraction (g•g^{-1})
	H_2O HCl $BaCl_2$ $^{133}BaCl_2$	54 1.0 6×10^{-4} 4×10^{-7}	0.96 0.04 1.2×10^{-4} 8×10^{-8}
Radiological Properties:			
Radionuclide	**Barium-133**		
Reference time	**1200 EST, 1 September 1993**		
Massic activity of the solution [c] (Activity per unit mass of solution)	**4.876×10^5 Bq•g^{-1}**		
Relative expanded uncertainty (k=2)	**0.52%** [d]		
Photon-emitting impurities	None detected [e]		
Half lives used	Barium-133: (10.52 ± 0.13) a [f] Radium-226: (1600 ± 7) a [f]		
Measuring instrument	Pressurized "4π"γ ionization chamber A calibrated using a barium-133 solution whose activity was determined by 4π(e+X)-γ-anticoincidence counting		

*Notes and references are on pages 5 and 6.

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EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i, the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [g]	Relative Sensitivity Factor, $\lvert\partial y/\partial x_i\rvert \cdot (x_i/y)$ [h]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [i]
PIC A net response per gram of SRM 4251C, measured relative to RRS20 [j]	Standard deviation of the mean for 1000 repeated measurements (A)	0.008	1.0	0.01
PIC A background response, measured relative to RRS20	Standard deviation of the mean for >150 repeated measurements (A)	0.25	0.001 [k]	0.00
PIC A net response for RRS200, measured relative to RRS20	Standard deviation of the mean for >100 repeated measurements (A)	0.06	1.0	0.06
PIC A net response per Bq of barium-133 in solution, measured relative to RRS200.	Standard deviation of the mean for 240 repeated measurements (A)	0.02	1.0	0.02
Gravimetric measurements	Estimated (B)	0.01	1.0	0.01
Half life of barium-133 Half life of radium-226	Standard uncertainty of the half life (A)	1.24 [m] 0.44 [m]	0.004 [n] 0.004 [n]	0.00 0.00
Activity used to calibrate PIC A net response per Bq of barium-133 in solution	Standard uncertainty of the activity determined by $4\pi(e+X)$-γ-anticoincidence counting. (B)	0.22	1.0	0.22
Live-time [p]	Estimated (B)	0.10	1.0	0.10
PIC A charge collection	Estimated (B)	0.05	1.0	0.05
Source Positioning	Estimated (B)	0.05	1.0	0.05
Photon-emitting impurities	Limit of detection for Cs-134 (B) [q]	100.	0.00002	0.00
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.26
Coverage Factor, k				x 2
Relative Expanded Uncertainty of the Output Quantity, U/y, (%)				0.52

*Notes and references are on pages 5 and 6.

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NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	100	1.5	0.2

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] Estimated limits of detection for photon-emitting impurities are:
600 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 12 and 75 keV,
150 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 84 and 379 keV, and
3 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 387 and 2700 keV, provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of barium-133.

[f] The stated uncertainty is the standard uncertainty. See reference [5].

[g] Relative standard uncertainty of the input quantity x_i.

[h] The relative change in the output quantity y divided by the relative change in the input quantity x_i. If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y. If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y.

[i] Relative component of combined standard uncertainty of output quantity y, rounded to two decimal places. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

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[j] The response of pressurized ionization chamber A (PIC A) is determined from measurement of the time required to collect a given amount of charge on a stable fixed capacitor. All of the response measurements in the NIST pressurized ionization chambers are made relative to the response of one or more artifact standards. These artifact standards consist of microgram quantities of aged radium-226 in small welded stainless-steel capsules. These capsules are encapsulated in plastic rods whose dimensions are similar to those of the standard NIST ampoule. The artifact standards are called **Radium Reference Sources** and are designated as RRSx, where x is the nominal mass (in micrograms) of radium-226 in the capsule.

[k] $|\partial y/\partial x_i| \cdot (x_i/y)$ = (average background response)/(average net sample response)

[m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$

[p] The live time is determined by counting the pulses from a gated oscillator.

[q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i$ = 100%. $|\partial y/\partial x_i| \cdot (x_i/y)$ = {(response per Bq of impurity)/(response per Bq of Ba-133)}·{(Bq of impurity)/(Bq of Ba-133)}. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] Evaluated Nuclear Structure Data File (ENSDF), April 1994.

RC-5-035-002f

Standard Traceability Log Rad

Source Material Info	
Parent Code:	0487
Prepared By:	Angela Johnson
Carrier Conc:	0.1 M HCL
Reference Date:	09/01/1993
Ampoule Mass (g):	5.054 g
Uncertainty:	+/- .26 %
LogBook No:	RC S 035 002

A Solution Material Info			
Isotope:	Barium-133		
Prepared By:	Angela Johnson		
Prep Date:	10/31/2002		
Verification Date:	10/10/2018		
Expiration Date:	10/10/2019		
Primary Code:	0487-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.7696 g		
Density(g/mL):	0.9984	Balance ID:	

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (bq/g)) * (conversion dpm to bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (100 mL) = 1395394.1760 dpm/mL
(4.7696 g) * (487600 bq/g) * (60 dpm/bq) / (0.9984 g/mL) / (100 mL) = 1397609.3930 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
12/18/2015	Gregory Ramsay	15.0062	1000	0487-B	20972.806 dpm/mL	11/18/2016	11/18/2017
01/17/2017	Bethany Fiem	15.1795	1000	0487-C	21215.0117 dpm/mL	01/17/2017	01/17/2018
11/08/2017	Bethany Fiem	15.5573	1000	0487-D	21708.5658 dpm/mL	10/10/2018	10/10/2019

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ba-133 Standard 0487-D

v1.0.2

Instrument	YELLOW
Analyst	BXF1
Verification Prep Date	10/10/2018

Standard Information	
Isotope	Ba-133
Serial Number	0487-D
Isotope Halflife	3.8410E+03 D
Reference Date	9/1/1993
Ref. Act. (DPM/mL)	21708.5658
Amount of Std. (mL)	1.0
Standard Prep Date	11/8/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	10/11/2018	761.95	3290.62	19.66
2	10/11/2018	761.95	3210.30	19.66
3	10/11/2018	760.37	3256.97	19.66

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	3270.96	0.763851	4282.20	4282.20
2	3190.64	0.763851	4177.04	4177.04
3	3237.31	0.763851	4238.14	4238.14

	dpm/mL
Mean Value =	4232.46
Stdev =	52.80544344
Certificate Value* =	**4148.3**
Two sigma =	105.611
10 % of Mean =	423.246
Rule A (Pass/Fail)	**Pass**
% Recovery	102.03%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**10/10/2019**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ba-133 source 0487-D by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYELLOW for Ba-133 source standard verification. The Ba-133 efficiency calibration which was used for verification calculations was performed on 10/10/2018 using Ba-133 source 1601-A.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,
B = BKG cpm,
C = System efficiency (cpm/dpm), and
D = volume used for standard verification.

RAD-M-001

10-11-18

11/14/18

National Institute of Standards & Technology

Certificate

Received 3-9-17

Standard Reference Material® 4339b

1810

Radium-228 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-228 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4339b consists of approximately 5 mL of a solution, whose composition is specified in Tables 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-228** massic activity value, at a **Reference Time of 1200 EST, 07 October 2010**, is:

$$\mathbf{(195 \pm 14)\ Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, Becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Tables 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4339b** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and Chemical Hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the Physical Measurement Laboratory, Radiation and Biomolecular Physics Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification and photon-emitting impurity analyses were provided by L. Pibida of the NIST Radioactivity Group, with production assistance by J. LaRosa, R. Collé, and L. Laureano-Pérez. Alpha-emitting impurity analyses were provided by J. LaRosa.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation and Biomolecular Physics Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 14 November 2012

Robert L. Watters, Jr., Director
Office of Reference Materials

CLCFD-707-103

Table 1. Certified Massic Activity of SRM 4339b

Radionuclide	**Radium-228[a]**
Reference time	**1200 EST, 07 October 2010**
Massic activity of the solution	**195 Bq g^{-1}**
Relative expanded uncertainty ($k = 2$)	**7.2 %[b]**

[a] The final ^{228}Ra purification from the ^{232}Th mother solution was performed on 02 September 2010 0920 EST.
[b] The uncertainties on certified values are expanded uncertainties, $U = ku_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides [4,5]. The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain what is assumed to be an approximate 95 % level of confidence.

Table 2. Uncertified Information of SRM 4339b

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.3 mol L^{-1} HNO_3 with 19.8 µg g^{-1} Ba^{+2}
Solution density	(1.034 ± 0.002) g mL^{-1} at 20.8 °C[a]
Solution mass	(5.180 ± 0.003) g[a]
Photon-emitting impurities	^{226}Ra: < 0.5 Bq g^{-1}[b]
Alpha-emitting impurities	^{232}Th: < 0.08 Bq g^{-1}[c]
Half-lives used	^{228}Ra: (5.75 ± 0.04) a[d] [6] ^{228}Ac: (6.15 ± 0.02) h [7] ^{226}Ra: (1600 ± 7) a [8] ^{232}Th: (14.02 ± 0.06) x 10^9 a [9]
Calibration methods (and instruments)	The certified massic activity for ^{228}Ra was obtained by high-resolution gamma-ray spectrometry of three master solution ampoules (eleven separate determinations), as measured on three to five different spectrometers and geometries on each ampoule, and used assumed nuclear data for probabilities per decay for 16 gamma-ray transitions. Confirmatory measurements were performed by 2πα spectrometry of ingrown ^{228}Th with a planar, ion-implanted Si detector.

[a] The stated uncertainty is two times the standard uncertainty. See reference 5.
[b] Based on gamma-ray spectrometry of forced-fitted peak at 186.2 keV and assuming a probability per decay of 0.0355 [6].
[c] The maximum ^{232}Th activity concentration in ^{228}Ra.
[d] The stated uncertainty is the standard uncertainty. See reference 5.

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4339b

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{228}Ra (%)
1	Gamma-ray spectrometry precision; relative standard deviation of the grand mean on the average massic gamma-ray emission rates for 16 measured ^{228}Ac gamma-ray transitions. Each mean in the grand mean is based on 11 determinations with three sources in three to five different detectors. The uncertainty in the determination of the massic gamma-ray emission rate for any one transition in a given determination ranged from typically 0.5 % to 1.5 %. The relative standard deviation of the mean for the average of the 16 lines, for any one determination, was typically 1 %; whereas the relative standard deviation of the grand mean for the average of the 16 lines across all 11 determinations is 0.34 %[b]. Data passes normality test.	A	0.84
2	Uncertainty due to assumed gamma-ray probabilities per decay for the measured ^{228}Ac transitions [7]. The uncertainty on each transition has a shared (correlated) component of 2.5 % (see comments in [7]).	B	3.5
3	Detection efficiencies not embodied within component 1	B	0.4
4	Mass determinations for dilution factors and counting source preparations	B	0.1
5	Decay corrections for ^{228}Ra half-life uncertainty of 0.7 % [6]	B	0.003
6	Effect of ^{228}Ra and ^{228}Ac half-life uncertainties on secular equilibrium ratio	B	0.02
Relative combined standard uncertainty			**3.6**
Relative expanded uncertainty (k = 2)			**7.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.
[b] Average massic gamma-ray emission rates of 11 geometries (R_γ) for 16 measured ^{228}Ac gamma-ray transitions with their respective energy (E_γ); assumed gamma-ray probabilities per decay (I_γ) and standard deviation of the mean (S_m).

E_γ (keV)	Assumed I_γ (%) [1]	Mean R_γ (s^{-1} g^{-1})(i)	S_m (%)(ii)
129.065	2.50	1347	0.38
153.967	0.754	421.6	0.40
209.249	3.97	2264	0.55
270.245	3.55	2014	0.33
328.004	3.04	1822	0.43
338.32	11.4	6712	0.43
409.46	2.02	1185	0.29
463.002	4.45	2645	0.33
755.313	1.03	593.3	0.46
772.291	1.52	899.2	0.53
794.942	4.31	2588	0.35
835.704	1.7	995.3	0.42
911.196	26.2	15609	0.29
964.786	4.99	3007	0.35
968.96	15.9	9582	0.30
1588.2	3.06	1889	0.28

(i) Grand mean for n = 11 determinations with three sources in three to five different detectors.
(ii) Relative standard deviation of the grand mean on R_γ for n = 11.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to SDS for further information.

Storage: SRM 4339b should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Nov 2012). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Nov 2012).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (ISO GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/ (accessed Nov 2012).

[6] Luca, A.; June 2009, ^{228}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-228_tables.pdf (accessed Nov 2012).

[7] Pearce, A.; January 2010, ^{228}Ac. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ac-228_tables.pdf (accessed Nov 2012).

[8] Christé, V. and M.M. Bé; December 2006, ^{226}Ra. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Nov 2012).

[9] Arinc, A.; September 2008, ^{232}Th. LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Th-232_tables.pdf (accessed Nov 2012).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1810
Prepared By:	Tim Chandler
Carrier Conc:	1.3M HNO3
Reference Date:	10/07/2010
Ampoule Mass (g):	5.18 g
Uncertainty:	+/- 3.6 %
LogBook No:	GL-CED-297-103

A Solution Material Info			
Isotope:	Radium-228 SPIKE		
Prepared By:	Bethany Fiem		
Prep Date:	05/23/2018		
Verification Date:	05/23/2018		
Expiration Date:	05/23/2019		
Primary Code:	1810-A		
Dilution(mL):	200 mL		
Mass of Parent(g):	5.1447 g		
Density(g/mL):	1.0178	Balance ID:	B733529066

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / (Dilution Vol) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq/g)) * (conversion dpm to Bq) / Density (g/mL)/ (Dilution Vol) = Parent Activity (dpm/g)
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (200 mL) = 300.9650 dpm/mL
(5.1447 g) * (195 Bq/g) * (60 dpm/Bq) / (1.0178 g/mL) / (200 mL) = 295.7015 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-228 Standard 1810-A Jar

v1.1.2
BMF
5/23/2018

Isotope	Result
Ra-228	pCi/L
Ra-228 N1	29340
Ra-228 N2	28510
Ra-228 N3	29320

Mean Value (Counting) =	29056.67	pCi/L	**107.165**	**Fail**	*Exception taken due to the high uncertainty of the certified value
Stdev =	473.533	pCi/L		**Rule B (Pass/Fail)**	
Certificate Value =	27114.0	pCi/L			
Two sigma =	947.0656436				
10 % of Mean =	2905.666667				
Rule A (Pass/Fail)	**Pass**				

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
Rule B = The determined mean value shall be within 5% of the certificate value.

5-23-18

5/25/18

Runlogs

Instrument Run Log

Instrument Type: GFPC **Batch ID: 1830755**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1204178239	MB	JXC9	PIC12A	DEC-27-18 11:38:19	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204178242	MSD	JXC9	PIC12D	DEC-27-18 11:38:28	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204178243	LCS	JXC9	PIC13A	DEC-27-18 11:38:31	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466633004	SAMPLE	JXC9	PIC11A	DEC-27-18 11:38:33	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466633005	SAMPLE	JXC9	PIC11B	DEC-27-18 11:38:37	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466633006	SAMPLE	JXC9	PIC11C	DEC-27-18 11:38:41	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466633007	SAMPLE	JXC9	PIC11D	DEC-27-18 11:38:45	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630001	SAMPLE	JXC9	PIC1A	DEC-27-18 11:39:15	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630002	SAMPLE	JXC9	PIC1B	DEC-27-18 11:39:18	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630003	SAMPLE	JXC9	PIC1C	DEC-27-18 11:39:20	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630004	SAMPLE	JXC9	PIC1D	DEC-27-18 11:39:23	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630005	SAMPLE	JXC9	PIC2A	DEC-27-18 11:39:25	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630006	SAMPLE	JXC9	PIC2B	DEC-27-18 11:39:28	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630007	SAMPLE	JXC9	PIC2C	DEC-27-18 11:39:31	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630009	SAMPLE	JXC9	PIC4D	DEC-27-18 11:39:37	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630010	SAMPLE	JXC9	PIC5A	DEC-27-18 11:39:43	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466633001	SAMPLE	JXC9	PIC5B	DEC-27-18 11:39:45	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466633002	SAMPLE	JXC9	PIC5C	DEC-27-18 11:39:50	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466633003	SAMPLE	JXC9	PIC5D	DEC-27-18 11:39:51	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204178240	DUP	JXC9	PIC9B	DEC-27-18 13:37:04	DONE	CeF on 25mm Filter	01-JUN-17 00:00
1204178241	MS	JXC9	PIC9C	DEC-27-18 13:37:08	DONE	CeF on 25mm Filter	01-JUN-17 00:00
466630008	SAMPLE	JXC9	PIC9A	DEC-27-18 13:37:12	DONE	CeF on 25mm Filter	01-JUN-17 00:00

Lucas Cell Raw Data

Batch 1830869 Check-list

This check-list was completed on 23-DEC-18 by Lyndsey Pace

This batch was reviewed by Lyndsey Pace on 23-DEC-18 and Elizabeth Krouse on 26-DEC-18.

Batch ID: 1830869

Product: LUC26RAL

Description: Lucas Cell Radium 226 GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous?	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences (RPD) between the MS and MSD recoveries within the acceptance limits?		No	
12	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
13	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Radium-226 Queue Sheet

22-DEC-18

GEL Laboratories, Radiochemistry Division

Batch #: 1830869 Analyst: PCW First Client Due Date: 01/10/2019 12/21/18 Internal Due Date: 01/06/2019

Spike Isotope: Radium-226 Spike Code: 7150 Expiration Date: 12/4/19 Vol: 0.1 End Initial/Degas Date/Time: 12/19/18 0815

LCS Isotope: Radium-226 LCS Code: 7510 Expiration Date: 12/4/19 Vol: 0.1 End LN De-em Date: 12/23/18

Bkg Count Time: 30 (Min) Sample Count Time: 30 (Min) Start Count Date: 12/23/18

Prep Date: 12/12/18 Pipet ID: 27(091) Balance ID: 18(50257) Initials: JW Witness: N/A

Sample I	Client Description	Type	Hazard Code	Matrix	Min CRDL	Client	Position (Label)	Aliquot (mL or g)	End LN De-em Time	Start Count Time	Cell #	Det #	Bkg counts	Total Counts
466626001-1	IR10SW01B11	SAMPLE		SURFACE WA	1 pCi/L	LANC001	1	500	0100	0400	106	1	1	2
466626002-1	IR10SW02B11	SAMPLE		SURFACE WA	1 pCi/L	LANC001	2	500	0100	0400	201	2	3	24
466627001-1	IR10SW-ROAD	SAMPLE		SURFACE WA	1 pCi/L	LANC001	3	500	0100	0400	307	3	1	17
466630001-1	MW-1	SAMPLE		WATER	1 pCi/L	LANC006	4	500	0100	0400	408	4	3	5
466630002-1	MW-2	SAMPLE		WATER	1 pCi/L	LANC006	5	500	0100	0400	508	5	1	71
466630003-1	MW-3	SAMPLE		WATER	1 pCi/L	LANC006	6	500	0100	0400	606	6	3	4
466630004-1	MW-4	SAMPLE		WATER	1 pCi/L	LANC006	7	500	0100	0400	705	7	4	18
466630005-1	MW-5	SAMPLE		WATER	1 pCi/L	LANC006	8	500	0100	0400	802	8	6	14
466630006-1	MW-6	SAMPLE		WATER	1 pCi/L	LANC006	9	500	0125	0435	104	1	0	4
466630007-1	MW-7	SAMPLE		WATER	1 pCi/L	LANC006	10	500	0125	0435	203	2	3	21
466630008-1	MW-8	SAMPLE		WATER	1 pCi/L	LANC006	11	500	0125	0435	305	3	1	58
466630009-1	MW-9	SAMPLE		WATER	1 pCi/L	LANC006	12	500	0125	0435	401	4	4	2
466630010-1	FB-20181203	SAMPLE		WATER	1 pCi/L	LANC006	13	500	0125	0435	504	5	1	14
466633001-1	MW-1	SAMPLE		WATER	1 pCi/L	LANC006	14	500	0125	0435	606	6	8	15
466633002-1	MW-2	SAMPLE		WATER	1 pCi/L	LANC006	15	500	0125	0435	703	7	4	11
466633003-1	MW-3	SAMPLE		WATER	1 pCi/L	LANC006	16	500	0125	0435	803	8	8	21
466633004-1	MW-4	SAMPLE		WATER	1 pCi/L	LANC006	17	500	0150	0510	108	1	1	6
466633005-1	MW-5	SAMPLE		WATER	1 pCi/L	LANC006	18	500	0150	0510	207	2	2	25
466633006-1	MW-6	SAMPLE		WATER	1 pCi/L	LANC006	19	500	0150	0510	308	3	8	28
466633007-1	FB-20181206	SAMPLE		WATER	1 pCi/L	LANC006	20	500	0150	0510	401	4	4	1
1204178462-1	MB for batch 1830869	MB		SURFACE WA	1 pCi/L	QC ACCOUNT	21	500	0150	0510	503	5	5	2
1204178463-1	FB-20181206(466633007DUP)	DUP		WATER	1 pCi/L	QC ACCOUNT	22	500	0150	0510	601	6	2	5
1204178464-1	FB-20181206(466633007MS)	MS		WATER	1 pCi/L	QC ACCOUNT	23	100	0150	0510	702	7	2	877
1204178465-1	FB-20181206(466633007MSD)	MSD		WATER	1 pCi/L	QC ACCOUNT	24	100	0150	0510	804	8	1	689
1204178466-1	LCS for batch 1830869	LCS		SURFACE WA	1 pCi/L	QC ACCOUNT	25	500	0215	0540	105	1	3	791

Comments: RETURNS EA

Data Reviewed By: 12/23/18

Radium-226 Liquid

Filename : RA226.XLS
File type : Excel
Version # : 1.3.2

Batch : 1830869
Analyst : PETE049
Prep Date : 12/12/2018
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halflife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halflife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					**Count Raw Data**							
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
1	466626001.1	0.5000	2.0256E-05	12/5/2018 13:10	106	30	2	0.067	1	0.033	30	2.1070
2	466626002.1	0.5000	2.0256E-05	12/5/2018 13:20	201	30	24	0.800	3	0.100	30	2.0070
3	466627001.1	0.5000	2.0256E-05	12/5/2018 13:25	307	30	17	0.567	1	0.033	30	1.8050
4	466630001.1	0.5000	2.0256E-05	12/3/2018 11:15	408	30	5	0.167	3	0.100	30	1.8510
5	466630002.1	0.5000	2.0256E-05	12/3/2018 12:40	508	30	71	2.367	1	0.033	30	2.1080
6	466630003.1	0.5000	2.0256E-05	12/3/2018 11:20	606	30	4	0.133	3	0.100	30	1.9430
7	466630004.1	0.5000	2.0256E-05	12/3/2018 13:05	705	30	18	0.600	4	0.133	30	1.8350
8	466630005.1	0.5000	2.0256E-05	12/4/2018 9:55	802	30	14	0.467	6	0.200	30	1.6450
9	466630006.1	0.5000	2.0256E-05	12/4/2018 10:35	104	30	4	0.133	2	0.067	30	2.0520
10	466630007.1	0.5000	2.0256E-05	12/4/2018 13:55	203	30	21	0.700	3	0.100	30	1.8290
11	466630008.1	0.5000	2.0256E-05	12/4/2018 12:30	305	30	52	1.733	1	0.033	30	1.4880
12	466630009.1	0.5000	2.0256E-05	12/4/2018 12:15	407	30	2	0.067	4	0.133	30	1.7420
13	466630010.1	0.5000	2.0256E-05	12/3/2018 12:00	504	30	14	0.467	1	0.033	30	1.8310
14	466633001.1	0.5000	2.0256E-05	12/6/2018 10:10	608	30	15	0.500	8	0.267	30	1.9750
15	466633002.1	0.5000	2.0256E-05	12/6/2018 10:10	703	30	11	0.367	4	0.133	30	1.9130
16	466633003.1	0.5000	2.0256E-05	12/6/2018 13:30	803	30	21	0.700	8	0.267	30	1.4750
17	466633004.1	0.5000	2.0256E-05	12/6/2018 11:35	108	30	6	0.200	1	0.033	30	2.0290
18	466633005.1	0.5000	2.0256E-05	12/6/2018 12:40	207	30	25	0.833	2	0.067	30	1.9750
19	466633006.1	0.5000	2.0256E-05	12/6/2018 14:20	308	30	28	0.933	8	0.267	30	1.4570
20	466633007.1	0.5000	2.0256E-05	12/6/2018 12:00	401	30	1	0.033	4	0.133	30	1.9020
21	1204178462.1	0.5000	2.0256E-05	12/12/2018 0:00	503	30	2	0.067	5	0.167	30	1.9410
22	1204178463.1	0.5000	2.0256E-05	12/6/2018 12:00	601	30	5	0.167	2	0.067	30	1.9080
23	1204178464.1	0.1000	1.1370E-05	12/6/2018 12:00	702	30	877	29.233	2	0.067	30	1.7830
24	1204178465.1	0.1000	1.1370E-05	12/6/2018 12:00	804	30	689	22.967	1	0.033	30	1.8590
25	1204178466.1	0.5000	2.0256E-05	12/12/2018 0:00	105	30	791	26.367	3	0.100	30	2.0440

Pipet, 0.1 ml Stdev : +/-	0.000200	ml
Pipet, 0.5 ml Stdev : +/-	0.001000	ml
Pipet, 1 ml Stdev : +/-	0.002000	ml

Analytical SOP: GL-RAD-A-008
Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections De-Gas to Ingrowth	Ingrowth to Count	During Count	Ra-226 Decay
4.700%	5/1/2018	4/30/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
8.300%	8/1/2018	7/31/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
6.300%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
7.000%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
5.200%	6/1/2018	5/31/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
2.400%	7/1/2018	6/30/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
1.800%	11/1/2018	10/31/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
5.600%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:00	12/23/2018 4:00	0.511	0.978	1.002	1.000
7.800%	5/1/2018	4/30/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
9.900%	8/1/2018	7/31/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
2.900%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
6.600%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
9.700%	6/1/2018	5/31/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
9.100%	7/1/2018	6/30/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
6.700%	11/1/2018	10/31/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
2.200%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:25	12/23/2018 4:35	0.513	0.976	1.002	1.000
6.700%	5/1/2018	4/30/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
2.100%	8/1/2018	7/31/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
9.500%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
0.500%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
8.100%	6/1/2018	5/31/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
8.500%	7/1/2018	6/30/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
9.300%	11/1/2018	10/31/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
4.200%	3/1/2018	2/28/2019	12/19/2018 2:15	12/23/2018 1:50	12/23/2018 5:10	0.514	0.975	1.002	1.000
9.300%	5/1/2018	4/30/2019	12/19/2018 2:15	12/23/2018 2:15	12/23/2018 5:40	0.516	0.975	1.002	1.000

Notes:
1 - Results are decay corrected to Sample Date/Time
2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
3 - Spike Nominals are decay corrected to Sample Date/Time

* - RPD changed to 0% due to sample & dup activity below MDA

Spike S/N : 1715-D
Spike Exp Date : 12/4/2019
Spike Activity (dpm/ml): 288.41
Spike Volume Added: 0.10

LCS S/N : 1715-D
LCS Exp Date : 12/4/2019
LCS Activity (dpm/ml): 288.41
LCS Volume Added: 0.10

Results

Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	**2 SIGMA** Counting Uncertainty pCi/L	**2 SIGMA** Total Prop. Uncertainty pCi/L	Sample QC	Sample Type		RPD	RER	Nominal pCi/L	Recovery
1	0.0942	0.0665	1	0.2187	**0.0286**	173.27%	0.0333	0.0577	0.0970	0.0971		SAMPLE					
2	0.1712	0.1209	1	0.3318	**0.6300**	26.10%	0.7000	0.1732	0.3055	0.3349		SAMPLE					
3	0.1099	0.0776	1	0.2553	**0.5337**	27.25%	0.5333	0.1414	0.2774	0.2953		SAMPLE					
4	0.1857	0.1311	1	0.3597	**0.0651**	141.59%	0.0667	0.0943	0.1803	0.1808		SAMPLE					
5	0.0941	0.0664	1	0.2186	**1.9994**	13.19%	2.3333	0.2828	0.4750	0.5920		SAMPLE					
6	0.1769	0.1249	1	0.3427	**0.0310**	264.59%	0.0333	0.0882	0.1607	0.1608		SAMPLE					
7	0.2162	0.1527	1	0.4038	**0.4594**	33.55%	0.4667	0.1563	0.3017	0.3093		SAMPLE					
8	0.2954	0.2086	1	0.5270	**0.2928**	56.18%	0.2667	0.1491	0.3208	0.3252		SAMPLE					
9	0.1365	0.0964	1	0.2806	**0.0586**	122.72%	0.0667	0.0816	0.1406	0.1412		SAMPLE					
10	0.1876	0.1324	1	0.3634	**0.5915**	28.96%	0.6000	0.1633	0.3155	0.3465		SAMPLE					
11	0.1331	0.0940	1	0.3091	**2.0601**	14.57%	1.7000	0.2427	0.5764	0.6591		SAMPLE					
12	0.2274	0.1605	1	0.4246	**-0.0690**	122.65%	-0.0667	0.0816	0.1657	0.1658		SAMPLE					
13	0.1082	0.0764	1	0.2512	**0.4268**	31.33%	0.4333	0.1291	0.2492	0.2692		SAMPLE					
14	0.2836	0.2003	1	0.4918	**0.2130**	69.11%	0.2333	0.1599	0.2861	0.2902		SAMPLE					
15	0.2071	0.1462	1	0.3866	**0.2199**	55.73%	0.2333	0.1291	0.2385	0.2423		SAMPLE					
16	0.3798	0.2681	1	0.6585	**0.5297**	41.48%	0.4333	0.1795	0.4301	0.4375		SAMPLE					
17	0.0974	0.0688	1	0.2263	**0.1479**	53.34%	0.1667	0.0882	0.1534	0.1560		SAMPLE					
18	0.1416	0.1000	1	0.2910	**0.6988**	22.69%	0.7667	0.1732	0.3094	0.3267		SAMPLE					
19	0.3838	0.2710	1	0.6655	**0.8236**	31.47%	0.6667	0.2000	0.4843	0.5217		SAMPLE					
20	0.2079	0.1468	1	0.3882	**-0.0946**	74.54%	-0.1000	0.0745	0.1383	0.1383		SAMPLE					
21	0.2278	0.1608	1	0.4144	**-0.0927**	88.56%	-0.1000	0.0882	0.1603	0.1604		MB					
22	0.1465	0.1035	1	0.3013	**0.0943**	88.60%	0.1000	0.0882	0.1631	0.1644	466633007.1	DUP	*	0.0%			
23	0.7841	0.5536	1	1.6120	**147.2298**	9.90%	29.1667	0.9883	9.7777	35.6021	466633007.1	MS				129.9133	113.3%
24	0.5318	0.3754	1	1.2350	**111.0320**	5.68%	22.9333	0.8756	8.3088	20.2351	466633007.1	MSD		28.0%		129.9133	85.5%
25	0.1671	0.1180	1	0.3239	**23.0780**	9.96%	26.2667	0.9393	1.6175	5.6044		LCS				25.9825	88.8%

Continuing Calibration Data

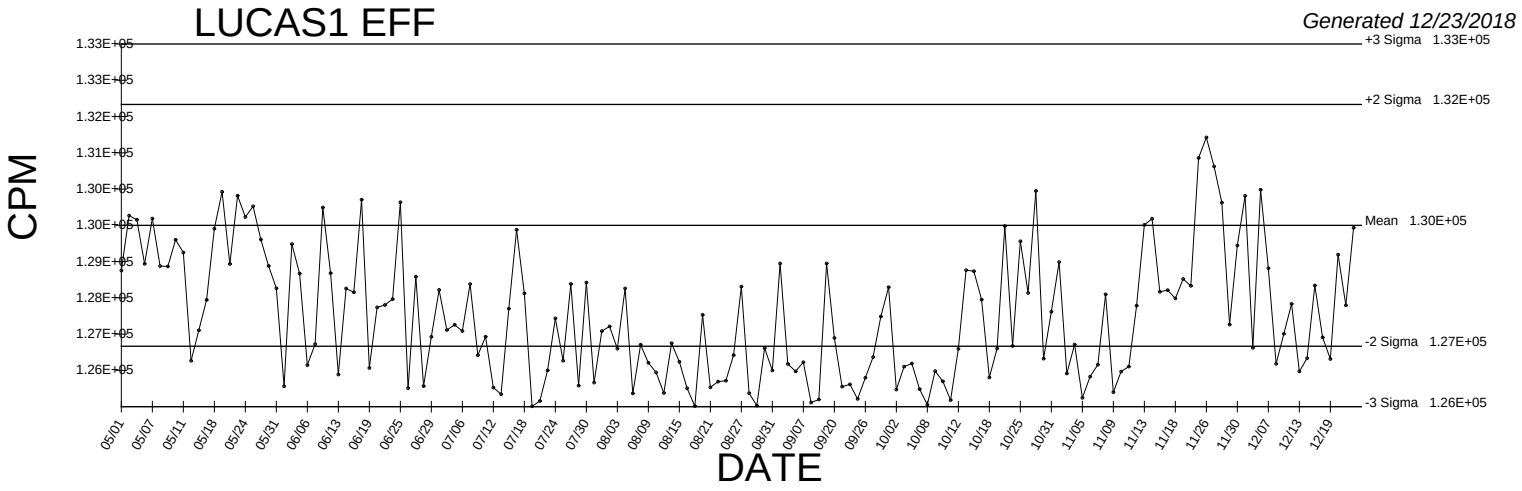
Ludlum Alpha Scintillation Counter Checks for 23-DEC-2018

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	03:00	1	1.29E+05	129499	-0.04		
LUCAS2	EFF	03:00	1	1.33E+05	132679	1.8		
LUCAS3	EFF	03:00	1	1.37E+05	137474	-1.67		
LUCAS4	EFF	03:00	1	1.31E+05	130988	-0.65		
LUCAS5	EFF	03:00	1	1.37E+05	137495	2.52		
LUCAS6	EFF	03:00	1	1.33E+05	132567	-2.21		
LUCAS7	EFF	03:00	1	1.42E+05	142406	0.64		
LUCAS8	EFF	03:00	1	1.46E+05	145500	2.24		

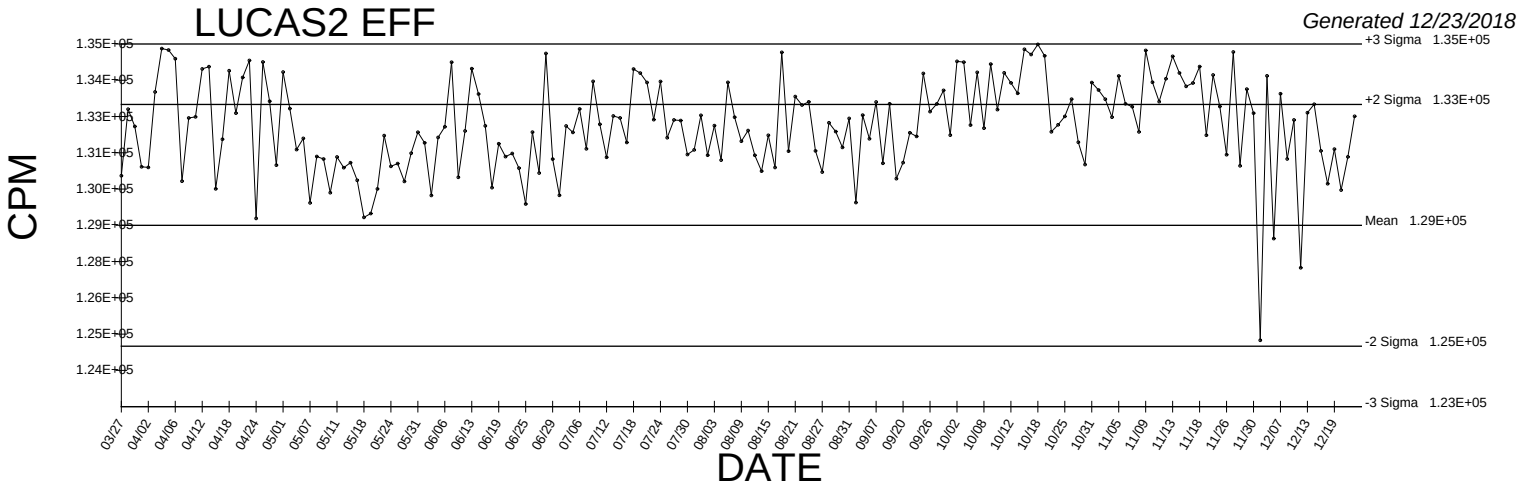
Reviewed by: Lyndsey Pace **Date:** 23-DEC-18

GEL Laboratories LLC

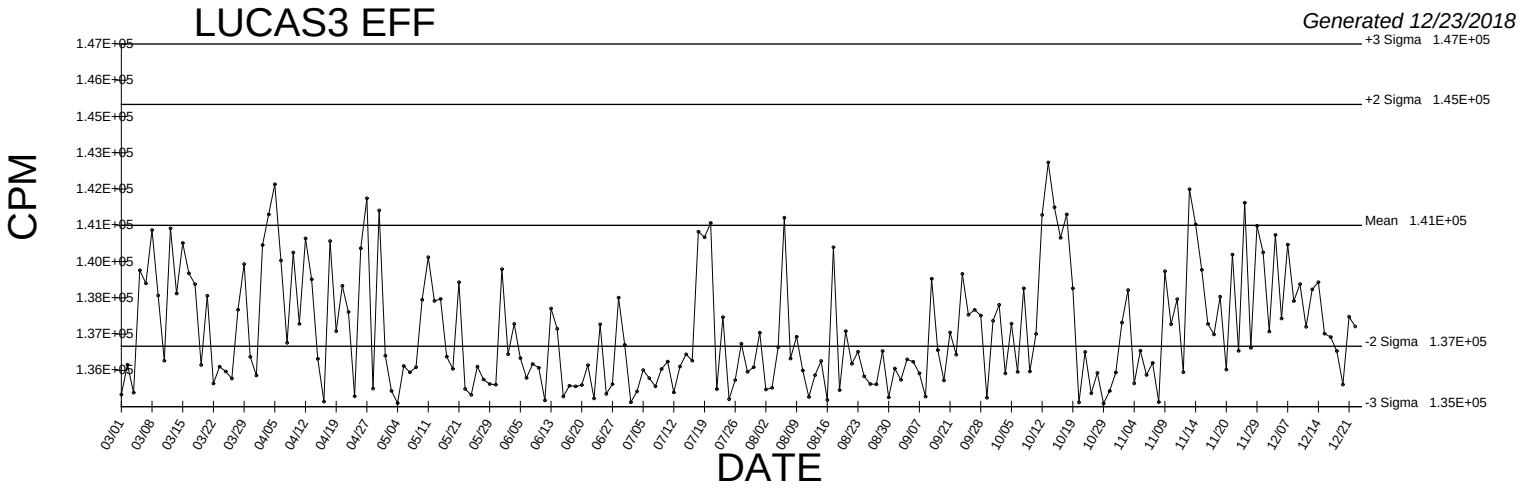
Efficiency Data



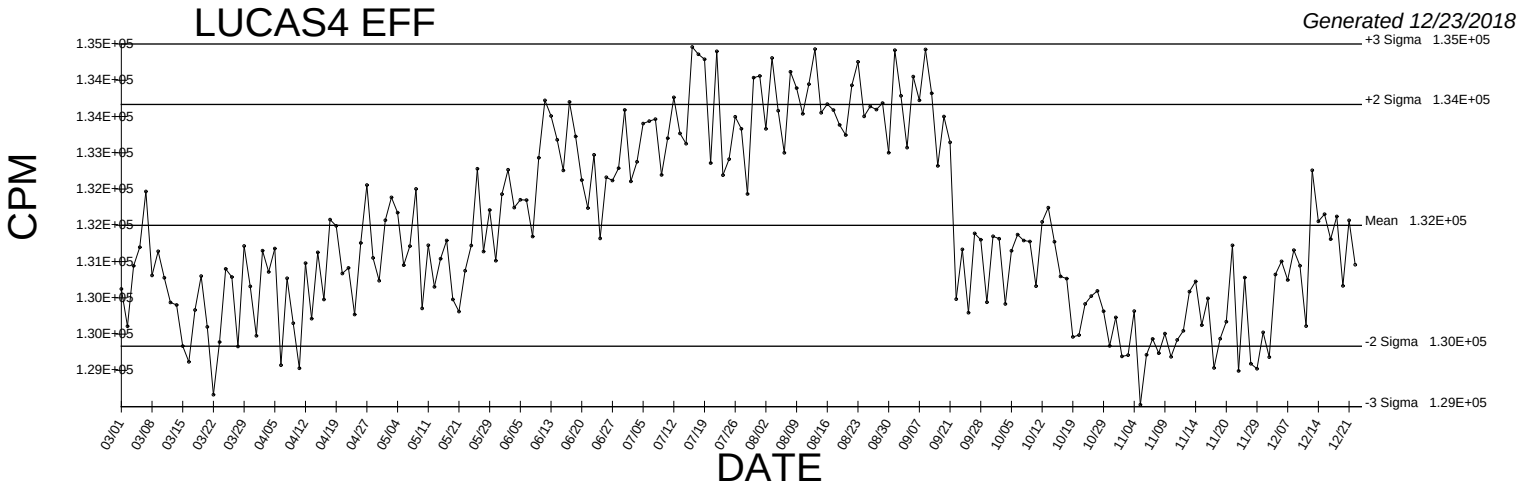
● Denotes Outlier



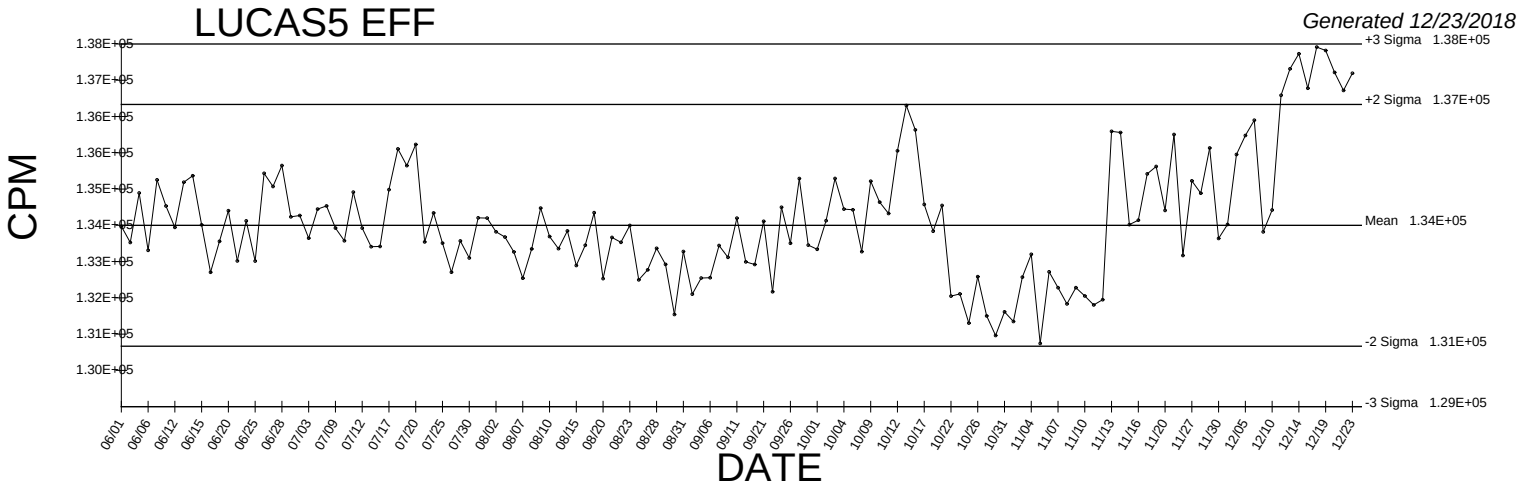
● Denotes Outlier



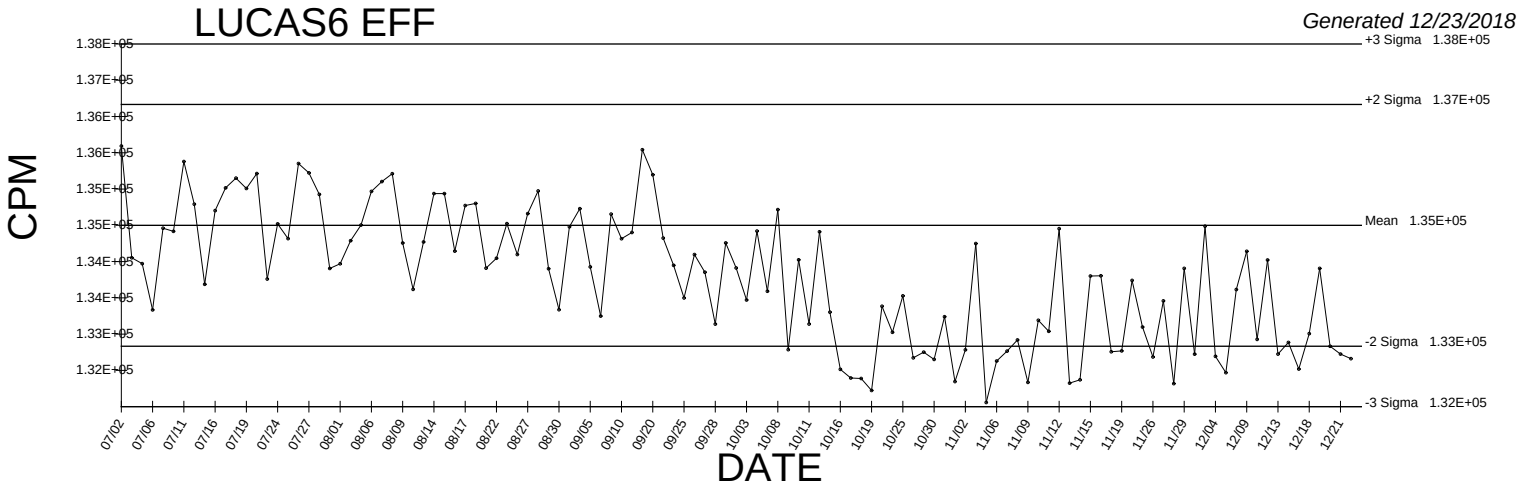
● Denotes Outlier



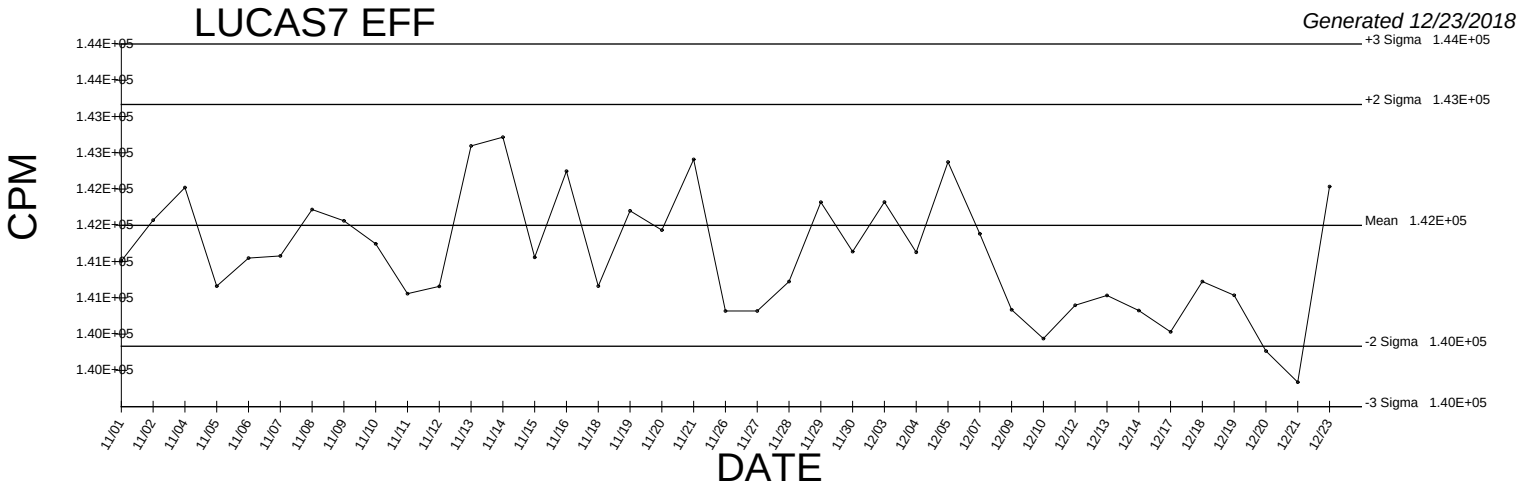
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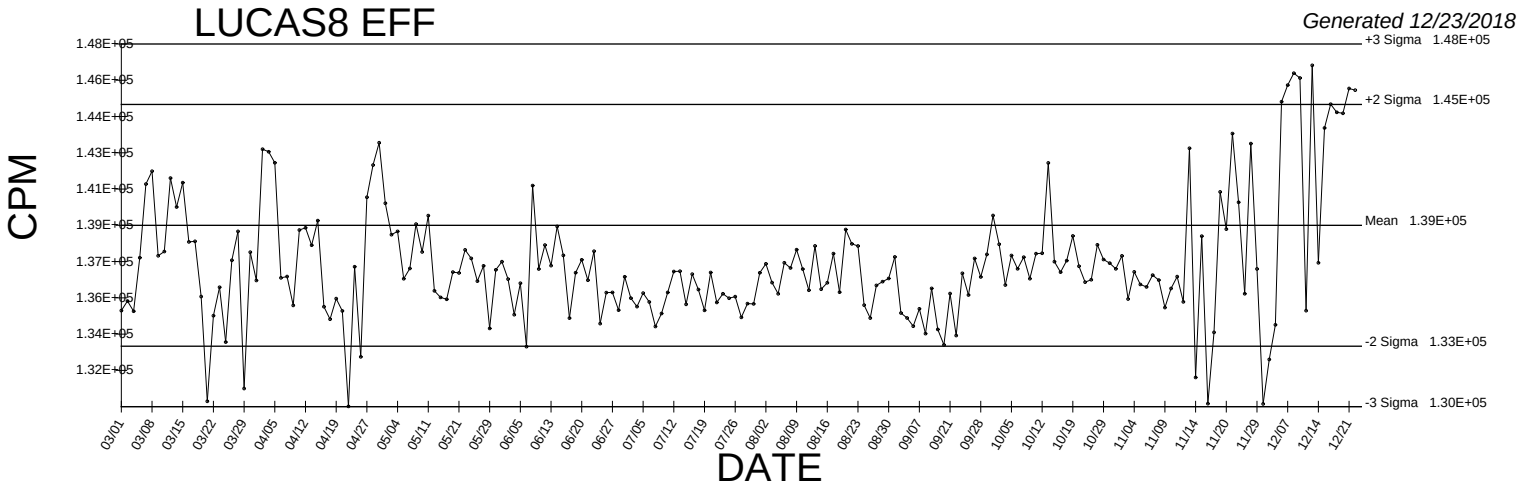
● Denotes Outlier



● Denotes Outlier



● Denotes Outlier



● Denotes Outlier

RAD Standards Traceability

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

1715

98367

Ra-226 5 mL Liquid in Flame Sealed Vial

Customer: GEL Laboratories, LLC
P.O. No.: GEL 1408580, Item 7 Product Code: 8226

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics, using a germanium gamma spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Ra-226	5.844E+05	3.676E+04	1.0	2.1	4.7	09/09/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities (other than decay products)<0.1%.
5.02193 g 0.1M HCl solution with approximately 30 μg/g Ba carrier.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QC Approved: L. Tk
L. Tkavadze, Nuclear Metrologist

Date: 9 Sep 14

RECEIVED 9/10/14

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Standard Traceability Log Rad

Source Material Info	
Parent Code:	1715
Prepared By:	Gregory Ramsay
Carrier Conc:	0.1M HCl
Reference Date:	09/09/2014
Ampoule Mass (g):	5.02193 g
Uncertainty:	+/- 2.35 %
LogBook No:	GL-CED-297-008

A Solution Material Info			
Isotope:	Radium-226		
Prepared By:	Gregory Ramsay		
Prep Date:	07/06/2016		
Verification Date:	12/04/2018		
Expiration Date:	12/04/2019		
Primary Code:	1715-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9865 g		
Density(g/mL):	0.9967	Balance ID:	C31514

Calculations Converting parent activity to dpm/mL|dpm/g

(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / (Ampoule Mass(g) *(Dilution Vol)) = Parent Activity (dpm/mL)
(Mass of parent(g)) * (Parm Activity (Bq)) * (conversion dpm to Bq) / Density / (Ampoule Mass (g) * (Dilution Vol)) = Parent Activity (dpm/g)
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (5.02193 g * 100 mL) = 21900.3937 dpm/mL
(4.9865 g) * (36760 Bq) * (60 dpm/Bq) / (0.9967 g/mL)/ (5.02193 g * 100 mL) = 21972.4854 dpm/g

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
07/06/2016	Gregory Ramsay	2.6261	200	1715-B	288.51 dpm/ml	01/25/2017	11/10/2018
02/08/2017	Gregory Ramsay	21.96	250	1715-C	1930.063 dpm/ml	02/08/2017	02/08/2018
12/19/2017	Gregory Ramsay	2.63	200	1715-D	288.938 dpm/ml	12/04/2018	12/04/2019

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Ra-226 Standard 1715-D

v1.0.2

Instrument	YELLOW
Analyst	BXF1
Verification Prep Date	12/4/2018

Standard Information	
Isotope	Ra-226
Serial Number	1715-D
Isotope Halflife	1.6000E+03 Y
Reference Date	9/9/2014
Ref. Act. (DPM/mL)	288.93
Amount of Std. (mL)	1.0
Standard Prep Date	12/19/2017

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	12/10/2018	762.97	228.60	5.30
2	12/10/2018	762.63	237.90	5.30
3	12/10/2018	762.63	239.80	5.30

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	223.30	0.838318	266.37	266.37
2	232.60	0.838318	277.46	277.46
3	234.50	0.838318	279.73	279.73

	dpm/mL
Mean Value =	274.52
Stdev =	7.149564487
Certificate Value* =	**288.4**
Two sigma =	14.299
10 % of Mean =	27.452
Rule A (Pass/Fail)	**Pass**
% Recovery	95.19%
Rule B (Pass/Fail)	**Pass**
Expiration Date	**12/4/2019**

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

*** Certificate Value is decay corrected to Count Date.**

The analyst prepared three standard verification sources for Ra-226 source 1715-D by transferring 1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCYELLOW for Ra-226 source standard verification. The Ra-226 efficiency calibration which was used for verification calculations was performed on 12/4/2018 using Ra-226 source 0024-A.

Standard results for each verification source was calculated as follows:

Source dpm/mL = (A - B)/(C)(D)

where:

A = Ver. source cpm,

B = BKG cpm,

C = System efficiency (cpm/dpm), and

D = volume used for standard verification.

RAD-M-001

12-11-18

12/12/18

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR **Batch ID: 1830869**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
466626001	SAMPLE	PCW	LUCAS1	DEC-23-18 04:00:00	DONE	Lucas Cell	01-MAY-18 00:00
466626002	SAMPLE	PCW	LUCAS2	DEC-23-18 04:00:00	DONE	Lucas Cell	01-AUG-18 00:00
466627001	SAMPLE	PCW	LUCAS3	DEC-23-18 04:00:00	DONE	Lucas Cell	01-MAR-18 00:00
466630001	SAMPLE	PCW	LUCAS4	DEC-23-18 04:00:00	DONE	Lucas Cell	01-MAR-18 00:00
466630002	SAMPLE	PCW	LUCAS5	DEC-23-18 04:00:00	DONE	Lucas Cell	01-JUN-18 00:00
466630003	SAMPLE	PCW	LUCAS6	DEC-23-18 04:00:00	DONE	Lucas Cell	01-JUL-18 00:00
466630004	SAMPLE	PCW	LUCAS7	DEC-23-18 04:00:00	DONE	Lucas Cell	01-NOV-18 00:00
466630005	SAMPLE	PCW	LUCAS8	DEC-23-18 04:00:00	DONE	Lucas Cell	01-MAR-18 00:00
466630006	SAMPLE	PCW	LUCAS1	DEC-23-18 04:35:00	DONE	Lucas Cell	01-MAY-18 00:00
466630007	SAMPLE	PCW	LUCAS2	DEC-23-18 04:35:00	DONE	Lucas Cell	01-AUG-18 00:00
466630008	SAMPLE	PCW	LUCAS3	DEC-23-18 04:35:00	DONE	Lucas Cell	01-MAR-18 00:00
466630009	SAMPLE	PCW	LUCAS4	DEC-23-18 04:35:00	DONE	Lucas Cell	01-MAR-18 00:00
466630010	SAMPLE	PCW	LUCAS5	DEC-23-18 04:35:00	DONE	Lucas Cell	01-JUN-18 00:00
466633001	SAMPLE	PCW	LUCAS6	DEC-23-18 04:35:00	DONE	Lucas Cell	01-JUL-18 00:00
466633002	SAMPLE	PCW	LUCAS7	DEC-23-18 04:35:00	DONE	Lucas Cell	01-NOV-18 00:00
466633003	SAMPLE	PCW	LUCAS8	DEC-23-18 04:35:00	DONE	Lucas Cell	01-MAR-18 00:00
466633004	SAMPLE	PCW	LUCAS1	DEC-23-18 05:10:00	DONE	Lucas Cell	01-MAY-18 00:00
466633005	SAMPLE	PCW	LUCAS2	DEC-23-18 05:10:00	DONE	Lucas Cell	01-AUG-18 00:00
466633006	SAMPLE	PCW	LUCAS3	DEC-23-18 05:10:00	DONE	Lucas Cell	01-MAR-18 00:00
466633007	SAMPLE	PCW	LUCAS4	DEC-23-18 05:10:00	DONE	Lucas Cell	01-MAR-18 00:00
1204178462	MB	PCW	LUCAS5	DEC-23-18 05:10:00	DONE	Lucas Cell	01-JUN-18 00:00
1204178463	DUP	PCW	LUCAS6	DEC-23-18 05:10:00	DONE	Lucas Cell	01-JUL-18 00:00
1204178464	MS	PCW	LUCAS7	DEC-23-18 05:10:00	DONE	Lucas Cell	01-NOV-18 00:00
1204178465	MSD	PCW	LUCAS8	DEC-23-18 05:10:00	DONE	Lucas Cell	01-MAR-18 00:00
1204178466	LCS	PCW	LUCAS1	DEC-23-18 05:40:00	DONE	Lucas Cell	01-MAY-18 00:00

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

WCD Group
1108 Old Thomasville Rd.
High Point NC 27260

Report Date: February 21, 2019 19:11

Project: PSEG Mercer

Account #: 44064
Group Number: 2027521
SDG: WCD03
PO Number: 18-11433
State of Sample Origin: NJ

Electronic Copy To	WCD Group	Attn: Scott McDonald
Electronic Copy To	WCD Group	Attn: Jim Blaney

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-1 Grab Groundwater	01/30/2019 12:25	9978114
MW-2 Grab Groundwater	01/30/2019 10:05	9978115
MW-3 Grab Groundwater	01/30/2019 14:20	9978116
MW-4 Grab Groundwater	01/30/2019 13:05	9978117
MW-5 Grab Groundwater	01/30/2019 11:50	9978118
MW-6 Grab Groundwater	01/30/2019 14:40	9978119
Field Blank Grab Water	01/30/2019 15:00	9978120

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: WCD Group
Project: PSEG Mercer
Sampling Date(s): 01/30/19
Laboratory Sample ID(s): 9978114-9978120
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	No
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality."
***The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.**

Dorothy M Love

Dorothy M. Love
Director

02/21/2019



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Project Name: PSEG Mercer
ELLE Group #: 2027521

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Sample #s: 9978114-9978120

The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 9978114, 9978115, 9978116, 9978117, 9978118, 9978119, 9978120

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

Sample #s: 9978114, 9978115, 9978116, 9978117, 9978118, 9978119, 9978120

The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.

EPA 300.0, Wet Chemistry

Batch #: 19039987117B (Sample number(s): 9978115-9978120 UNSPK: 9978115 BKG: 9978115)

The recovery(ies) for the following analyte(s) in the MS were below the acceptance window: Chloride

Sample Description: **MW-1 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 12:25
SDG#: WCD03-01

WCD Group
ELLE Sample #: GW 9978114
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0569	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	2.51	0.0120	0.0500	1
01750	Calcium	7440-70-2	311	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0040 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	The NJ DKQP analyte list requirement was not met for metals. The client specified list is reported.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K1	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	0.00029 J	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0652	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	55.7	4.0	8.0	20
01504	Fluoride	16984-48-8	0.39 J	0.25	0.50	5
00228	Sulfate	14808-79-8	729	60.0	200	200
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,540	160	480	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 12:25
SDG#: WCD03-01

WCD Group
ELLE Sample #: GW 9978114
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.5	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.6	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:18	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:08	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:18	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:08	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:18	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:18	Cindy M Gehman	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:08	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:08	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:32	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:32	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/18/2019 09:31	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:32	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:32	Bradley M Berlot	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 12:25
SDG#: WCD03-01

WCD Group
ELLE Sample #: GW 9978114
ELLE Group #: 2027521
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190381404701C	02/13/2019 18:32	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190380571301	02/10/2019 14:12	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190371404403	02/07/2019 05:33	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190381404701	02/08/2019 05:00	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190380571301	02/08/2019 07:15	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	19039987215A	02/09/2019 19:13	Clinton M Wilson	20
01504	Fluoride	EPA 300.0	1	19039987215A	02/09/2019 18:45	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19039987215A	02/09/2019 19:28	Clinton M Wilson	200
00212	Total Dissolved Solids	SM 2540 C-2011	1	19035921201A	02/04/2019 15:39	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19036004202A	02/05/2019 18:57	Kristen Wroblewski	1
12152	pH	SM 4500-H+ B-2011	1	19036004202A	02/05/2019 18:57	Kristen Wroblewski	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 10:05
SDG#: WCD03-02

WCD Group
ELLE Sample #: GW 9978115
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0155	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.0264 J	0.0120	0.0500	1
01750	Calcium	7440-70-2	23.1	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D. K4	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	The NJ DKQP analyte list requirement was not met for metals. The client specified list is reported.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K1	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0029	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0023	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	2.3	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	N.D.	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	87.5	20.0	60.0	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 10:05
SDG#: WCD03-02

WCD Group
ELLE Sample #: GW 9978115
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.5	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	8.0	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:20	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:11	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:20	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:11	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:20	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:11	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:11	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:11	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:34	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:34	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/18/2019 09:33	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:34	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:34	Bradley M Berlot	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 10:05
SDG#: WCD03-02

WCD Group
ELLE Sample #: GW 9978115
ELLE Group #: 2027521
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190381404701C	02/13/2019 18:34	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190380571301	02/10/2019 14:14	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190371404403	02/07/2019 05:33	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190381404701	02/08/2019 05:00	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190380571301	02/08/2019 07:15	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	19039987117B	02/08/2019 22:03	Clinton M Wilson	5
01504	Fluoride	EPA 300.0	1	19039987117B	02/08/2019 22:03	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19039987117B	02/08/2019 22:03	Clinton M Wilson	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19035921201A	02/04/2019 15:39	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19036004202A	02/05/2019 17:50	Kristen Wroblewski	1
12152	pH	SM 4500-H+ B-2011	1	19036004202A	02/05/2019 17:50	Kristen Wroblewski	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 14:20
SDG#: WCD03-03

WCD Group
ELLE Sample #: GW 9978116
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.142	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.184	0.0120	0.0500	1
01750	Calcium	7440-70-2	43.4	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D. K4	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	The NJ DKQP analyte list requirement was not met for metals. The client specified list is reported.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K1	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0103	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	10.1	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	17.7	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	199	20.0	60.0	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 14:20
SDG#: WCD03-03

WCD Group
ELLE Sample #: GW 9978116
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.9	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.9	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:23	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:23	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:23	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:19	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:23	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:23	Cindy M Gehman	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:19	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:19	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:36	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:36	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/18/2019 09:41	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:36	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:36	Bradley M Berlot	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 14:20
SDG#: WCD03-03

WCD Group
ELLE Sample #: GW 9978116
ELLE Group #: 2027521
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190381404701C	02/13/2019 18:36	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190380571301	02/10/2019 14:16	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190371404403	02/07/2019 05:33	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190381404701	02/08/2019 05:00	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190380571301	02/08/2019 07:15	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	19039987117B	02/08/2019 23:33	Clinton M Wilson	5
01504	Fluoride	EPA 300.0	1	19039987117B	02/08/2019 23:33	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19039987117B	02/08/2019 23:33	Clinton M Wilson	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19035921202A	02/04/2019 15:13	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19036004202A	02/05/2019 19:12	Kristen Wroblewski	1
12152	pH	SM 4500-H+ B-2011	1	19036004202A	02/05/2019 19:12	Kristen Wroblewski	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 13:05
SDG#: WCD03-04

WCD Group
ELLE Sample #: GW 9978117
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0067	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	N.D.	0.0120	0.0500	1
01750	Calcium	7440-70-2	2.65	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D. K4	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D. K4	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	The NJ DKQP analyte list requirement was not met for metals. The client specified list is reported.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K1	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0020	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	N.D.	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	34.5 J	20.0	60.0	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 13:05
SDG#: WCD03-04

WCD Group
ELLE Sample #: GW 9978117
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.4	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.3	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:26	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:26	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:26	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:22	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:26	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:22	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:22	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:22	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:38	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:38	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/18/2019 09:43	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:38	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:38	Bradley M Berlot	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 13:05
SDG#: WCD03-04

WCD Group
ELLE Sample #: GW 9978117
ELLE Group #: 2027521
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190381404701C	02/13/2019 18:38	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190380571301	02/10/2019 14:18	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190371404403	02/07/2019 05:33	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190381404701	02/08/2019 05:00	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190380571301	02/08/2019 07:15	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	19039987117B	02/08/2019 23:51	Clinton M Wilson	5
01504	Fluoride	EPA 300.0	1	19039987117B	02/08/2019 23:51	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19039987117B	02/08/2019 23:51	Clinton M Wilson	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19035921201A	02/04/2019 15:39	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19036002106A	02/06/2019 03:49	Kristen Wroblewski	1
12152	pH	SM 4500-H+ B-2011	1	19036002106A	02/06/2019 03:49	Kristen Wroblewski	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 11:50
SDG#: WCD03-05

WCD Group
ELLE Sample #: GW 9978118
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.201	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.434	0.0120	0.0500	1
01750	Calcium	7440-70-2	94.8	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D. K4	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D. K4	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	The NJ DKQP analyte list requirement was not met for metals. The client specified list is reported.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K1	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0183	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	100	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	94.4	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	632	80.0	240	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 11:50
SDG#: WCD03-05

WCD Group
ELLE Sample #: GW 9978118
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.0	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	8.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:28	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:28	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:28	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:25	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:28	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:25	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:25	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:25	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:41	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:41	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/18/2019 09:46	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:41	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:41	Bradley M Berlot	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 11:50
SDG#: WCD03-05

WCD Group
ELLE Sample #: GW 9978118
ELLE Group #: 2027521
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190381404701C	02/13/2019 18:41	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190380571301	02/10/2019 14:20	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190371404403	02/07/2019 05:33	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190381404701	02/08/2019 05:00	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190380571301	02/08/2019 07:15	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	19039987117B	02/09/2019 00:28	Clinton M Wilson	50
01504	Fluoride	EPA 300.0	1	19039987117B	02/09/2019 00:09	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19039987117B	02/09/2019 00:28	Clinton M Wilson	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	19035921201A	02/04/2019 15:39	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19036004202A	02/05/2019 19:09	Kristen Wroblewski	1
12152	pH	SM 4500-H+ B-2011	1	19036004202A	02/05/2019 19:09	Kristen Wroblewski	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 14:40
SDG#: WCD03-06

WCD Group
ELLE Sample #: GW 9978119
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.104	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.248	0.0120	0.0500	1
01750	Calcium	7440-70-2	36.9	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D. K4	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0028 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	The NJ DKQP analyte list requirement was not met for metals. The client specified list is reported.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	0.0011 J	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.00080 J	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0123	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	76.8	4.0	8.0	20
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	8.6	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	306	40.0	120	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 14:40
SDG#: WCD03-06

WCD Group
ELLE Sample #: GW 9978119
ELLE Group #: 2027521
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.5	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	8.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:31	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:31	Cindy M Gehman	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:31	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:28	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:31	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:31	Cindy M Gehman	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:28	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:28	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/18/2019 09:48	Choon Y Tian	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:43	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/18/2019 09:48	Choon Y Tian	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:43	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190381404701A	02/13/2019 18:43	Bradley M Berlot	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 14:40
SDG#: WCD03-06

WCD Group
ELLE Sample #: GW 9978119
ELLE Group #: 2027521
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190381404701C	02/13/2019 18:43	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190380571301	02/10/2019 14:22	Parker D Lindstrom	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190371404403	02/07/2019 05:33	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190381404701	02/08/2019 05:00	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190380571301	02/08/2019 07:15	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	19039987117B	02/09/2019 01:04	Clinton M Wilson	20
01504	Fluoride	EPA 300.0	1	19039987117B	02/09/2019 00:46	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19039987117B	02/09/2019 00:46	Clinton M Wilson	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19035921202A	02/04/2019 15:13	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19036004202A	02/05/2019 18:38	Kristen Wroblewski	1
12152	pH	SM 4500-H+ B-2011	1	19036004202A	02/05/2019 18:38	Kristen Wroblewski	1

*=This limit was used in the evaluation of the final result

Sample Description: **Field Blank Grab Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 15:00
SDG#: WCD03-07FB

WCD Group
ELLE Sample #: **GW 9978120**
ELLE Group #: **2027521**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D. K4	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	N.D. K4	0.0120	0.0500	1
01750	Calcium	7440-70-2	0.0989 J	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D. K4	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D. K4	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	The NJ DKQP analyte list requirement was not met for metals. The client specified list is reported.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D. K1K2K4	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D. K1	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1

*=This limit was used in the evaluation of the final result

Sample Description: **Field Blank Grab Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 15:00
SDG#: WCD03-07FB

WCD Group
ELLE Sample #: **GW 9978120**
ELLE Group #: **2027521**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	23.1	0.010	0.010	1
	SM 4500-H+ B-2011		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.3	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.
All Depts: FOLLOW NJ DKQP PROTOCOL / REQUIREMENTS !!!!!!!!!!!!!!!!
See Project Notes.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:31	Elaine F Stoltzfus	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:31	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:34	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:31	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190371404403	02/12/2019 20:34	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:31	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:31	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190371404403	02/11/2019 23:31	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190381404702A	02/13/2019 18:09	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190381404702A	02/13/2019 18:09	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190381404702A	02/13/2019 18:09	Bradley M Berlot	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190381404702A	02/13/2019 18:09	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190381404702A	02/13/2019 18:09	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190381404702C	02/13/2019 18:09	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190380571301	02/10/2019 14:24	Parker D Lindstrom	1

*=This limit was used in the evaluation of the final result

Sample Description: **Field Blank Grab Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 01/31/2019 16:52
Collection Date/Time: 01/30/2019 15:00
SDG#: WCD03-07FB

WCD Group
ELLE Sample #: **GW 9978120**
ELLE Group #: **2027521**
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190371404403	02/07/2019 05:33	James L Mertz	1
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190381404702	02/08/2019 05:05	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190380571301	02/08/2019 07:15	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	19039987117B	02/09/2019 01:22	Clinton M Wilson	1
01504	Fluoride	EPA 300.0	1	19039987117B	02/09/2019 01:22	Clinton M Wilson	1
00228	Sulfate	EPA 300.0	1	19039987117B	02/09/2019 01:22	Clinton M Wilson	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	19035921202A	02/04/2019 15:13	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19036004202A	02/05/2019 18:05	Kristen Wroblewski	1
12152	pH	SM 4500-H+ B-2011	1	19036004202A	02/05/2019 18:05	Kristen Wroblewski	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: WCD Group
Reported: 02/21/2019 19:11

Group Number: 2027521

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 190371404403	Sample number(s): 9978114-9978120		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	N.D.	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	N.D.	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 190380571301	Sample number(s): 9978114-9978120		
Mercury	N.D.	0.000050	0.00020
Batch number: 190381404701A	Sample number(s): 9978114-9978119		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Batch number: 190381404701C	Sample number(s): 9978114-9978119		
Molybdenum	N.D.	0.00031	0.0020
Batch number: 190381404702A	Sample number(s): 9978120		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Batch number: 190381404702C	Sample number(s): 9978120		
Molybdenum	N.D.	0.00031	0.0020
Batch number: 19039987117B	Sample number(s): 9978115-9978120		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 19039987215A	Sample number(s): 9978114		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: WCD Group
Reported: 02/21/2019 19:11

Group Number: 2027521

Method Blank (continued)

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 19035921201A	Sample number(s): 9978114-9978115,9978117-9978118		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19035921202A	Sample number(s): 9978116,9978119-9978120		
Total Dissolved Solids	N.D.	20.0	60.0

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 190371404403	Sample number(s): 9978114-9978120								
Barium	2.00	2.10			105		80-120		
Boron	2.00	1.99			100		80-120		
Calcium	4.00	4.61			115		80-120		
Chromium	0.200	0.211			106		80-120		
Cobalt	0.500	0.542			108		80-120		
Lithium	1.00	1.09			109		80-120		
Selenium	0.150	0.144			96		80-120		
Thallium	0.150	0.161			107		80-120		
Batch number: 190380571301	Sample number(s): 9978114-9978120								
Mercury	0.00100	0.000866			87		80-120		
Batch number: 190381404701A	Sample number(s): 9978114-9978119								
Antimony	0.00600	0.00601			100		80-120		
Arsenic	0.0100	0.00969			97		80-120		
Beryllium	0.00400	0.00391			98		80-120		
Cadmium	0.00500	0.00503			101		80-120		
Lead	0.0150	0.0150			100		80-120		
Batch number: 190381404701C	Sample number(s): 9978114-9978119								
Molybdenum	0.0500	0.0504			101		80-120		
Batch number: 190381404702A	Sample number(s): 9978120								
Antimony	0.00600	0.00597			100		80-120		
Arsenic	0.0100	0.0110			110		80-120		
Beryllium	0.00400	0.00443			111		80-120		
Cadmium	0.00500	0.00548			110		80-120		
Lead	0.0150	0.0151			101		80-120		
Batch number: 190381404702C	Sample number(s): 9978120								
Molybdenum	0.0500	0.0514			103		80-120		

*- Outside of specification
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(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: WCD Group
Reported: 02/21/2019 19:11

Group Number: 2027521

LCS/LCSD (continued)

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 19039987117B	Sample number(s): 9978115-9978120								
Chloride	3.00	2.82			94		90-110		
Fluoride	0.750	0.741			99		90-110		
Sulfate	7.50	7.25			97		90-110		
Batch number: 19039987215A	Sample number(s): 9978114								
Chloride	3.00	2.77			92		90-110		
Fluoride	0.750	0.736			98		90-110		
Sulfate	7.50	7.46			100		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 19035921201A	Sample number(s): 9978114-9978115,9978117-9978118								
Total Dissolved Solids	200	207			104		62-127		
Batch number: 19035921202A	Sample number(s): 9978116,9978119-9978120								
Total Dissolved Solids	200	203			102		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 19036002106A	Sample number(s): 9978117								
pH	7.00	6.89			98		95-105		
Batch number: 19036004202A	Sample number(s): 9978114-9978116,9978118-9978120								
pH	7.00	6.99			100		95-105		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19039987117B	Sample number(s): 9978115-9978120 UNSPK: 9978115									
Chloride	2.31	10	10.65			83*		90-110		
Fluoride	N.D.	2.50	2.44			98		90-110		
Sulfate	N.D.	25	25.46			102		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**	**mg/l**					
Batch number: 19035921201A	Sample number(s): 9978114-9978115,9978117-9978118 UNSPK: 9978114									
Total Dissolved Solids	1540	1600	3092			97		62-127		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: WCD Group
Reported: 02/21/2019 19:11

Group Number: 2027521

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 19039987117B	Sample number(s): 9978115-9978120 BKG: 9978115			
Chloride	2.31	2.30	1 (1)	15
Fluoride	N.D.	N.D.	0 (1)	15
Sulfate	N.D.	N.D.	0 (1)	15
	Degrees C	Degrees C		
Batch number: 19036004202A	Sample number(s): 9978114-9978116,9978118-9978120 BKG: 9978115			
Temperature of pH	22.51	22.45	0	5
	mg/l	mg/l		
Batch number: 19035921201A	Sample number(s): 9978114-9978115,9978117-9978118 BKG: 9978114			
Total Dissolved Solids	1540	1536	0 (1)	5
	Std. Units	Std. Units		
Batch number: 19036004202A	Sample number(s): 9978114-9978116,9978118-9978120 BKG: 9978115			
pH	8.04	7.93	1	4

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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Acct. # 44064 Group # 2027521 Sample # 9978114-20

Client: WCD Group	
Project Name/#: Former PSEG Mercer	Site ID #:
Project Manager: Scott McDonald	P.O. #:
Sampler: Greg Mayer, Tristan Mayan	PWSID #:
Phone #:	Quote #:
State where sample(s) were collected: NJ	

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil	Sediment	Water: Potable	Water: Ground	Water: NPDES	Water: Surface	Other:	Total # of Containers	Dissolved Metals	Dissolved Hg	Chloride	Fluoride	Sulfate	pH	TDS	Ra 228, Ra 226	Metals QC	
MW-1	1/30/19	1225	X					X				7	X	X	X	X	X	X	X	X		
MW-2	1/30/19	1005	X					X				7	X	X	X	X	X	X	X	X		
MW-3	1/30/19	1420	X					X				8	X	X	X	X	X	X	X	X	X	
MW-4	1/30/19	1305	X					X				7	X	X	X	X	X	X	X	X		
MW-5	1/30/19	1150	X					X				7	X	X	X	X	X	X	X	X		
MW-6	1/30/19	1440	X					X				7	X	X	X	X	X	X	X	X		
Field Blank	1/30/19	1500						X				7	X	X	X	X	X	X	X	X		

Analyses Requested — Preservation Codes

For Lab Use Only
SF #: _____
SCR #: _____

Preservation Codes
H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Remarks
- Metals: Ba, B, Ca, Cr
- Co, Li, Se, Tl, Sb, As
- Be, Cd, Pb, Mo, Hg
- Lab to filter

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by (please check): E-Mail ☐ Phone ☐

E-mail Address: smcdonald@wcdgroup.com

Phone: 609-730-0007

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐
Type III (Reduced non-CLP) ☐ CT RCP ☐
Type IV (CLP SOW) ☐ TX TRRP-13 ☐
Type VI (Raw Data Only) ☐

EDD Required? Yes ☐ No ☐ If yes, format: _____

Relinquished by:	Date	Time	Received by:	Date	Time
	1/31/19	0930	Frank Dano (HCL)	1/31/19	0930
Frank Dano (HCL)	1/31/19	1355		1/31/19	1355
	1/31/19	1652			

Relinquished by Commercial Carrier:
UPS _____ FedEx _____ Other _____

Temperature upon receipt 08-26 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 239954

Group Number(s): 2027521

Client: WCD Group

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	01/31/2019 16:52
Number of Packages:	5	Number of Projects:	3
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	No
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Ariel Garcia (15332) at 20:21 on 01/31/2019

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	0.8	DT	Wet	Y	Loose	N
2	32170023	2.6	IR	Wet	Y	Loose	N
3	32170023	1.1	IR	Wet	Y	Loose	N
4	32170023	2.3	IR	Wet	Y	Loose	N
5	DT42-02	0.8	DT	Wet	Y	Loose	N

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Lancaster, PA 17605-2425
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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

WCD Group
1108 Old Thomasville Rd.
High Point NC 27260

Report Date: March 13, 2019 15:00

Project: PSEG Mercer

Account #: 44064
Group Number: 2027522
PO Number: 18-11433
State of Sample Origin: NJ

Electronic Copy To	WCD Group	Attn: Scott McDonald
Electronic Copy To	WCD Group	Attn: Jim Blaney

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-1 Grab Groundwater	01/30/2019 12:25	9978121
MW-2 Grab Groundwater	01/30/2019 10:05	9978122
MW-3 Grab Groundwater	01/30/2019 14:20	9978123
MW-4 Grab Groundwater	01/30/2019 13:05	9978124
MW-5 Grab Groundwater	01/30/2019 11:50	9978125
MW-6 Grab Groundwater	01/30/2019 14:40	9978126
Field Blank Grab Water	01/30/2019 15:00	9978127

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Sample Description:	**MW-1 Grab Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:** **ELLE Group #:**	 **GW 9978121** **2027522**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	01/31/2019 16:52		
Collection Date/Time:	01/30/2019 12:25		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-2 Grab Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 9978122**
		ELLE Group #:	**2027522**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	01/31/2019 16:52		
Collection Date/Time:	01/30/2019 10:05		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-3 Grab Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 9978123**
		ELLE Group #:	**2027522**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	01/31/2019 16:52		
Collection Date/Time:	01/30/2019 14:20		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-4 Grab Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 9978124**
Project Name:	**PSEG Mercer**	**ELLE Group #:**	**2027522**
Submittal Date/Time:	01/31/2019 16:52		
Collection Date/Time:	01/30/2019 13:05		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-5 Grab Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 9978125**
		ELLE Group #:	**2027522**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	01/31/2019 16:52		
Collection Date/Time:	01/30/2019 11:50		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-6 Grab Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 9978126**
		ELLE Group #:	**2027522**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	01/31/2019 16:52		
Collection Date/Time:	01/30/2019 14:40		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**Field Blank Grab Water** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:** **ELLE Group #:**	 **GW 9978127** **2027522**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	01/31/2019 16:52		
Collection Date/Time:	01/30/2019 15:00		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

Environmental Analysis Request/Chain of Custody

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Acct. # 44064 Group # 2027522 Sample # 9978121-27

Client: WCD Group	
Project Name/#: Former PSEG Mercer	Site ID #:
Project Manager: Scott McDonald	P.O. #:
Sampler: Greg Mayer, Tristan Magan	PWSID #:
Phone #:	Quote #:
State where sample(s) were collected: NJ	

Matrix: Soil ☐ Sediment ☐ Water ☑ (Ground ☑, Potable ☐, NPDES ☐, Surface ☐) Other: ☐

Sample Identification	Collection Date	Collection Time	Grab	Composite	Total # of Containers	Dissolved Metals	Dissolved Hg	Chloride	Fluoride	Sulfate	pH	TDS	Ra 228, Ra 226	Metals QC	
MW-1	1/30/19	1225	X		7	X	X	X	X	X	X	X	X		
MW-2	1/30/19	1005	X		7	X	X	X	X	X	X	X	X		
MW-3	1/30/19	1420	X		8	X	X	X	X	X	X	X	X	X	
MW-4	1/30/19	1305	X		7	X	X	X	X	X	X	X	X		
MW-5	1/30/19	1150	X		7	X	X	X	X	X	X	X	X		
MW-6	1/30/19	1440	X		7	X	X	X	X	X	X	X	X		
Field Blank	1/30/19	1500			7	X	X	X	X	X	X	X	X		

Analyses Requested — Preservation Codes

For Lab Use Only
SF #: _____
SCR #: _____

Preservation Codes
H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Remarks
- Metals: Ba, B, Ca, Cr
- Co, Li, Se, Tl, Sb, As
- Be, Cd, Pb, Mo, Hg
- Lab to filter

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by (please check): E-Mail ☐ Phone ☐

E-mail Address: smcdonald@wcdgroup.com

Phone: 609-730-0007

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type IV (CLP SOW)	☐	TX TRRP-13	☐
Type VI (Raw Data Only)	☐		

EDD Required? Yes ☐ No ☐ If yes, format: _____

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	1/31/19	0930	HCl [signature]	1/31/19	0930
[signature] HCl	1/31/19	1355	[signature]	1/31/19	1355
[signature]	1/31/19	1652			
			[signature]	1/31/19	1652

Relinquished by Commercial Carrier:
UPS _____ FedEx _____ Other _____

Temperature upon receipt 0826 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 239954

Group Number(s): 2027522

Client: WCD Group

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	01/31/2019 16:52
Number of Packages:	5	Number of Projects:	3
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	No
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Ariel Garcia (15332) at 20:21 on 01/31/2019

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	0.8	DT	Wet	Y	Loose	N
2	32170023	2.6	IR	Wet	Y	Loose	N
3	32170023	1.1	IR	Wet	Y	Loose	N
4	32170023	2.3	IR	Wet	Y	Loose	N
5	DT42-02	0.8	DT	Wet	Y	Loose	N

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-32828-1
Client Project/Site: Ra-226/228: GW Monitoring

For:
Eurofins Lancaster Laboratories Env LLC
2425 New Holland Pike
Lancaster, Pennsylvania 17601

Attn: Jenifer Lewis

Authorized for release by:
3/6/2019 10:45:33 AM

Jayna Awalt, Project Manager II
(314)298-8566
jayna.awalt@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 160-32828-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Eurofins Lancaster Laboratories Env LLC

Project: Ra-226/228: GW Monitoring

Report Number: 160-32828-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 2/5/2019 9:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 0.9º C and 1.1º C.

For GFPC analyses, the following samples were run at a reduced aliquot due to sediment in the sample matrix: MW-4 (160-32828-4) and MW-5 (160-32828-5).

Job ID: 160-32828-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

RADIUM-226 (GFPC)

Samples MW-1 (160-32828-1), MW-2 (160-32828-2), MW-3 (160-32828-3), MW-4 (160-32828-4), MW-5 (160-32828-5), MW-6 (160-32828-6) and FIELD BLANK (160-32828-7) were analyzed for Radium-226 (GFPC) in accordance with EPA Method 903.0. The samples were prepared on 02/08/2019 and analyzed on 03/04/2019.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-228 (GFPC)

Samples MW-1 (160-32828-1), MW-2 (160-32828-2), MW-3 (160-32828-3), MW-4 (160-32828-4), MW-5 (160-32828-5), MW-6 (160-32828-6) and FIELD BLANK (160-32828-7) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 02/08/2019 and analyzed on 02/28/2019.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Environmental Analysis Request/Chain of Custody

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Acct. # _____ Group # 2027522 Sample # 9978121-27

Subcontractor:	TestAmerica-St. Louis		
Project Name/#:	2027522	Site ID #:	
Requestor	Hannah Cottman	P.O. #:	NA
Sampler:		PWSID #:	
Phone #:	717-556-7383	Quote #:	
State where samples were collected:	NJ	For Compliance:	Yes ☑ No ☐

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil	Sediment	Tissue	Water	Ground	Potable	Surface	NPDES	Other:	Total # of Containers	Analyses Requested: Radium-226 (EPA 903.1)	Radium-228 (EPA 904.0 mod)	Remarks
MW-1	1/29/2019	1225	X					X						2	X	X	9978121
MW-2	1/29/2019	1005	X					X						2	X	X	9978122
MW-3	1/29/2019	1420	X					X						2	X	X	9978123
MW-4	1/29/2019	1305	X					X						2	X	X	9978124
MW-5	1/29/2019	1150	X					X						2	X	X	9978125
MW-6	1/29/2019	1440	X					X						2	X	X	9978126
Field Blank	1/29/2019	1500	X					X						2	X	X	9978127

2-4-19 KB (3)

ok to preserve upon receipt.

160-32828 Chain of Custody

For Lab Use Only

SF #: _____

SCR #: _____

Preservation Codes

H = HCl T = Thiosulfate
N = HNO_3 B = NaOH
S = H_2SO_4 P = H_3PO_4
F = Field Filtered O = Other

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by (please check): E-Mail ☐ Phone ☐

E-mail Address: ELLE_Subcontracting@EurofinsUS.com

Phone: 717-556-7383

Data Package Options (please check if required) ☐ Full Data Package

Type I (Validation/non-CLP) ☐ MA MCP ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type VI (Raw Data Only) ☐ TX TRRP-13 ☐

NJ DKQP ☑ NYSDEC Category ☐ A or ☐ B

EDD Required? Yes ☑ No ☐ If yes, format: HazSite

Relinquished by:	Date	Time	Received by:	Date	Time
Kathleen Bintley	2-4-19	1615	[signature]	2-5-19	0920
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Relinquished by Commercial Carrier:

UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

Login Sample Receipt Checklist

Client: Eurofins Lancaster Laboratories Env LLC

Job Number: 160-32828-1

Login Number: 32828
List Number: 1
Creator: Press, Nicholas B

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

TestAmerica Job ID: 160-32828-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

TestAmerica Job ID: 160-32828-1

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency
None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

TestAmerica Job ID: 160-32828-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-32828-1	MW-1	Water	01/30/19 12:25	02/05/19 09:20
160-32828-2	MW-2	Water	01/30/19 10:05	02/05/19 09:20
160-32828-3	MW-3	Water	01/30/19 14:20	02/05/19 09:20
160-32828-4	MW-4	Water	01/30/19 13:05	02/05/19 09:20
160-32828-5	MW-5	Water	01/30/19 11:50	02/05/19 09:20
160-32828-6	MW-6	Water	01/30/19 14:40	02/05/19 09:20
160-32828-7	FIELD BLANK	Water	01/30/19 15:00	02/05/19 09:20

Client Sample ID: MW-1
Lab Sample ID: 160-32828-1
Date Collected: 01/30/19 12:25
Matrix: Water
Date Received: 02/05/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.110		0.0811	0.0817	1.00	0.110	pCi/L	02/08/19 12:54	03/04/19 08:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.8*		*40 - 110*	*02/08/19 12:54*	*03/04/19 08:26*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.459		0.240	0.244	1.00	0.354	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.8*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*
Y Carrier	*87.1*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*

Client Sample ID: MW-2
Lab Sample ID: 160-32828-2
Date Collected: 01/30/19 10:05
Matrix: Water
Date Received: 02/05/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0969	U	0.0788	0.0793	1.00	0.109	pCi/L	02/08/19 12:54	03/04/19 08:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.5*		*40 - 110*	*02/08/19 12:54*	*03/04/19 08:26*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.00425	U	0.196	0.196	1.00	0.356	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.5*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*
Y Carrier	*86.7*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*

Client Sample ID: MW-3
Lab Sample ID: 160-32828-3
Date Collected: 01/30/19 14:20
Matrix: Water
Date Received: 02/05/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.171		0.101	0.102	1.00	0.123	pCi/L	02/08/19 12:54	03/04/19 08:26	1

Client Sample ID: MW-3
Lab Sample ID: 160-32828-3
Date Collected: 01/30/19 14:20
Matrix: Water
Date Received: 02/05/19 09:20

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	92.0		40 - 110	02/08/19 12:54	03/04/19 08:26	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0415	U	0.205	0.205	1.00	0.362	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	92.0		40 - 110	02/08/19 13:25	02/28/19 09:56	1
Y Carrier	85.6		40 - 110	02/08/19 13:25	02/28/19 09:56	1

Client Sample ID: MW-4
Lab Sample ID: 160-32828-4
Date Collected: 01/30/19 13:05
Matrix: Water
Date Received: 02/05/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0542	U	0.154	0.154	1.00	0.283	pCi/L	02/08/19 12:54	03/04/19 08:26	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	71.1		40 - 110	02/08/19 12:54	03/04/19 08:26	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.00802	U	0.365	0.365	1.00	0.662	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	71.1		40 - 110	02/08/19 13:25	02/28/19 09:56	1
Y Carrier	81.1		40 - 110	02/08/19 13:25	02/28/19 09:56	1

Client Sample ID: MW-5
Lab Sample ID: 160-32828-5
Date Collected: 01/30/19 11:50
Matrix: Water
Date Received: 02/05/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.456**		0.186	0.190	1.00	0.203	pCi/L	02/08/19 12:54	03/04/19 10:41	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	95.3		40 - 110	02/08/19 12:54	03/04/19 10:41	1

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

TestAmerica Job ID: 160-32828-1

Client Sample ID: MW-5

Lab Sample ID: 160-32828-5
Date Collected: 01/30/19 11:50
Matrix: Water
Date Received: 02/05/19 09:20

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.980		0.320	0.332	1.00	0.406	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.3*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*
Y Carrier	*89.0*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*

Client Sample ID: MW-6

Lab Sample ID: 160-32828-6
Date Collected: 01/30/19 14:40
Matrix: Water
Date Received: 02/05/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.123	U	0.0993	0.0999	1.00	0.141	pCi/L	02/08/19 12:54	03/04/19 10:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.9*		*40 - 110*	*02/08/19 12:54*	*03/04/19 10:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.279	U	0.251	0.252	1.00	0.404	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.9*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*
Y Carrier	*91.2*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*

Client Sample ID: FIELD BLANK

Lab Sample ID: 160-32828-7
Date Collected: 01/30/19 15:00
Matrix: Water
Date Received: 02/05/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0188	U	0.0762	0.0762	1.00	0.165	pCi/L	02/08/19 12:54	03/04/19 10:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.8*		*40 - 110*	*02/08/19 12:54*	*03/04/19 10:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0277	U	0.174	0.174	1.00	0.310	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

TestAmerica Job ID: 160-32828-1

Client Sample ID: FIELD BLANK
Date Collected: 01/30/19 15:00
Date Received: 02/05/19 09:20

Lab Sample ID: 160-32828-7
Matrix: Water

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	96.8		40 - 110	02/08/19 13:25	02/28/19 09:56	1
Y Carrier	90.5		40 - 110	02/08/19 13:25	02/28/19 09:56	1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-414196/23-A
Matrix: Water
Analysis Batch: 417562

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 414196

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.03794	U	0.0514	0.0516	1.00	0.135	pCi/L	02/08/19 12:54	03/04/19 10:42	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.1*		*40 - 110*	*02/08/19 12:54*	*03/04/19 10:42*	*1*

Lab Sample ID: LCS 160-414196/1-A
Matrix: Water
Analysis Batch: 417536

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 414196

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.4	8.876		0.986	1.00	0.125	pCi/L	78	68 - 137		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*97.9*		*40 - 110*

Lab Sample ID: LCSD 160-414196/2-A
Matrix: Water
Analysis Batch: 417536

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 414196

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			11.4	8.447		0.934	1.00	0.0873	pCi/L	74	68 - 137	0.22	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*105*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-414198/23-A
Matrix: Water
Analysis Batch: 417284

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 414198

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2392	U	0.221	0.222	1.00	0.357	pCi/L	02/08/19 13:25	02/28/19 09:56	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.1*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*
Y Carrier	*87.9*		*40 - 110*	*02/08/19 13:25*	*02/28/19 09:56*	*1*

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-414198/1-A
Matrix: Water
Analysis Batch: 417283

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 414198

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			9.44	9.104		1.06	1.00	0.355	pCi/L	96	56 - 140		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*97.9*		*40 - 110*
Y Carrier	*84.9*		*40 - 110*

Lab Sample ID: LCSD 160-414198/2-A
Matrix: Water
Analysis Batch: 417283

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 414198

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			9.44	8.652		0.985	1.00	0.327	pCi/L	92	56 - 140	0.22	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*105*		*40 - 110*
Y Carrier	*92.3*		*40 - 110*

QC Association Summary

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

TestAmerica Job ID: 160-32828-1

Rad

Prep Batch: 414196

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-32828-1	MW-1	Total/NA	Water	PrecSep-21	
160-32828-2	MW-2	Total/NA	Water	PrecSep-21	
160-32828-3	MW-3	Total/NA	Water	PrecSep-21	
160-32828-4	MW-4	Total/NA	Water	PrecSep-21	
160-32828-5	MW-5	Total/NA	Water	PrecSep-21	
160-32828-6	MW-6	Total/NA	Water	PrecSep-21	
160-32828-7	FIELD BLANK	Total/NA	Water	PrecSep-21	
MB 160-414196/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-414196/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-414196/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	

Prep Batch: 414198

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-32828-1	MW-1	Total/NA	Water	PrecSep_0	
160-32828-2	MW-2	Total/NA	Water	PrecSep_0	
160-32828-3	MW-3	Total/NA	Water	PrecSep_0	
160-32828-4	MW-4	Total/NA	Water	PrecSep_0	
160-32828-5	MW-5	Total/NA	Water	PrecSep_0	
160-32828-6	MW-6	Total/NA	Water	PrecSep_0	
160-32828-7	FIELD BLANK	Total/NA	Water	PrecSep_0	
MB 160-414198/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-414198/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-414198/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Tracer/Carrier Summary

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

TestAmerica Job ID: 160-32828-1

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)
160-32828-1	MW-1	93.8
160-32828-2	MW-2	93.5
160-32828-3	MW-3	92.0
160-32828-4	MW-4	71.1
160-32828-5	MW-5	95.3
160-32828-6	MW-6	87.9
160-32828-7	FIELD BLANK	96.8
LCS 160-414196/1-A	Lab Control Sample	97.9
LCSD 160-414196/2-A	Lab Control Sample Dup	105
MB 160-414196/23-A	Method Blank	99.1

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)
160-32828-1	MW-1	93.8	87.1
160-32828-2	MW-2	93.5	86.7
160-32828-3	MW-3	92.0	85.6
160-32828-4	MW-4	71.1	81.1
160-32828-5	MW-5	95.3	89.0
160-32828-6	MW-6	87.9	91.2
160-32828-7	FIELD BLANK	96.8	90.5
LCS 160-414198/1-A	Lab Control Sample	97.9	84.9
LCSD 160-414198/2-A	Lab Control Sample Dup	105	92.3
MB 160-414198/23-A	Method Blank	99.1	87.9

Tracer/Carrier Legend

Ba Carrier = Ba Carrier
Y Carrier = Y Carrier

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

WCD Group
1108 Old Thomasville Rd.
High Point NC 27260

Report Date: April 22, 2019 14:46

Project: PSEG Mercer

Account #: 44064
Group Number: 2035158
SDG: WCD06
PO Number: 18-11433
State of Sample Origin: NJ

Electronic Copy To WCD Group Attn: Scott McDonald

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-2 Groundwater	03/20/2019 10:15	1016456
MW-1 Groundwater	03/20/2019 12:00	1016457
MW-5 Groundwater	03/20/2019 13:35	1016458
MW-4 Groundwater	03/20/2019 14:55	1016459
MW-6 Groundwater	03/20/2019 16:20	1016460
FB-01 Water	03/20/2019 17:00	1016461
MW-3 Groundwater	03/21/2019 10:25	1016462
FB-02 Water	03/21/2019 11:15	1016463

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: WCD Group
Project: PSEG Mercer
Sampling Date(s): 03/20/19 - 03/21/19
Laboratory Sample ID(s): 1016456-1016463
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	Yes
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality."
***The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.**

04/22/2019

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Project Name: PSEG Mercer
ELLE Group #: 2035158

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Sample #s: 1016456-1016463

The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 1016456, 1016457, 1016458, 1016459, 1016460, 1016461, 1016462, 1016463

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

Sample #s: 1016456, 1016457, 1016458, 1016459, 1016460, 1016461, 1016462, 1016463

The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.

Sample Description: **MW-2 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 10:15
SDG#: WCD06-01

WCD Group
ELLE Sample #: GW 1016456
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.184	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.468	0.0120	0.0500	1
01750	Calcium	7440-70-2	72.0	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0736	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0025	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0198	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	78.2	4.0	8.0	20
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	78.8	6.0	20.0	20
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	456	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 10:15
SDG#: WCD06-01

WCD Group
ELLE Sample #: GW 1016456
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.7	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:10	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:10	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:42	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:42	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:42	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:42	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:42	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:42	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:13	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:13	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/18/2019 14:34	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:13	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/16/2019 19:54	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:13	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:47	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404404	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-2 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 10:15
SDG#: WCD06-01

WCD Group
ELLE Sample #: GW 1016456
ELLE Group #: 2035158
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404703	03/26/2019 15:05	JoElla L Rice	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 15:58	Hallie A Burnett	20
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 00:58	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 15:58	Hallie A Burnett	20
00212	Total Dissolved Solids	SM 2540 C-2011	1	19085921201A	03/26/2019 16:20	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19084013201A	03/25/2019 18:05	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19084013201A	03/25/2019 18:05	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 12:00
SDG#: WCD06-02

WCD Group
ELLE Sample #: GW 1016457
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.202	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	1.47	0.0120	0.0500	1
01750	Calcium	7440-70-2	286	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0305 J	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0130	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	127	20.0	40.0	100
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	510	30.0	100	100
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,290	160	480	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 12:00
SDG#: WCD06-02

WCD Group
ELLE Sample #: GW 1016457
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.8	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.3	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:00	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:00	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:34	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:34	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:34	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:34	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:34	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:34	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 21:42	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 21:42	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/18/2019 14:27	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 21:42	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/16/2019 19:23	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 21:42	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:49	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404404	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-1 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 12:00
SDG#: WCD06-02

WCD Group
ELLE Sample #: GW 1016457
ELLE Group #: 2035158
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404703	03/26/2019 15:05	JoElla L Rice	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 01:26	Hallie A Burnett	100
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 01:12	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 01:26	Hallie A Burnett	100
00212	Total Dissolved Solids	SM 2540 C-2011	1	19085921202A	03/26/2019 13:32	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19084013201A	03/25/2019 18:28	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19084013201A	03/25/2019 18:28	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 13:35
SDG#: WCD06-03

WCD Group
ELLE Sample #: GW 1016458
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.195	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.388	0.0120	0.0500	1
01750	Calcium	7440-70-2	105	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0124	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	96.4	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	89.5	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	655	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 13:35
SDG#: WCD06-03

WCD Group
ELLE Sample #: GW 1016458
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.9	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.4	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:26	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:26	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:50	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:50	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:50	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:50	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:50	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:50	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:13	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 15:55	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/20/2019 15:01	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:13	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:13	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 15:55	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:43	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404404	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 13:35
SDG#: WCD06-03

WCD Group
ELLE Sample #: GW 1016458
ELLE Group #: 2035158
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404707	03/27/2019 06:05	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 01:54	Hallie A Burnett	50
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 01:40	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 01:54	Hallie A Burnett	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	19086921201A	03/27/2019 10:35	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19085004202A	03/26/2019 18:33	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19085004202A	03/26/2019 18:33	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 14:55
SDG#: WCD06-04

WCD Group
ELLE Sample #: GW 1016459
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0096	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.0167 J	0.0120	0.0500	1
01750	Calcium	7440-70-2	3.89	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.00042 J	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	3.3	1.0	2.0	5
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	2.8 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	32.5 J	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 14:55
SDG#: WCD06-04

WCD Group
ELLE Sample #: GW 1016459
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.0	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.3	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:13	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:13	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:45	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:45	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:45	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:45	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:45	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:45	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:22	Bradley M Berlot	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:22	Bradley M Berlot	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/18/2019 14:36	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:22	Bradley M Berlot	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/16/2019 20:04	Bradley M Berlot	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404703A	04/09/2019 22:22	Bradley M Berlot	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:51	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404404	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-4 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 14:55
SDG#: WCD06-04

WCD Group
ELLE Sample #: GW 1016459
ELLE Group #: 2035158
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404703	03/26/2019 15:05	JoElla L Rice	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 02:09	Hallie A Burnett	5
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 02:09	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 02:09	Hallie A Burnett	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19086921201A	03/27/2019 10:35	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19084013201A	03/25/2019 18:09	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19084013201A	03/25/2019 18:09	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 16:20
SDG#: WCD06-05

WCD Group
ELLE Sample #: GW 1016460
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0759	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.172	0.0120	0.0500	1
01750	Calcium	7440-70-2	33.7	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0023 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	0.00095 J	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0112	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	60.9	4.0	8.0	20
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	7.6	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	243	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 16:20
SDG#: WCD06-05

WCD Group
ELLE Sample #: GW 1016460
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.2	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:29	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:29	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:53	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:53	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:53	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:53	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:53	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:53	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:24	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 15:59	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/20/2019 15:03	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:24	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:24	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 15:59	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:53	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404404	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-6 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 16:20
SDG#: WCD06-05

WCD Group
ELLE Sample #: GW 1016460
ELLE Group #: 2035158
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404707	03/27/2019 06:05	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 03:05	Hallie A Burnett	20
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 02:23	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 02:23	Hallie A Burnett	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19086921201A	03/27/2019 10:35	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19085004202A	03/26/2019 18:29	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19085004202A	03/26/2019 18:29	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-01 Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 17:00
SDG#: WCD06-06FB

WCD Group
ELLE Sample #: **GW 1016461**
ELLE Group #: **2035158**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D.	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	N.D.	0.0120	0.0500	1
01750	Calcium	7440-70-2	0.0567 J	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **FB-01 Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 17:00
SDG#: WCD06-06FB

WCD Group
ELLE Sample #: **GW 1016461**
ELLE Group #: **2035158**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.9	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	5.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404403	04/04/2019 00:46	Elaine F Stoltzfus	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404403	04/07/2019 05:29	Kevin Litwa	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404403	04/04/2019 00:46	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404403	04/04/2019 00:46	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404403	04/07/2019 05:29	Kevin Litwa	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404403	04/04/2019 00:46	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404403	04/07/2019 05:29	Kevin Litwa	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404403	04/07/2019 05:29	Kevin Litwa	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:27	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 16:02	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/20/2019 15:05	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:27	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:27	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 16:02	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:59	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404403	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **FB-01 Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/20/2019 17:00
SDG#: WCD06-06FB

WCD Group
ELLE Sample #: **GW 1016461**
ELLE Group #: **2035158**
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404707	03/27/2019 06:05	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 03:19	Hallie A Burnett	1
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 03:19	Hallie A Burnett	1
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 03:19	Hallie A Burnett	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	19086921201A	03/27/2019 10:35	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19084013201A	03/25/2019 18:13	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19084013201A	03/25/2019 18:13	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/21/2019 10:25
SDG#: WCD06-07

WCD Group
ELLE Sample #: GW 1016462
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.112	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.112	0.0120	0.0500	1
01750	Calcium	7440-70-2	30.9	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0090	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	40.0	4.0	8.0	20
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	9.2	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	189	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/21/2019 10:25
SDG#: WCD06-07

WCD Group
ELLE Sample #: GW 1016462
ELLE Group #: 2035158
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.1	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:32	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:32	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:55	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:55	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:55	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:55	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:55	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:55	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:31	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/20/2019 15:08	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/20/2019 15:08	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:31	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:31	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 16:06	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:41	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404404	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/21/2019 10:25
SDG#: WCD06-07

WCD Group
ELLE Sample #: GW 1016462
ELLE Group #: 2035158
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404707	03/27/2019 06:05	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 16:16	Hallie A Burnett	20
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 03:33	Hallie A Burnett	5
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 03:33	Hallie A Burnett	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19086921203A	03/27/2019 16:42	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19084013201A	03/25/2019 18:21	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19084013201A	03/25/2019 18:21	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-02 Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/21/2019 11:15
SDG#: WCD06-08FB

WCD Group
ELLE Sample #: **GW 1016463**
ELLE Group #: **2035158**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D.	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	N.D.	0.0120	0.0500	1
01750	Calcium	7440-70-2	0.0529 J	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **FB-02 Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/21/2019 11:15
SDG#: WCD06-08FB

WCD Group
ELLE Sample #: **GW 1016463**
ELLE Group #: **2035158**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.8	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.0	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:16	Lisa J Cooke	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190851404404	04/02/2019 08:16	Lisa J Cooke	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:47	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:47	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:47	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:47	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:47	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190851404404	03/30/2019 16:47	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:34	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 16:10	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/20/2019 15:10	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:34	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/08/2019 13:34	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190851404707A	04/18/2019 16:10	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190860571302	03/28/2019 11:45	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190851404404	03/26/2019 16:17	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **FB-02 Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 03/22/2019 17:55
Collection Date/Time: 03/21/2019 11:15
SDG#: WCD06-08FB

WCD Group
ELLE Sample #: **GW 1016463**
ELLE Group #: **2035158**
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190851404707	03/27/2019 06:05	James L Mertz	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190860571302	03/28/2019 07:25	James L Mertz	1
00224	Chloride	EPA 300.0	1	19100120206A	04/11/2019 03:47	Hallie A Burnett	1
01504	Fluoride	EPA 300.0	1	19100120206A	04/11/2019 03:47	Hallie A Burnett	1
00228	Sulfate	EPA 300.0	1	19100120206A	04/11/2019 03:47	Hallie A Burnett	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	19086921203A	03/27/2019 16:42	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19084013201A	03/25/2019 18:24	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19084013201A	03/25/2019 18:24	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: WCD Group
Reported: 04/22/2019 14:46

Group Number: 2035158

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 190851404403	Sample number(s): 1016461		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	N.D.	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	0.0021 J	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 190851404404	Sample number(s): 1016456-1016460,1016462-1016463		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	N.D.	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	N.D.	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 190851404703A	Sample number(s): 1016456-1016457,1016459		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Molybdenum	N.D.	0.00031	0.0020
Batch number: 190851404707A	Sample number(s): 1016458,1016460-1016463		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Molybdenum	N.D.	0.00031	0.0020
Batch number: 190860571302	Sample number(s): 1016456-1016463		
Mercury	N.D.	0.000050	0.00020
Batch number: 19100120206A	Sample number(s): 1016456-1016463		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: WCD Group
Reported: 04/22/2019 14:46

Group Number: 2035158

Method Blank (continued)

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Sulfate	N.D.	0.30	1.0
Batch number: 19085921201A	Sample number(s): 1016456		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19085921202A	Sample number(s): 1016457		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19086921201A	Sample number(s): 1016458-1016461		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19086921203A	Sample number(s): 1016462-1016463		
Total Dissolved Solids	N.D.	20.0	60.0

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 190851404403	Sample number(s): 1016461								
Barium	2.00	2.04			102		80-120		
Boron	2.00	1.84			92		80-120		
Calcium	4.00	4.08			102		80-120		
Chromium	0.200	0.200			100		80-120		
Cobalt	0.500	0.517			103		80-120		
Lithium	1.00	1.00			100		80-120		
Selenium	0.150	0.148			98		80-120		
Thallium	0.150	0.168			112		80-120		
Batch number: 190851404404	Sample number(s): 1016456-1016460,1016462-1016463								
Barium	2.00	2.02			101		80-120		
Boron	2.00	1.89			95		80-120		
Calcium	4.00	4.10			103		80-120		
Chromium	0.200	0.205			103		80-120		
Cobalt	0.500	0.527			105		80-120		
Lithium	1.00	1.04			104		80-120		
Selenium	0.150	0.147			98		80-120		
Thallium	0.150	0.164			110		80-120		
Batch number: 190851404703A	Sample number(s): 1016456-1016457,1016459								
Antimony	0.00600	0.00568			95		80-120		
Arsenic	0.0100	0.0102			102		80-120		
Beryllium	0.00400	0.00420			105		80-120		
Cadmium	0.00500	0.00494			99		80-120		
Lead	0.0150	0.0152			101		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: WCD Group
Reported: 04/22/2019 14:46

Group Number: 2035158

LCS/LCSD (continued)

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Molybdenum	0.0500	0.0509			102		80-120		
Batch number: 190851404707A	Sample number(s): 1016458,1016460-1016463								
Antimony	0.00600	0.00611			102		80-120		
Arsenic	0.0100	0.0110			110		80-120		
Beryllium	0.00400	0.00416			104		80-120		
Cadmium	0.00500	0.00500			100		80-120		
Lead	0.0150	0.0149			99		80-120		
Molybdenum	0.0500	0.0475			95		80-120		
Batch number: 190860571302	Sample number(s): 1016456-1016463								
Mercury	0.00100	0.000835			83		80-120		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 19100120206A	Sample number(s): 1016456-1016463								
Chloride	3.00	3.06			102		90-110		
Fluoride	0.750	0.741			99		90-110		
Sulfate	7.50	7.67			102		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 19085921201A	Sample number(s): 1016456								
Total Dissolved Solids	200	204	200	204	102	102	62-127	0	14
Batch number: 19085921202A	Sample number(s): 1016457								
Total Dissolved Solids	200	211			106		62-127		
Batch number: 19086921201A	Sample number(s): 1016458-1016461								
Total Dissolved Solids	200	205			103		62-127		
Batch number: 19086921203A	Sample number(s): 1016462-1016463								
Total Dissolved Solids	200	198			99		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 19084013201A	Sample number(s): 1016456-1016457,1016459,1016461-1016463								
pH	7.00	7.02			100		95-105		
Batch number: 19085004202A	Sample number(s): 1016458,1016460								
pH	7.00	7.01			100		95-105		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Quality Control Summary

Client Name: WCD Group
Group Number: 2035158
Reported: 04/22/2019 14:46

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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Acct. # 44064 Group # 2035158 Sample # 1016456-63

COC # 575396

Client Information

Client: WCD Group | Acct. #:

Project Name/#: Former PSEG Mercer | PWSID #:

Project Manager: Scott McDonald | P.O. #:

Sampler: Fabio Iannacco | Quote #:

State where samples were collected: NJ | For Compliance: Yes ☐ No ☐

Sample Identification	Collected Date	Collected Time	Grab	Composite	Matrix: Soil	Sediment	Tissue	Water	Ground	Potable	Surface	NPDES	Other:	Total # of Containers	Dissolved metals	Dissolved Hg	Chloride	Fluoride	Sulfate	pH	TDS	Ra 228, Ra 226
MW-2	3/20/19	10:15						X						7	X	X	X	X	X	X	X	X
MW-1	3/20/19	12:00						X						7	X	X	X	X	X	X	X	X
MW-5	3/20/19	13:35						X						7	X	X	X	X	X	X	X	X
MW-4	3/20/19	14:55						X						7	X	X	X	X	X	X	X	X
MW-6	3/20/19	16:20						X						7	X	X	X	X	X	X	X	X
FB-01	3/20/19	17:00						X						7	X	X	X	X	X	X	X	X
MW-3	3/21/19	10:25						X						7	X	X	X	X	X	X	X	X
FB-02	3/21/19	11:15						X						7	X	X	X	X	X	X	X	X
								X FI 3/21														

Analysis Requested — Preservation and Filtration Codes

For Lab Use Only
FSC:
SCR#: 240277

Preservation Codes
H=HCl | T=Thiosulfate
N=HNO_3 | B=NaOH
S=H_2SO_4 | P=H_3PO_4
F=Field Filtered | O=Other

Remarks
Report to follow previous
Metals: Ba, B, Ca, Cr, Co, Li, Se, Tl, Sb, As, Be, Cd, Pb, Mo, Hg
Lab to filter

Turnaround Time (TAT) Requested (please circle)
Standard | Rush
(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days:

E-mail address: smcdonald@wcdgroup.com cc: -730-0007

Data Package Options (circle if required)
Type I (EPA Level 3 Equivalent/non-CLP) | Type VI (Raw Data Only)
Type III (Reduced non-CLP) | NJ DKQP | TX TRRP-13
NYSDEC Category A or B | MA MCP | CT RCP

Relinquished by	Date	Time	Received by	Date	Time
	3/19/19	11:25		3/19/19	14:30
	Date	Time		3/21/19	13:01
	3/22/19	14:14		3/22/19	14:14
	3/22/19	17:55		Date	Time
	Date	Time		3/22/19	0.4-0.6 1755

EDD Required? Yes No
If yes, format:

Site-Specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier: UPS ____ FedEx ____ Other ____

Temperature upon receipt 0.4-0.6°C

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Sample Administration Receipt Documentation Log

Doc Log ID: 244408

Group Number(s): 2035158

Client: WCD Group

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	03/22/2019 17:55
Number of Packages:	3	Number of Projects:	1
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Ariel Garcia (15332) at 19:34 on 03/22/2019

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	0.6	DT	Wet	Y	Loose	N
2	DT42-02	0.4	DT	Wet	Y	Loose	N
3	DT42-02	0.5	DT	Wet	Y	Loose	N

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

WCD Group
1108 Old Thomasville Rd.
High Point NC 27260

Report Date: May 05, 2019 14:56

Project: PSEG Mercer

Account #: 44064
Group Number: 2035159
PO Number: 18-11433

Electronic Copy To WCD Group Attn: Scott McDonald

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-2 Groundwater	03/20/2019 10:15	1016464
MW-1 Groundwater	03/20/2019 12:00	1016465
MW-5 Groundwater	03/20/2019 13:35	1016466
MW-4 Groundwater	03/20/2019 14:55	1016467
MW-6 Groundwater	03/20/2019 16:20	1016468
FB-01 Water	03/20/2019 17:00	1016469
MW-3 Groundwater	03/21/2019 10:25	1016470
FB-02 Water	03/21/2019 11:15	1016471

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Sample Description:	**MW-2 Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:** **ELLE Group #:**	 **GW 1016464** **2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/20/2019 10:15		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-1 Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:** **ELLE Group #:**	 **GW 1016465** **2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/20/2019 12:00		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-5 Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:** **ELLE Group #:**	 **GW 1016466** **2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/20/2019 13:35		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-4 Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 1016467**
		ELLE Group #:	**2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/20/2019 14:55		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-6 Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:** **ELLE Group #:**	 **GW 1016468** **2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/20/2019 16:20		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**FB-01 Water** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 1016469**
		ELLE Group #:	**2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/20/2019 17:00		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**MW-3 Groundwater** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:** **ELLE Group #:**	 **GW 1016470** **2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/21/2019 10:25		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

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Sample Description:	**FB-02 Water** **Former PSEG Mercer**	**WCD Group** **ELLE Sample #:**	**GW 1016471**
		ELLE Group #:	**2035159**
Project Name:	**PSEG Mercer**		
Submittal Date/Time:	03/22/2019 17:55		
Collection Date/Time:	03/21/2019 11:15		

Sample Comments

The analyses for Ra 226 and Ra 228 were subcontracted to another laboratory.
See Attached Reports.

Environmental Analysis Request/Chain of Custody

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Acct. # 44064 Group # 2035159 Sample # 1016464-71

COC # 575396

Client Information

Client: WCD Group	Acct. #:
Project Name/#: Former PSEG Mercer	PWSID #:
Project Manager: Scott McDonald	P.O. #:
Sampler: Fabio Iannacco	Quote #:
State where samples were collected: NJ	For Compliance: Yes ☐ No ☐

Matrix: ☐ Tissue ☐ Sediment ☐ Soil ☒ Water ☐ Ground ☐ Potable ☐ Surface ☐ NPDES ☐ Other: ____

For Lab Use Only
FSC: ____
SCR#: 240277

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 P=H_3PO_4
F=Field Filtered O=Other

Sample Identification	Collected Date	Collected Time	Grab	Composite	Total # of Containers	Dissolved Metals	Dissolved Hg	Chloride	Fluoride	Sulfate	pH	TDS	Ra 228, Ra 226	Remarks
MW-2	3/20/19	10:15			7	X	X	X	X	X	X	X	X	Report to follow previous Metals: Ba, B, Ca, Cr, Co, Li, Se, Tl, Sb, As, Be, Cd, Pb, Mo, Hg Lab to filter
MW-1	3/20/19	12:00			7	X	X	X	X	X	X	X	X	
MW-5	3/20/19	13:35			7	X	X	X	X	X	X	X	X	
MW-4	3/20/19	14:55			7	X	X	X	X	X	X	X	X	
MW-6	3/20/19	16:20			7	X	X	X	X	X	X	X	X	
FB-01	3/20/19	17:00			7	X	X	X	X	X	X	X	X	
MW-3	3/21/19	10:25			7	X	X	X	X	X	X	X	X	
FB-02	3/21/19	11:15			7	X	X	X	X	X	X	X	X	
						X FI 3/21								

Turnaround Time (TAT) Requested (please circle)
Standard Rush
(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days: ____

E-mail address: smcdonald@wcdgroup.com cc fiannacco@wcdgroup.com

Data Package Options (circle if required)
Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only)
Type III (Reduced non-CLP) NJ DKQP TX TRRP-13
NYSDEC Category A or B MA MCP CT RCP

Relinquished by	Date	Time	Received by	Date	Time
[signature]	3/19/19	11:25	[signature]	3/19/19	14:30
[signature]			[signature]	3/21/19	13:01
[signature]	3/22/19	14:44	[signature]	3/22/19	14:14
[signature]	3/22/19	17:55			
			[signature]	3/22/19	0.4-0.6 1755

EDD Required? Yes No
If yes, format: ____

Site-Specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:
UPS ____ FedEx ____ Other ____

Temperature upon receipt 0.4-0.6°C

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Sample Administration Receipt Documentation Log

Doc Log ID: 244408

Group Number(s): 2035159

Client: WCD Group

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	03/22/2019 17:55
Number of Packages:	3	Number of Projects:	1
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Ariel Garcia (15332) at 19:34 on 03/22/2019

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	0.6	DT	Wet	Y	Loose	N
2	DT42-02	0.4	DT	Wet	Y	Loose	N
3	DT42-02	0.5	DT	Wet	Y	Loose	N

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ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-33443-1
Client Project/Site: Ra-226/228: GW Monitoring

For:
Eurofins Lancaster Laboratories Env LLC
2425 New Holland Pike
Lancaster, Pennsylvania 17601

Attn: Jenifer Lewis

Rhonda Ridenhower

Authorized for release by:
5/3/2019 4:47:50 PM
Rhonda Ridenhower, Manager of Project Management
rhonda.ridenhower@testamericainc.com

Designee for

Jayna Awalt, Project Manager II
(314)298-8566
jayna.awalt@testamericainc.com

LINKS

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Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Tracer Carrier Summary 16

Job ID: 160-33443-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Eurofins Lancaster Laboratories Env LLC

Project: Ra-226/228: GW Monitoring

Report Number: 160-33443-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date

RECEIPT

The samples were received on 03/26/2019; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 1.0 C.

RADIUM-226 (GFPC)

Samples MW-2 (160-33443-1), MW-1 (160-33443-2), MW-5 (160-33443-3), MW-4 (160-33443-4), MW-6 (160-33443-5), FB-01 (160-33443-6), W-3 (160-33443-7) and FB-02 (160-33443-8) were analyzed for Radium-226 (GFPC) in accordance with EPA Method 903.0. The samples were prepared on 04/07/2019 and analyzed on 04/30/2019.

Job ID: 160-33443-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-228 (GFPC)

Samples MW-2 (160-33443-1), MW-1 (160-33443-2), MW-5 (160-33443-3), MW-4 (160-33443-4), MW-6 (160-33443-5), FB-01 (160-33443-6), W-3 (160-33443-7) and FB-02 (160-33443-8) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 04/07/2019 and analyzed on 04/17/2019.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # _____ Group # 2035159 Sample # 1016464-1016471

Subcontractor:	TestAmerica-St. Louis		
Project Name/#:	2035159	Site ID #:	
Requestor	Hannah Cottman	P.O. #:	NA
Sampler: FI		PWSID #:	
Phone #:	717-556-7383	Quote #:	
State where samples were collected:	NJ	For Compliance: Yes ☑ No ☐	

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil ☐ Sediment ☐ Tissue ☐	Water ☑ Ground ☐ Potable ☐ Surface ☐ NPDES ☐	Other:	Total # of Containers	Analyses Requested: Radium-226 (EPA 903.1)	Radium-228 (EPA 904.0 mod)										
									Preservation and Filtration Codes: N	N										
MW-2	3/20/2019	1015	X			X		2	X	X										1016464
MW-1	3/20/2019	1200	X			X		2	X	X										1016465
MW-5	3/20/2019	1335	X			X		2	X	X										1016466
MW-4	3/20/2019	1455	X			X		2	X	X										1016467
MW-6	3/20/2019	1620	X			X		2	X	X										1016468
FB-01	3/20/2019	1700	X			X		2	X	X										1016469
MW-3	3/21/2019	1025	X			X		2	X	X										1016470
FB-02	3/21/2019	1115	X			X		2	X	X										1016471

ok to preserve upon receipt.
(3) HLC 2213 3-25-19

160-33443 Chain of Custody

For Lab Use Only
SF #: _____
SCR #: _____

Preservation Codes
H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; F = Field Filtered; O = Other

Remarks

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by (please check): E-Mail ☐ Phone ☐

E-mail Address: ELLE_Subcontracting@EurofinsUS.com

Phone: 717-556-7383

Data Package Options (please check if required) ☐ Full Data Package

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☑	NYSDEC Category	☐ A or ☐ B

EDD Required? Yes ☑ No ☐ If yes, format: HazSite

Relinquished by:	Date	Time	Received by:	Date	Time
(3) HLC 2213 3-25-19 Hannah Cottman	3-25-19	1620		3-26-19	0920
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Relinquished by Commercial Carrier:
UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

Login Sample Receipt Checklist

Client: Eurofins Lancaster Laboratories Env LLC

Job Number: 160-33443-1

Login Number: 33443
List Number: 1
Creator: Press, Nicholas B

List Source: Eurofins TestAmerica, St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Eurofins Lancaster Laboratories Env LLC
Job ID: 160-33443-1
Project/Site: Ra-226/228: GW Monitoring

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Eurofins Lancaster Laboratories Env LLC
Job ID: 160-33443-1
Project/Site: Ra-226/228: GW Monitoring

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Eurofins Lancaster Laboratories Env LLC
Project/Site: Ra-226/228: GW Monitoring

Job ID: 160-33443-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-33443-1	MW-2	Water	03/20/19 10:15	03/26/19 09:20
160-33443-2	MW-1	Water	03/20/19 12:00	03/26/19 09:20
160-33443-3	MW-5	Water	03/20/19 13:35	03/26/19 09:20
160-33443-4	MW-4	Water	03/20/19 14:55	03/26/19 09:20
160-33443-5	MW-6	Water	03/20/19 16:20	03/26/19 09:20
160-33443-6	FB-01	Water	03/20/19 17:00	03/26/19 09:20
160-33443-7	W-3	Water	03/21/19 10:25	03/26/19 09:20
160-33443-8	FB-02	Water	03/21/19 11:15	03/26/19 09:20

Client Sample ID: MW-2
Lab Sample ID: 160-33443-1
Date Collected: 03/20/19 10:15
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.294		0.0899	0.0937	1.00	0.0712	pCi/L	04/07/19 12:47	04/30/19 13:12	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110	04/07/19 12:47	04/30/19 13:12	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.186	U	0.204	0.205	1.00	0.334	pCi/L	04/07/19 12:47	04/17/19 15:49	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110	04/07/19 12:47	04/17/19 15:49	1
Y Carrier	87.9		40 - 110	04/07/19 12:47	04/17/19 15:49	1

Client Sample ID: MW-1
Lab Sample ID: 160-33443-2
Date Collected: 03/20/19 12:00
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.193		0.0750	0.0770	1.00	0.0645	pCi/L	04/07/19 12:47	04/30/19 13:12	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	99.4		40 - 110	04/07/19 12:47	04/30/19 13:12	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.380		0.231	0.234	1.00	0.350	pCi/L	04/07/19 12:47	04/17/19 15:50	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	99.4		40 - 110	04/07/19 12:47	04/17/19 15:50	1
Y Carrier	86.7		40 - 110	04/07/19 12:47	04/17/19 15:50	1

Client Sample ID: MW-5
Lab Sample ID: 160-33443-3
Date Collected: 03/20/19 13:35
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.298		0.0944	0.0981	1.00	0.0739	pCi/L	04/07/19 12:47	04/30/19 13:12	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	95.0		40 - 110	04/07/19 12:47	04/30/19 13:12	1

Client Sample ID: MW-5
Lab Sample ID: 160-33443-3
Date Collected: 03/20/19 13:35
Matrix: Water
Date Received: 03/26/19 09:20

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.663**		0.314	0.320	1.00	0.466	pCi/L	04/07/19 12:47	04/17/19 15:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.0*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:50*	*1*
Y Carrier	*85.6*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:50*	*1*

Client Sample ID: MW-4
Lab Sample ID: 160-33443-4
Date Collected: 03/20/19 14:55
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0578	U	0.0491	0.0494	1.00	0.0712	pCi/L	04/07/19 12:47	04/30/19 13:13	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*04/07/19 12:47*	*04/30/19 13:13*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.259	U	0.211	0.212	1.00	0.334	pCi/L	04/07/19 12:47	04/17/19 15:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:50*	*1*
Y Carrier	*89.7*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:50*	*1*

Client Sample ID: MW-6
Lab Sample ID: 160-33443-5
Date Collected: 03/20/19 16:20
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.0768**		0.0540	0.0545	1.00	0.0715	pCi/L	04/07/19 12:47	04/30/19 13:13	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*100*		*40 - 110*	*04/07/19 12:47*	*04/30/19 13:13*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.150	U	0.242	0.242	1.00	0.408	pCi/L	04/07/19 12:47	04/17/19 15:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*100*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:50*	*1*

Client: Eurofins Lancaster Laboratories Env LLC
Job ID: 160-33443-1
Project/Site: Ra-226/228: GW Monitoring

Client Sample ID: MW-6
Lab Sample ID: 160-33443-5
Date Collected: 03/20/19 16:20
Matrix: Water
Date Received: 03/26/19 09:20

Method: 904.0 - Radium-228 (GFPC) (Continued)

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Y Carrier	84.9		40 - 110	04/07/19 12:47	04/17/19 15:50	1

Client Sample ID: FB-01
Lab Sample ID: 160-33443-6
Date Collected: 03/20/19 17:00
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0221	U	0.0436	0.0436	1.00	0.0781	pCi/L	04/07/19 12:47	04/30/19 13:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110	04/07/19 12:47	04/30/19 13:14	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0417	U	0.190	0.190	1.00	0.333	pCi/L	04/07/19 12:47	04/17/19 15:50	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110	04/07/19 12:47	04/17/19 15:50	1
Y Carrier	87.9		40 - 110	04/07/19 12:47	04/17/19 15:50	1

Client Sample ID: W-3
Lab Sample ID: 160-33443-7
Date Collected: 03/21/19 10:25
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0552	U	0.0498	0.0500	1.00	0.0748	pCi/L	04/07/19 12:47	04/30/19 13:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110	04/07/19 12:47	04/30/19 13:14	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.109	U	0.205	0.206	1.00	0.350	pCi/L	04/07/19 12:47	04/17/19 15:50	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110	04/07/19 12:47	04/17/19 15:50	1
Y Carrier	84.9		40 - 110	04/07/19 12:47	04/17/19 15:50	1

Client Sample Results

Client: Eurofins Lancaster Laboratories Env LLC
Job ID: 160-33443-1
Project/Site: Ra-226/228: GW Monitoring

Client Sample ID: FB-02
Lab Sample ID: 160-33443-8
Date Collected: 03/21/19 11:15
Matrix: Water
Date Received: 03/26/19 09:20

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.00414	U	0.0350	0.0350	1.00	0.0729	pCi/L	04/07/19 12:47	04/30/19 22:06	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*109*		*40 - 110*	*04/07/19 12:47*	*04/30/19 22:06*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.148	U	0.207	0.208	1.00	0.347	pCi/L	04/07/19 12:47	04/17/19 15:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*109*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:51*	*1*
Y Carrier	*85.6*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:51*	*1*

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-422876/24-A
Matrix: Water
Analysis Batch: 426246

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 422876

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.01460	U	0.0395	0.0395	1.00	0.0757	pCi/L	04/07/19 12:47	04/30/19 13:47	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*04/07/19 12:47*	*04/30/19 13:47*	*1*

Lab Sample ID: LCS 160-422876/1-A
Matrix: Water
Analysis Batch: 426247

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 422876

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.4	8.831		0.914	1.00	0.0698	pCi/L	78	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*107*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-422960/24-A
Matrix: Water
Analysis Batch: 424310

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 422960

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3031	U	0.246	0.247	1.00	0.390	pCi/L	04/07/19 12:47	04/17/19 15:56	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:56*	*1*
Y Carrier	*84.1*		*40 - 110*	*04/07/19 12:47*	*04/17/19 15:56*	*1*

Lab Sample ID: LCS 160-422960/1-A
Matrix: Water
Analysis Batch: 424263

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 422960

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			9.29	8.669		1.01	1.00	0.349	pCi/L	93	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*107*		*40 - 110*
Y Carrier	*85.6*		*40 - 110*

QC Association Summary

Client: Eurofins Lancaster Laboratories Env LLC
Job ID: 160-33443-1
Project/Site: Ra-226/228: GW Monitoring

Rad

Prep Batch: 422876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-33443-1	MW-2	Total/NA	Water	PrecSep-21	
160-33443-2	MW-1	Total/NA	Water	PrecSep-21	
160-33443-3	MW-5	Total/NA	Water	PrecSep-21	
160-33443-4	MW-4	Total/NA	Water	PrecSep-21	
160-33443-5	MW-6	Total/NA	Water	PrecSep-21	
160-33443-6	FB-01	Total/NA	Water	PrecSep-21	
160-33443-7	W-3	Total/NA	Water	PrecSep-21	
160-33443-8	FB-02	Total/NA	Water	PrecSep-21	
MB 160-422876/24-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-422876/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 422960

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-33443-1	MW-2	Total/NA	Water	PrecSep_0	
160-33443-2	MW-1	Total/NA	Water	PrecSep_0	
160-33443-3	MW-5	Total/NA	Water	PrecSep_0	
160-33443-4	MW-4	Total/NA	Water	PrecSep_0	
160-33443-5	MW-6	Total/NA	Water	PrecSep_0	
160-33443-6	FB-01	Total/NA	Water	PrecSep_0	
160-33443-7	W-3	Total/NA	Water	PrecSep_0	
160-33443-8	FB-02	Total/NA	Water	PrecSep_0	
MB 160-422960/24-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-422960/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Tracer/Carrier Summary

Client: Eurofins Lancaster Laboratories Env LLC
Job ID: 160-33443-1
Project/Site: Ra-226/228: GW Monitoring

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)
160-33443-1	MW-2	104
160-33443-2	MW-1	99.4
160-33443-3	MW-5	95.0
160-33443-4	MW-4	103
160-33443-5	MW-6	100
160-33443-6	FB-01	109
160-33443-7	W-3	109
160-33443-8	FB-02	109
LCS 160-422876/1-A	Lab Control Sample	107
MB 160-422876/24-A	Method Blank	101

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)
160-33443-1	MW-2	104	87.9
160-33443-2	MW-1	99.4	86.7
160-33443-3	MW-5	95.0	85.6
160-33443-4	MW-4	103	89.7
160-33443-5	MW-6	100	84.9
160-33443-6	FB-01	109	87.9
160-33443-7	W-3	109	84.9
160-33443-8	FB-02	109	85.6
LCS 160-422960/1-A	Lab Control Sample	107	85.6
MB 160-422960/24-A	Method Blank	101	84.1

Tracer/Carrier Legend

Ba Carrier = Ba Carrier
Y Carrier = Y Carrier

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

WCD Group
1108 Old Thomasville Rd.
High Point NC 27260

Report Date: May 02, 2019 18:22

Project: PSEG Mercer

Account #: 44064
Group Number: 2037302
SDG: WCD08
PO Number: 18-11433
State of Sample Origin: NJ

Electronic Copy To WCD Group Attn: Scott McDonald

Respectfully Submitted,

Kerri Sachtleben

(717)-556-7376

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.



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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MW-2 Grab Groundwater	04/03/2019 09:25	1026600
MW-1 Grab Groundwater	04/03/2019 10:20	1026601
MW-5 Grab Groundwater	04/03/2019 11:15	1026602
MW-6 Grab Groundwater	04/03/2019 13:05	1026603
MW-3 Grab Groundwater	04/03/2019 14:55	1026604
FB-01 Grab Water	04/03/2019 14:20	1026605
MW-4 Grab Groundwater	04/03/2019 12:45	1026606

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Client: WCD Group
Project: PSEG Mercer
Sampling Date(s): 04/03/19
Laboratory Sample ID(s): 1026600-1026606
List DKQP Methods Used (e.g., 8260, 8270, et cetera)
EPA 300.0; SM 2540 C-2011; SM 2550 B-2010; SM 4500-H+ B-2011; SW-846 6010D Rev.4, July 2014; SW-846 6020B Rev.2, July 2014; SW-846 7470A

		Yes or No
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes
1A	Were the method specified handling, preservation, and holding time requirements met?	No
1B	***EPH Method*:** Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes
3	Were samples received at an appropriate temperature (</=6° C)?	Yes
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	Yes
5A	Were reporting limits* specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	Yes
5B	Were these reporting limits met?	No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	No
Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality." *The Limit of Quantitation (LOQ) meets requirements for the Reporting Limit (RL) as defined in the NJDEP Data of Known Quality performance standards, unless otherwise noted.		

Kenneth Boley
Senior Specialist, Quality Assurance

05/02/2019



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Project Name: PSEG Mercer
ELLE Group #: 2037302

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Sample #s: 1026600-1026606

The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.

Analysis Specific Comments:

SW-846 6010D Rev.4, July 2014, Metals Dissolved

Sample #s: 1026600, 1026601, 1026602, 1026603, 1026604, 1026605, 1026606

The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.

Sample #s: 1026600, 1026601, 1026602, 1026603, 1026604, 1026605, 1026606

The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.

Sample Description: **MW-2 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 09:25
SDG#: WCD08-01

WCD Group
ELLE Sample #: GW 1026600
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.229	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.679	0.0120	0.0500	1
01750	Calcium	7440-70-2	98.0	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D. K4	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	0.0927	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	0.00055 J	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.0030	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.00050	1
06028	Cadmium	7440-43-9	0.00043 J	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0439	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	110	4.0	8.0	20
01504	Fluoride	16984-48-8	0.66	0.25	0.50	5
00228	Sulfate	14808-79-8	137	6.0	20.0	20
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	597	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-2 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 09:25
SDG#: WCD08-01

WCD Group
ELLE Sample #: GW 1026600
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.9	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 21:12	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:48	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 21:12	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:48	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 21:12	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 21:12	Cindy M Gehman	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:48	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:48	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:39	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:39	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:39	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:39	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:39	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:39	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190980571302	04/10/2019 07:49	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190951404407	04/08/2019 16:04	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-2 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 09:25
SDG#: WCD08-01

WCD Group
ELLE Sample #: GW 1026600
ELLE Group #: 2037302
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190961404704	04/09/2019 17:00	Barbara A Kane	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190980571302	04/09/2019 08:30	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	19110963117B	04/21/2019 05:35	Anna Campanella	20
01504	Fluoride	EPA 300.0	1	19110963117B	04/21/2019 05:18	Anna Campanella	5
00228	Sulfate	EPA 300.0	1	19110963117B	04/21/2019 05:35	Anna Campanella	20
00212	Total Dissolved Solids	SM 2540 C-2011	1	19095921201B	04/05/2019 17:05	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19095003202A	04/05/2019 19:28	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19095003202A	04/05/2019 19:28	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 10:20
SDG#: WCD08-02

WCD Group
ELLE Sample #: GW 1026601
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.199	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	1.65	0.0120	0.0500	1
01750	Calcium	7440-70-2	314	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D. K4	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D. K4	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0139	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	91.9	10.0	20.0	50
01504	Fluoride	16984-48-8	N.D.	0.25	0.50	5
00228	Sulfate	14808-79-8	467	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,320	80.0	240	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-1 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 10:20
SDG#: WCD08-02

WCD Group
ELLE Sample #: GW 1026601
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.8	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.3	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 20:53	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:31	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 20:53	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:31	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:31	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:31	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:31	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:31	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:15	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:15	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:15	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:15	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:15	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:15	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190980571302	04/10/2019 08:18	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190951404407	04/08/2019 16:04	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-1 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 10:20
SDG#: WCD08-02

WCD Group
ELLE Sample #: GW 1026601
ELLE Group #: 2037302
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190961404704	04/09/2019 17:00	Barbara A Kane	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190980571302	04/09/2019 08:30	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	19112520109A	04/22/2019 17:58	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	19112520109A	04/22/2019 17:40	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19112520109A	04/22/2019 17:58	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	19095921202B	04/05/2019 18:15	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19095003201A	04/05/2019 18:27	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19095003201A	04/05/2019 18:27	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 11:15
SDG#: WCD08-03

WCD Group
ELLE Sample #: GW 1026602
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.226	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.422	0.0120	0.0500	1
01750	Calcium	7440-70-2	116	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D.	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0132	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	85.3	10.0	20.0	50
01504	Fluoride	16984-48-8	0.63	0.25	0.50	5
00228	Sulfate	14808-79-8	101	15.0	50.0	50
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	644	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-5 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 11:15
SDG#: WCD08-03

WCD Group
ELLE Sample #: GW 1026602
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.3	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 19:15	Elaine F Stoltzfus	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 19:15	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 19:15	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 19:15	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 19:15	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 19:15	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/16/2019 14:06	Kevin Litwa	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/16/2019 14:06	Kevin Litwa	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:44	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:44	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:44	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:44	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:44	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:44	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190980571302	04/10/2019 07:58	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190961404401	04/08/2019 16:04	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-5 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 11:15
SDG#: WCD08-03

WCD Group
ELLE Sample #: GW 1026602
ELLE Group #: 2037302
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190961404704	04/09/2019 17:00	Barbara A Kane	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190980571302	04/09/2019 08:30	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	19112520109A	04/22/2019 18:51	Ashlynn M Cornelius	50
01504	Fluoride	EPA 300.0	1	19112520109A	04/23/2019 10:42	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19112520109A	04/22/2019 18:51	Ashlynn M Cornelius	50
00212	Total Dissolved Solids	SM 2540 C-2011	1	19095921202A	04/05/2019 18:15	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19095003201A	04/05/2019 18:31	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19095003201A	04/05/2019 18:31	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 13:05
SDG#: WCD08-04

WCD Group
ELLE Sample #: GW 1026603
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0809	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.208	0.0120	0.0500	1
01750	Calcium	7440-70-2	35.6	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0020 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D.	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D.	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	0.0011 J	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D.	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0132	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	45.3	4.0	8.0	20
01504	Fluoride	16984-48-8	0.67	0.25	0.50	5
00228	Sulfate	14808-79-8	7.7	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	201	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-6 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 13:05
SDG#: WCD08-04

WCD Group
ELLE Sample #: GW 1026603
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.1	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.0	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 18:41	Elaine F Stoltzfus	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 18:41	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 18:41	Elaine F Stoltzfus	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 18:41	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 18:41	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/15/2019 18:41	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/16/2019 13:36	Kevin Litwa	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190961404401	04/16/2019 13:36	Kevin Litwa	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:32	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:32	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:32	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:32	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:32	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 14:32	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190980571302	04/10/2019 07:45	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190961404401	04/08/2019 16:04	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-6 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 13:05
SDG#: WCD08-04

WCD Group
ELLE Sample #: GW 1026603
ELLE Group #: 2037302
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190961404704	04/09/2019 17:00	Barbara A Kane	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190980571302	04/09/2019 08:30	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	19110963117B	04/21/2019 07:01	Anna Campanella	20
01504	Fluoride	EPA 300.0	1	19110963117B	04/21/2019 06:44	Anna Campanella	5
00228	Sulfate	EPA 300.0	1	19110963117B	04/21/2019 06:44	Anna Campanella	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19095921203A	04/05/2019 18:42	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19095003201A	04/05/2019 18:58	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19095003201A	04/05/2019 18:58	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 14:55
SDG#: WCD08-05

WCD Group
ELLE Sample #: GW 1026604
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.134	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.105	0.0120	0.0500	1
01750	Calcium	7440-70-2	31.9	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D. K4	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D.	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	0.00068 J	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.0086	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	62.5	4.0	8.0	20
01504	Fluoride	16984-48-8	0.71	0.25	0.50	5
00228	Sulfate	14808-79-8	7.0	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	211	40.0	120	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 14:55
SDG#: WCD08-05

WCD Group
ELLE Sample #: GW 1026604
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.8	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.8	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 20:50	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:28	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 20:50	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:28	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:28	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 20:50	Cindy M Gehman	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:28	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:28	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:20	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:20	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:20	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:20	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:20	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:20	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190960571303	04/10/2019 07:19	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190951404407	04/08/2019 16:04	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-3 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 14:55
SDG#: WCD08-05

WCD Group
ELLE Sample #: GW 1026604
ELLE Group #: 2037302
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190961404704	04/09/2019 17:00	Barbara A Kane	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190960571303	04/09/2019 08:30	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	19110963117B	04/21/2019 06:27	Anna Campanella	20
01504	Fluoride	EPA 300.0	1	19110963117B	04/21/2019 06:09	Anna Campanella	5
00228	Sulfate	EPA 300.0	1	19110963117B	04/21/2019 06:09	Anna Campanella	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19095921203B	04/05/2019 18:42	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19095003202A	04/05/2019 19:32	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19095003202A	04/05/2019 19:32	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **FB-01 Grab Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 14:20
SDG#: WCD08-06FB

WCD Group
ELLE Sample #: **GW 1026605**
ELLE Group #: **2037302**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	N.D. K4	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	N.D.	0.0120	0.0500	1
01750	Calcium	7440-70-2	0.0598 J	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D.	0.0053	0.0150	1
07052	Cobalt	7440-48-4	N.D. K4	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D. K4	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	N.D.	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	N.D.	0.20	0.40	1
01504	Fluoride	16984-48-8	N.D.	0.050	0.10	1
00228	Sulfate	14808-79-8	N.D.	0.30	1.0	1
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	N.D.	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **FB-01 Grab Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 14:20
SDG#: WCD08-06FB

WCD Group
ELLE Sample #: **GW 1026605**
ELLE Group #: **2037302**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	21.3	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	7.4	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:25	Elaine F Stoltzfus	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:25	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 20:47	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:25	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:25	Elaine F Stoltzfus	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:25	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:25	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:25	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:18	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:18	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:18	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:18	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:18	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:18	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190960571303	04/10/2019 07:21	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190951404407	04/08/2019 16:04	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **FB-01 Grab Water**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 14:20
SDG#: WCD08-06FB

WCD Group
ELLE Sample #: **GW 1026605**
ELLE Group #: **2037302**
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190961404704	04/09/2019 17:00	Barbara A Kane	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190960571303	04/09/2019 08:30	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	19110963117B	04/21/2019 04:27	Anna Campanella	1
01504	Fluoride	EPA 300.0	1	19110963117B	04/21/2019 04:27	Anna Campanella	1
00228	Sulfate	EPA 300.0	1	19110963117B	04/21/2019 04:27	Anna Campanella	1
00212	Total Dissolved Solids	SM 2540 C-2011	1	19095921203A	04/05/2019 18:42	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19095003201A	04/05/2019 18:42	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19095003201A	04/05/2019 18:42	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 12:45
SDG#: WCD08-07

WCD Group
ELLE Sample #: GW 1026606
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010D Rev.4, July 2014**		**mg/l**	**mg/l**	**mg/l**	
07046	Barium	7440-39-3	0.0115	0.0010	0.0050	1
	The NJ DKQP analyte list requirement was not met for Metals. The client specified list is reported.					
08014	Boron	7440-42-8	0.0206 J	0.0120	0.0500	1
01750	Calcium	7440-70-2	4.29	0.0330	0.500	1
07051	Chromium	7440-47-3	N.D. K4	0.0053	0.0150	1
07052	Cobalt	7440-48-4	0.0015 J	0.0015	0.0050	1
01756	Lithium	7439-93-2	N.D. K4	0.0110	0.0500	1
07036	Selenium	7782-49-2	N.D. K4	0.0210	0.0500	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
07022	Thallium	7440-28-0	N.D. K4	0.0140	0.0300	1
	The NJ DKQP required reporting limit could not be attained using the laboratory LOQ. The analyte was evaluated using the MDL.					
	SW-846 6020B Rev.2, July 2014		**mg/l**	**mg/l**	**mg/l**	
06024	Antimony	7440-36-0	N.D.	0.00041	0.0020	1
06025	Arsenic	7440-38-2	N.D.	0.00068	0.0020	1
06027	Beryllium	7440-41-7	N.D. K4	0.000091	0.00050	1
06028	Cadmium	7440-43-9	N.D.	0.00015	0.0010	1
06035	Lead	7439-92-1	N.D.	0.0011	0.0030	1
06038	Molybdenum	7439-98-7	0.00059 J	0.00031	0.0020	1
	SW-846 7470A		**mg/l**	**mg/l**	**mg/l**	
00259	Mercury	7439-97-6	N.D.	0.000050	0.00020	1
03277	**Lab Filtration - Metals**					
	The holding time was not met for dissolved sample filtration. The filtration time for dissolved metals is to be within 15 minutes from collection. Since the filtration occurred after receipt in the laboratory, the 15 minute criteria was exceeded. This sample was not collected per applicable Clean Water Act (40CFR136) or SW-846 regulations.					
Wet Chemistry	**EPA 300.0**		**mg/l**	**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	3.7	1.0	2.0	5
01504	Fluoride	16984-48-8	0.66	0.25	0.50	5
00228	Sulfate	14808-79-8	3.4 J	1.5	5.0	5
	SM 2540 C-2011		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	28.0 J	20.0	60.0	1
	SM 2550 B-2010		**Degrees C**	**Degrees C**	**Degrees C**	

*=This limit was used in the evaluation of the final result

Sample Description: **MW-4 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 12:45
SDG#: WCD08-07

WCD Group
ELLE Sample #: GW 1026606
ELLE Group #: 2037302
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2550 B-2010**		**Degrees C**	**Degrees C**	**Degrees C**	
12151	Temperature of pH	n.a.	22.0	0.010	0.010	1
Wet Chemistry	**SM 4500-H+ B-2011**		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	6.1	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

Sample Comments

State of New Jersey Lab Certification No. PA011
This sample was lab filtered for dissolved metals.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07046	Barium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 21:16	Cindy M Gehman	1
08014	Boron	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:51	Elaine F Stoltzfus	1
01750	Calcium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 21:16	Cindy M Gehman	1
07051	Chromium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:51	Elaine F Stoltzfus	1
07052	Cobalt	SW-846 6010D Rev.4, July 2014	1	190951404407	04/15/2019 21:16	Cindy M Gehman	1
01756	Lithium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:51	Elaine F Stoltzfus	1
07036	Selenium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:51	Elaine F Stoltzfus	1
07022	Thallium	SW-846 6010D Rev.4, July 2014	1	190951404407	04/11/2019 14:51	Elaine F Stoltzfus	1
06024	Antimony	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:11	Patrick J Engle	1
06025	Arsenic	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:11	Patrick J Engle	1
06027	Beryllium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:11	Patrick J Engle	1
06028	Cadmium	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:11	Patrick J Engle	1
06035	Lead	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:11	Patrick J Engle	1
06038	Molybdenum	SW-846 6020B Rev.2, July 2014	1	190961404704A	05/02/2019 15:11	Patrick J Engle	1
00259	Mercury	SW-846 7470A	1	190960571303	04/10/2019 07:23	Damary Valentin	1
14044	ICP-WW, 3005A (tot rec) - U345	SW-846 3005A	1	190951404407	04/08/2019 16:04	Barbara A Kane	1

*=This limit was used in the evaluation of the final result

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Sample Description: **MW-4 Grab Groundwater**
Former PSEG Mercer

Project Name: **PSEG Mercer**

Submittal Date/Time: 04/04/2019 19:00
Collection Date/Time: 04/03/2019 12:45
SDG#: WCD08-07

WCD Group
ELLE Sample #: GW 1026606
ELLE Group #: 2037302
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14047	ICPMS - Water, 3020A - U345	SW-846 3020A	1	190961404704	04/09/2019 17:00	Barbara A Kane	1
05713	WW SW846 Hg Digest	SW-846 7470A	1	190960571303	04/09/2019 08:30	Denise L Trimby	1
00224	Chloride	EPA 300.0	1	19110963117B	04/21/2019 04:10	Anna Campanella	5
01504	Fluoride	EPA 300.0	1	19110963117B	04/21/2019 04:10	Anna Campanella	5
00228	Sulfate	EPA 300.0	1	19110963117B	04/21/2019 04:10	Anna Campanella	5
00212	Total Dissolved Solids	SM 2540 C-2011	1	19095921203A	04/05/2019 18:42	Angelica Cintron	1
12151	Temperature of pH	SM 2550 B-2010	1	19095003202A	04/05/2019 19:24	Jeremy L Bolf	1
12152	pH	SM 4500-H+ B-2011	1	19095003202A	04/05/2019 19:24	Jeremy L Bolf	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: WCD Group
Reported: 05/02/2019 18:22

Group Number: 2037302

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Batch number: 190951404407	Sample number(s): 1026600-1026601,1026604-1026606		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	N.D.	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	N.D.	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 190960571303	Sample number(s): 1026604-1026606		
Mercury	N.D.	0.000050	0.00020
Batch number: 190961404401	Sample number(s): 1026602-1026603		
Barium	N.D.	0.0010	0.0050
Boron	N.D.	0.0120	0.0500
Calcium	N.D.	0.0330	0.500
Chromium	N.D.	0.0053	0.0150
Cobalt	N.D.	0.0015	0.0050
Lithium	N.D.	0.0110	0.0500
Selenium	N.D.	0.0210	0.0500
Thallium	N.D.	0.0140	0.0300
Batch number: 190961404704A	Sample number(s): 1026600-1026606		
Antimony	N.D.	0.00041	0.0020
Arsenic	N.D.	0.00068	0.0020
Beryllium	N.D.	0.000091	0.00050
Cadmium	N.D.	0.00015	0.0010
Lead	N.D.	0.0011	0.0030
Molybdenum	N.D.	0.00031	0.0020
Batch number: 190980571302	Sample number(s): 1026600-1026603		
Mercury	N.D.	0.000050	0.00020
Batch number: 19110963117B	Sample number(s): 1026600,1026603-1026606		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10
Sulfate	N.D.	0.30	1.0
Batch number: 19112520109A	Sample number(s): 1026601-1026602		
Chloride	N.D.	0.20	0.40
Fluoride	N.D.	0.050	0.10

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: WCD Group
Reported: 05/02/2019 18:22

Group Number: 2037302

Method Blank (continued)

Analysis Name	Result	MDL**	LOQ
	mg/l	mg/l	mg/l
Sulfate	N.D.	0.30	1.0
Batch number: 19095921201B	Sample number(s): 1026600		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19095921202A	Sample number(s): 1026602		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19095921202B	Sample number(s): 1026601		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19095921203A	Sample number(s): 1026603,1026605-1026606		
Total Dissolved Solids	N.D.	20.0	60.0
Batch number: 19095921203B	Sample number(s): 1026604		
Total Dissolved Solids	N.D.	20.0	60.0

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 190951404407	Sample number(s): 1026600-1026601,1026604-1026606								
Barium	2.00	2.02			101		80-120		
Boron	2.00	1.88			94		80-120		
Calcium	4.00	4.18			104		80-120		
Chromium	0.200	0.204			102		80-120		
Cobalt	0.500	0.525			105		80-120		
Lithium	1.00	1.02			102		80-120		
Selenium	0.150	0.153			102		80-120		
Thallium	0.150	0.156			104		80-120		
Batch number: 190960571303	Sample number(s): 1026604-1026606								
Mercury	0.00100	0.000896			90		80-120		
Batch number: 190961404401	Sample number(s): 1026602-1026603								
Barium	2.00	2.07			103		80-120		
Boron	2.00	1.96			98		80-120		
Calcium	4.00	4.03			101		80-120		
Chromium	0.200	0.201			101		80-120		
Cobalt	0.500	0.509			102		80-120		
Lithium	1.00	1.00			100		80-120		
Selenium	0.150	0.146			98		80-120		
Thallium	0.150	0.164			109		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: WCD Group
Reported: 05/02/2019 18:22

Group Number: 2037302

LCS/LCSD (continued)

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 190961404704A	Sample number(s): 1026600-1026606								
Antimony	0.00600	0.00644			107		80-120		
Arsenic	0.0100	0.0107			107		80-120		
Beryllium	0.00400	0.00431			108		80-120		
Cadmium	0.00500	0.00530			106		80-120		
Lead	0.0150	0.0160			107		80-120		
Molybdenum	0.0500	0.0532			106		80-120		
Batch number: 190980571302	Sample number(s): 1026600-1026603								
Mercury	0.00100	0.000916			92		80-120		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 19110963117B	Sample number(s): 1026600,1026603-1026606								
Chloride	3.00	2.85			95		90-110		
Fluoride	0.750	0.730			97		90-110		
Sulfate	7.50	7.31			97		90-110		
Batch number: 19112520109A	Sample number(s): 1026601-1026602								
Chloride	3.00	2.77			92		90-110		
Fluoride	0.750	0.732			98		90-110		
Sulfate	7.50	7.16			95		90-110		
	mg/l	**mg/l**	**mg/l**	**mg/l**					
Batch number: 19095921201B	Sample number(s): 1026600								
Total Dissolved Solids	200	199			100		62-127		
Batch number: 19095921202A	Sample number(s): 1026602								
Total Dissolved Solids	200	204			102		62-127		
Batch number: 19095921202B	Sample number(s): 1026601								
Total Dissolved Solids	200	204			102		62-127		
Batch number: 19095921203A	Sample number(s): 1026603,1026605-1026606								
Total Dissolved Solids	200	199			100		62-127		
Batch number: 19095921203B	Sample number(s): 1026604								
Total Dissolved Solids	200	199			100		62-127		
	Std. Units	**Std. Units**	**Std. Units**	**Std. Units**					
Batch number: 19095003201A	Sample number(s): 1026601-1026603,1026605								
pH	7.00	6.94			99		95-105		
Batch number: 19095003202A	Sample number(s): 1026600,1026604,1026606								
pH	7.00	6.99			100		95-105		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Quality Control Summary

Client Name: WCD Group
Reported: 05/02/2019 18:22

Group Number: 2037302

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc mg/l	DUP Conc mg/l	DUP RPD	DUP RPD Max
Batch number: 19095921201B	Sample number(s): 1026600 BKG: 1026600			
Total Dissolved Solids	597	599	0 (1)	5
Batch number: 19095921202B	Sample number(s): 1026601 BKG: 1026601			
Total Dissolved Solids	1322	1260	5	5
Batch number: 19095921203B	Sample number(s): 1026604 BKG: 1026604			
Total Dissolved Solids	211	205	3 (1)	5

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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Acct. # 44064 | For Eurofins Lancaster Laboratories Environmental use only: Group # 203732 Sample # 102622-06

COC # 574619

Client Information

Client: WCD Group	Acct. #:
Project Name/#: Former PSEG Mercer	PWSID #:
Project Manager: Scott McDonald	P.O. #:
Sampler: Tristan Morgan & Fabio Fanucci	Quote #:
State where samples were collected: NJ	For Compliance: Yes ☐ No ☐

Matrix: Soil ☐ Sediment ☐ Tissue ☐ | Water ☒ Potable ☐ Ground ☒ NPDES ☐ Surface ☐ | Other: ____

Total # of Containers: 49

Analysis Requested — Preservation and Filtration Codes

For Lab Use Only
FSC: ____
SCR#: 240880

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 P=H_3PO_4
F=Field Filtered O=Other

Sample Identification	Collected Date	Collected Time	Grab	Composite	Dissolved Metals	Dissolved Hg	Chloride	Fluoride	Sulfate	pH	TDS	Radium 226, Radium 228	Remarks
MW-2	4/3/19	925	X		X	X	X	X	X	X	X	X	Metals: Ba, B, Ca, Cr, Co, Li, Se, Tl, Sb, As, Be, Cd, Pb, Mo, Hg
MW-1	4/3/19	1020	X		X	X	X	X	X	X	X	X	
MW-5	4/3/19	1115	X		X	X	X	X	X	X	X	X	
MW-6	4/3/19	1305	X		X	X	X	X	X	X	X	X	
MW-3	4/3/19	1455	X		X	X	X	X	X	X	X	X	Lab to Filter
FB-01	4/3/19	1420	X			X	X	X	X	X	X	X	
MW-4	4/3/19	1245	X		X	X	X	X	X	X	X	X	

Report to follow previous

Turnaround Time (TAT) Requested (please circle)
~~Standard~~ Rush
(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days: ____

E-mail address: SMcdonald@WCDgroup.com 609-730-6007

Data Package Options (circle if required)
Type I (EPA Level 3 Equivalent/non-CLP) | Type VI (Raw Data Only)
Type III (Reduced non-CLP) | NJ DKQP | TX TRRP-13
NYSDEC Category A or B | MA MCP | CT RCP

Relinquished by	Date	Time	Received by	Date	Time
	4/3/19	17:34		4/3/19	17:36
	4/4/19	12:16		4/4/19	12:16
	4/4/19	19:00			
				4.4.19	1900

EDD Required? Yes No
If yes, format: ____

Site-Specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:
UPS ____ FedEx ____ Other ____

Temperature upon receipt 1.2 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 245535

Group Number(s): 2037302

Client: WCD Group

Former SPEG Mercer

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	04/04/2019 19:00
Number of Packages:	2	Number of Projects:	1
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Darian Jaynes (29952) at 21:26 on 04/04/2019

Samples Chilled Details: Former SPEG Mercer

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.2	DT	Wet	Y	Loose	N
2	DT42-02	0.6	DT	Wet	Y	Loose	N

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Lancaster, PA 17605-2425
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F | 717-656-2681
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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

APPENDIX C

Normality Testing

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Coefficient of Variation Normality Test

Constituent: Antimony, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-2 (n = 8)				
	no	0.5694	1	Yes
	square root	0.3129	1	Yes
	square	0.8776	1	Yes
	cube root	0.2133	1	Yes
	cube	1.001	1	No
	natural log	-0.09661	1	Yes
	x^4	1.045	1	No
	x^5	1.06	1	No
	x^6	1.066	1	No
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-6 (n = 8)				
	no	0.3004	1	Yes
	square root	0.1603	1	Yes
	square	0.5145	1	Yes
	cube root	0.1089	1	Yes
	cube	0.6501	1	Yes
	natural log	-0.05231	1	Yes
	x^4	0.7296	1	Yes
	x^5	0.7744	1	Yes
	x^6	0.799	1	Yes
Pooled Background (bg) (n = 16)				
	no	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Antimony, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	3.2e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	4.3e-16	1	Yes
	natural log	-3.0e-16	1	Yes
	x^4	0	1	Yes
	x^5	4.1e-16	1	Yes
	x^6	2.0e-16	1	Yes

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Coefficient of Variation Normality Test

Constituent: Arsenic, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-2 (n = 8)				
	no	0.3599	1	Yes
	square root	0.2112	1	Yes
	square	0.5721	1	Yes
	cube root	0.1494	1	Yes
	cube	0.7475	1	Yes
	natural log	-0.08486	1	Yes
	x^4	0.9103	1	Yes
	x^5	1.061	1	No
	x^6	1.197	1	No
MW-3 (bg) (n = 8)				
	no	0.7468	1	Yes
	square root	0.3519	1	Yes
	square	1.423	1	No
	cube root	0.2273	1	Yes
	cube	1.791	1	No
	natural log	-0.105	1	Yes
	x^4	1.97	1	No
	x^5	2.082	1	No
	x^6	2.172	1	No
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-5 (n = 8)				
	no	0.2252	1	Yes
	square root	0.1332	1	Yes
	square	0.3283	1	Yes
	cube root	0.09392	1	Yes
	cube	0.3725	1	Yes
	natural log	-0.04983	1	Yes
	x^4	0.3911	1	Yes
	x^5	0.3987	1	Yes
	x^6	0.4019	1	Yes
MW-6 (n = 8)				
	no	0.2293	1	Yes
	square root	0.1362	1	Yes
	square	0.3318	1	Yes
	cube root	0.09622	1	Yes
	cube	0.3748	1	Yes
	natural log	-0.05119	1	Yes
	x^4	0.3923	1	Yes
	x^5	0.3993	1	Yes
	x^6	0.4022	1	Yes
Pooled Background (bg) (n = 16)				
	no	0.6461	1	Yes

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Coefficient of Variation Normality Test

Constituent: Arsenic, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.2701	1	Yes
	square	1.598	1	No
	cube root	0.1687	1	Yes
	cube	2.37	1	No
	natural log	-0.07268	1	Yes
	x^4	2.782	1	No
	x^5	2.994	1	No
	x^6	3.132	1	No

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Coefficient of Variation Normality Test

Constituent: Barium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.289	1	Yes
	square root	0.1738	1	Yes
	square	0.4223	1	Yes
	cube root	0.1235	1	Yes
	cube	0.5013	1	Yes
	natural log	-0.227	1	Yes
	x^4	0.5634	1	Yes
	x^5	0.6198	1	Yes
	x^6	0.6738	1	Yes
MW-2 (n = 8)				
	no	1.092	1	No
	square root	0.6275	1	Yes
	square	1.759	1	No
	cube root	0.4335	1	Yes
	cube	2.252	1	No
	natural log	-0.5207	1	Yes
	x^4	2.55	1	No
	x^5	2.702	1	No
	x^6	2.772	1	No
MW-3 (bg) (n = 8)				
	no	0.2799	1	Yes
	square root	0.1422	1	Yes
	square	0.5381	1	Yes
	cube root	0.09522	1	Yes
	cube	0.7691	1	Yes
	natural log	-0.1651	1	Yes
	x^4	0.9708	1	Yes
	x^5	1.143	1	No
	x^6	1.287	1	No
MW-4 (bg) (n = 8)				
	no	0.4038	1	Yes
	square root	0.2037	1	Yes
	square	0.7807	1	Yes
	cube root	0.1361	1	Yes
	cube	1.108	1	No
	natural log	-0.0897	1	Yes
	x^4	1.372	1	No
	x^5	1.576	1	No
	x^6	1.731	1	No
MW-5 (n = 8)				
	no	0.04996	1	Yes
	square root	0.02473	1	Yes
	square	0.1019	1	Yes
	cube root	0.01643	1	Yes
	cube	0.1558	1	Yes
	natural log	-0.03096	1	Yes
	x^4	0.2117	1	Yes
	x^5	0.2696	1	Yes
	x^6	0.3294	1	Yes
MW-6 (n = 8)				
	no	0.4222	1	Yes
	square root	0.2274	1	Yes
	square	0.713	1	Yes
	cube root	0.1549	1	Yes
	cube	0.9107	1	Yes
	natural log	-0.2537	1	Yes
	x^4	1.062	1	No
	x^5	1.192	1	No
	x^6	1.313	1	No
Pooled Background (bg) (n = 16)				
	no	0.9814	1	Yes

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Coefficient of Variation Normality Test

Constituent: Barium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.6457	1	Yes
	square	1.259	1	No
	cube root	0.4632	1	Yes
	cube	1.473	1	No
	natural log	-0.4742	1	Yes
	x^4	1.681	1	No
	x^5	1.872	1	No
	x^6	2.039	1	No

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Coefficient of Variation Normality Test

Constituent: Beryllium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-2 (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-4 (bg) (n = 8)				
	no	0.2129	1	Yes
	square root	0.1243	1	Yes
	square	0.3171	1	Yes
	cube root	0.08726	1	Yes
	cube	0.3652	1	Yes
	natural log	-0.03768	1	Yes
	x^4	0.3868	1	Yes
	x^5	0.3965	1	Yes
	x^6	0.4007	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-6 (n = 8)				
	no	0	1	Yes
	square root	1.7e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
Pooled Background (bg) (n = 16)				
	no	0.1451	1	Yes

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Coefficient of Variation Normality Test

Constituent: Beryllium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.08598	1	Yes
	square	0.2123	1	Yes
	cube root	0.06076	1	Yes
	cube	0.2426	1	Yes
	natural log	-0.02682	1	Yes
	x^4	0.256	1	Yes
	x^5	0.262	1	Yes
	x^6	0.2646	1	Yes

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Coefficient of Variation Normality Test

Constituent: Boron, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.3775	1	Yes
	square root	0.1839	1	Yes
	square	0.7671	1	Yes
	cube root	0.1213	1	Yes
	cube	1.119	1	No
	natural log	0.9997	1	Yes
	x^4	1.407	1	No
	x^5	1.631	1	No
	x^6	1.803	1	No
MW-2 (n = 8)				
	no	0.9418	1	Yes
	square root	0.6099	1	Yes
	square	1.249	1	No
	cube root	0.4403	1	Yes
	cube	1.43	1	No
	natural log	-0.9412	1	Yes
	x^4	1.568	1	No
	x^5	1.677	1	No
	x^6	1.766	1	No
MW-3 (bg) (n = 8)				
	no	0.3392	1	Yes
	square root	0.1871	1	Yes
	square	0.5532	1	Yes
	cube root	0.1286	1	Yes
	cube	0.6852	1	Yes
	natural log	-0.2558	1	Yes
	x^4	0.773	1	Yes
	x^5	0.8383	1	Yes
	x^6	0.892	1	Yes
MW-4 (bg) (n = 8)				
	no	1.331	1	No
	square root	0.7008	1	Yes
	square	1.786	1	No
	cube root	0.453	1	Yes
	cube	1.844	1	No
	natural log	-0.3789	1	Yes
	x^4	1.851	1	No
	x^5	1.852	1	No
	x^6	1.852	1	No
MW-5 (n = 8)				
	no	0.05628	1	Yes
	square root	0.02826	1	Yes
	square	0.1116	1	Yes
	cube root	0.01886	1	Yes
	cube	0.1659	1	Yes
	natural log	-0.06402	1	Yes
	x^4	0.219	1	Yes
	x^5	0.271	1	Yes
	x^6	0.3219	1	Yes
MW-6 (n = 8)				
	no	0.3214	1	Yes
	square root	0.1676	1	Yes
	square	0.5891	1	Yes
	cube root	0.1132	1	Yes
	cube	0.8125	1	Yes
	natural log	-0.1913	1	Yes
	x^4	1.003	1	No
	x^5	1.169	1	No
	x^6	1.315	1	No
Pooled Background (bg) (n = 16)				
	no	0.7584	1	Yes

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Coefficient of Variation Normality Test

Constituent: Boron, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.4853	1	Yes
	square	0.9831	1	Yes
	cube root	0.3487	1	Yes
	cube	1.078	1	No
	natural log	-0.4955	1	Yes
	x^4	1.137	1	No
	x^5	1.18	1	No
	x^6	1.216	1	No

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Coefficient of Variation Normality Test

Constituent: Cadmium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.4318	1	Yes
	square root	0.2703	1	Yes
	square	0.5674	1	Yes
	cube root	0.1938	1	Yes
	cube	0.604	1	Yes
	natural log	-0.09175	1	Yes
	x^4	0.6137	1	Yes
	x^5	0.6162	1	Yes
	x^6	0.6169	1	Yes
MW-2 (n = 8)				
	no	0.3592	1	Yes
	square root	0.2134	1	Yes
	square	0.5147	1	Yes
	cube root	0.1505	1	Yes
	cube	0.5765	1	Yes
	natural log	-0.07016	1	Yes
	x^4	0.6008	1	Yes
	x^5	0.6105	1	Yes
	x^6	0.6144	1	Yes
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	1.5e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	1.5e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	1.5e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-6 (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	1.5e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
Pooled Background (bg) (n = 16)				
	no	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Cadmium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0	1	Yes
	square	0	1	Yes
	cube root	1.4e-16	1	Yes
	cube	4.3e-16	1	Yes
	natural log	-1.3e-16	1	Yes
	x^4	0	1	Yes
	x^5	4.1e-16	1	Yes
	x^6	2.0e-16	1	Yes

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Coefficient of Variation Normality Test

Constituent: Calcium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.2094	1	Yes
	square root	0.1055	1	Yes
	square	0.4054	1	Yes
	cube root	0.07045	1	Yes
	cube	0.5776	1	Yes
	natural log	0.03827	1	Yes
	x^4	0.7209	1	Yes
	x^5	0.8355	1	Yes
	x^6	0.9247	1	Yes
MW-2 (n = 8)				
	no	0.5893	1	Yes
	square root	0.3175	1	Yes
	square	0.9585	1	Yes
	cube root	0.2154	1	Yes
	cube	1.158	1	No
	natural log	0.1656	1	Yes
	x^4	1.277	1	No
	x^5	1.358	1	No
	x^6	1.423	1	No
MW-3 (bg) (n = 8)				
	no	0.2788	1	Yes
	square root	0.1422	1	Yes
	square	0.5348	1	Yes
	cube root	0.09542	1	Yes
	cube	0.7701	1	Yes
	natural log	0.07532	1	Yes
	x^4	0.9873	1	Yes
	x^5	1.188	1	No
	x^6	1.371	1	No
MW-4 (bg) (n = 8)				
	no	0.2996	1	Yes
	square root	0.1499	1	Yes
	square	0.593	1	Yes
	cube root	0.09987	1	Yes
	cube	0.8733	1	Yes
	natural log	0.2194	1	Yes
	x^4	1.137	1	No
	x^5	1.382	1	No
	x^6	1.604	1	No
MW-5 (n = 8)				
	no	0.0777	1	Yes
	square root	0.03847	1	Yes
	square	0.1586	1	Yes
	cube root	0.02556	1	Yes
	cube	0.2429	1	Yes
	natural log	0.01652	1	Yes
	x^4	0.3306	1	Yes
	x^5	0.4218	1	Yes
	x^6	0.5163	1	Yes
MW-6 (n = 8)				
	no	0.09336	1	Yes
	square root	0.04686	1	Yes
	square	0.1854	1	Yes
	cube root	0.03128	1	Yes
	cube	0.2765	1	Yes
	natural log	0.02643	1	Yes
	x^4	0.3668	1	Yes
	x^5	0.4564	1	Yes
	x^6	0.5453	1	Yes
Pooled Background (bg) (n = 16)				
	no	0.942	1	Yes

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Coefficient of Variation Normality Test

Constituent: Calcium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.5912	1	Yes
	square	1.25	1	No
	cube root	0.4168	1	Yes
	cube	1.473	1	No
	natural log	0.5047	1	Yes
	x^4	1.699	1	No
	x^5	1.923	1	No
	x^6	2.139	1	No

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Coefficient of Variation Normality Test

Constituent: Chloride Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.3242	1	Yes
	square root	0.1763	1	Yes
	square	0.5487	1	Yes
	cube root	0.1208	1	Yes
	cube	0.7039	1	Yes
	natural log	0.0805	1	Yes
	x^4	0.8147	1	Yes
	x^5	0.8979	1	Yes
	x^6	0.9643	1	Yes
MW-2 (n = 8)				
	no	1.043	1	No
	square root	0.7979	1	Yes
	square	1.145	1	No
	cube root	0.6042	1	Yes
	cube	1.224	1	No
	natural log	0.7804	1	Yes
	x^4	1.311	1	No
	x^5	1.398	1	No
	x^6	1.48	1	No
MW-3 (bg) (n = 8)				
	no	0.8512	1	Yes
	square root	0.4884	1	Yes
	square	1.331	1	No
	cube root	0.3424	1	Yes
	cube	1.631	1	No
	natural log	0.2563	1	Yes
	x^4	1.857	1	No
	x^5	2.045	1	No
	x^6	2.204	1	No
MW-4 (bg) (n = 8)				
	no	0.4438	1	Yes
	square root	0.2175	1	Yes
	square	0.8872	1	Yes
	cube root	0.1437	1	Yes
	cube	1.261	1	No
	natural log	0.6378	1	Yes
	x^4	1.536	1	No
	x^5	1.726	1	No
	x^6	1.856	1	No
MW-5 (n = 8)				
	no	0.09624	1	Yes
	square root	0.04839	1	Yes
	square	0.1904	1	Yes
	cube root	0.03232	1	Yes
	cube	0.2828	1	Yes
	natural log	0.02109	1	Yes
	x^4	0.3733	1	Yes
	x^5	0.462	1	Yes
	x^6	0.5488	1	Yes
MW-6 (n = 8)				
	no	0.6919	1	Yes
	square root	0.3878	1	Yes
	square	1.058	1	No
	cube root	0.2667	1	Yes
	cube	1.233	1	No
	natural log	0.1827	1	Yes
	x^4	1.331	1	No
	x^5	1.397	1	No
	x^6	1.451	1	No
Pooled Background (bg) (n = 16)				
	no	1.521	1	No

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Coefficient of Variation Normality Test

Constituent: Chloride Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.9851	1	Yes
	square	2.091	1	No
	cube root	0.7034	1	Yes
	cube	2.456	1	No
	natural log	0.8326	1	Yes
	x^4	2.739	1	No
	x^5	2.979	1	No
	x^6	3.183	1	No

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Coefficient of Variation Normality Test

Constituent: Chromium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	1.2e-16	1	Yes
	square	0	1	Yes
	cube root	2.4e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-2 (n = 8)				
	no	0	1	Yes
	square root	1.2e-16	1	Yes
	square	0	1	Yes
	cube root	2.4e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.2e-16	1	Yes
	square	0	1	Yes
	cube root	2.4e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.2e-16	1	Yes
	square	0	1	Yes
	cube root	2.4e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	1.2e-16	1	Yes
	square	0	1	Yes
	cube root	2.4e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-6 (n = 8)				
	no	0	1	Yes
	square root	1.2e-16	1	Yes
	square	0	1	Yes
	cube root	2.4e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
Pooled Background (bg) (n = 16)				
	no	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Chromium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	2.3e-16	1	Yes
	square	0	1	Yes
	cube root	3.5e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	1.4e-16	1	Yes
	x^6	1.5e-16	1	Yes

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Coefficient of Variation Normality Test

Constituent: Cobalt, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.5883	1	Yes
	square root	0.2474	1	Yes
	square	1.457	1	No
	cube root	0.1548	1	Yes
	cube	2.201	1	No
	natural log	-0.07848	1	Yes
	x^4	2.591	1	No
	x^5	2.746	1	No
	x^6	2.801	1	No
MW-2 (n = 8)				
	no	0.2501	1	Yes
	square root	0.1178	1	Yes
	square	0.5516	1	Yes
	cube root	0.07692	1	Yes
	cube	0.8819	1	Yes
	natural log	-0.04262	1	Yes
	x^4	1.209	1	No
	x^5	1.504	1	No
	x^6	1.753	1	No
MW-3 (bg) (n = 8)				
	no	1.07	1	No
	square root	0.4383	1	Yes
	square	2.256	1	No
	cube root	0.2688	1	Yes
	cube	2.705	1	No
	natural log	-0.13	1	Yes
	x^4	2.805	1	No
	x^5	2.824	1	No
	x^6	2.828	1	No
MW-4 (bg) (n = 8)				
	no	0.4541	1	Yes
	square root	0.2426	1	Yes
	square	0.7568	1	Yes
	cube root	0.1645	1	Yes
	cube	0.9207	1	Yes
	natural log	-0.08797	1	Yes
	x^4	1	1	No
	x^5	1.037	1	No
	x^6	1.054	1	No
MW-5 (n = 8)				
	no	0	1	Yes
	square root	2.1e-16	1	Yes
	square	0	1	Yes
	cube root	1.7e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-6 (n = 8)				
	no	0.385	1	Yes
	square root	0.2011	1	Yes
	square	0.6742	1	Yes
	cube root	0.1354	1	Yes
	cube	0.8557	1	Yes
	natural log	-0.07259	1	Yes
	x^4	0.9575	1	Yes
	x^5	1.011	1	No
	x^6	1.039	1	No
Pooled Background (bg) (n = 16)				
	no	1.061	1	No

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Coefficient of Variation Normality Test

Constituent: Cobalt, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.4029	1	Yes
	square	2.81	1	No
	cube root	0.2463	1	Yes
	cube	3.721	1	No
	natural log	-0.117	1	Yes
	x^4	3.945	1	No
	x^5	3.99	1	No
	x^6	3.998	1	No

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Coefficient of Variation Normality Test

Constituent: Fluoride Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.07998	1	Yes
	square root	0.04192	1	Yes
	square	0.1456	1	Yes
	cube root	0.02838	1	Yes
	cube	0.1988	1	Yes
	natural log	-0.1213	1	Yes
	x^4	0.2417	1	Yes
	x^5	0.276	1	Yes
	x^6	0.3033	1	Yes
MW-2 (n = 8)				
	no	0.1497	1	Yes
	square root	0.0723	1	Yes
	square	0.3181	1	Yes
	cube root	0.04762	1	Yes
	cube	0.5003	1	Yes
	natural log	-0.2254	1	Yes
	x^4	0.6891	1	Yes
	x^5	0.8765	1	Yes
	x^6	1.055	1	No
MW-3 (bg) (n = 8)				
	no	0.1915	1	Yes
	square root	0.09476	1	Yes
	square	0.3992	1	Yes
	cube root	0.06306	1	Yes
	cube	0.6336	1	Yes
	natural log	-0.2724	1	Yes
	x^4	0.8953	1	Yes
	x^5	1.175	1	No
	x^6	1.457	1	No
MW-4 (bg) (n = 8)				
	no	0.1088	1	Yes
	square root	0.05169	1	Yes
	square	0.2402	1	Yes
	cube root	0.03387	1	Yes
	cube	0.3954	1	Yes
	natural log	-0.1491	1	Yes
	x^4	0.5738	1	Yes
	x^5	0.7728	1	Yes
	x^6	0.9873	1	Yes
MW-5 (n = 8)				
	no	0.1742	1	Yes
	square root	0.0856	1	Yes
	square	0.36	1	Yes
	cube root	0.05674	1	Yes
	cube	0.5558	1	Yes
	natural log	-0.2706	1	Yes
	x^4	0.7576	1	Yes
	x^5	0.9605	1	Yes
	x^6	1.159	1	No
MW-6 (n = 8)				
	no	0.1153	1	Yes
	square root	0.05464	1	Yes
	square	0.2558	1	Yes
	cube root	0.03577	1	Yes
	cube	0.4228	1	Yes
	natural log	-0.1576	1	Yes
	x^4	0.6153	1	Yes
	x^5	0.8296	1	Yes
	x^6	1.059	1	No
Pooled Background (bg) (n = 16)				
	no	0.1501	1	Yes

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Coefficient of Variation Normality Test

Constituent: Fluoride Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.07384	1	Yes
	square	0.3166	1	Yes
	cube root	0.04906	1	Yes
	cube	0.5091	1	Yes
	natural log	-0.2169	1	Yes
	x^4	0.7307	1	Yes
	x^5	0.9778	1	Yes
	x^6	1.242	1	No

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Coefficient of Variation Normality Test

Constituent: Lead, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.7e-16	1	Yes
	x^5	0	1	Yes
	x^6	1.4e-16	1	Yes
MW-2 (n = 8)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.7e-16	1	Yes
	x^5	0	1	Yes
	x^6	1.4e-16	1	Yes
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.7e-16	1	Yes
	x^5	0	1	Yes
	x^6	1.4e-16	1	Yes
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.7e-16	1	Yes
	x^5	0	1	Yes
	x^6	1.4e-16	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.7e-16	1	Yes
	x^5	0	1	Yes
	x^6	1.4e-16	1	Yes
MW-6 (n = 8)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.7e-16	1	Yes
	x^5	0	1	Yes
	x^6	1.4e-16	1	Yes
Pooled Background (bg) (n = 16)				
	no	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Lead, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	2.6e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	3.8e-16	1	Yes
	natural log	-3.2e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	1.4e-16	1	Yes

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Coefficient of Variation Normality Test

Constituent: Lithium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.3285	1	Yes
	square root	0.1859	1	Yes
	square	0.522	1	Yes
	cube root	0.1292	1	Yes
	cube	0.6387	1	Yes
	natural log	-0.1291	1	Yes
	x^4	0.7108	1	Yes
	x^5	0.7556	1	Yes
	x^6	0.7834	1	Yes
MW-2 (n = 8)				
	no	0.2707	1	Yes
	square root	0.1324	1	Yes
	square	0.5535	1	Yes
	cube root	0.08748	1	Yes
	cube	0.8252	1	Yes
	natural log	-0.09239	1	Yes
	x^4	1.069	1	No
	x^5	1.277	1	No
	x^6	1.452	1	No
MW-3 (bg) (n = 8)				
	no	0.383	1	Yes
	square root	0.2028	1	Yes
	square	0.6761	1	Yes
	cube root	0.1377	1	Yes
	cube	0.8897	1	Yes
	natural log	-0.1251	1	Yes
	x^4	1.041	1	No
	x^5	1.146	1	No
	x^6	1.219	1	No
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-6 (n = 8)				
	no	0.2712	1	Yes
	square root	0.1695	1	Yes
	square	0.363	1	Yes
	cube root	0.1219	1	Yes
	cube	0.3916	1	Yes
	natural log	-0.1353	1	Yes
	x^4	0.4003	1	Yes
	x^5	0.4029	1	Yes
	x^6	0.4037	1	Yes
Pooled Background (bg) (n = 16)				
	no	0.2798	1	Yes

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Coefficient of Variation Normality Test

Constituent: Lithium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.1593	1	Yes
	square	0.4401	1	Yes
	cube root	0.1109	1	Yes
	cube	0.5338	1	Yes
	natural log	-0.1135	1	Yes
	x^4	0.5907	1	Yes
	x^5	0.6264	1	Yes
	x^6	0.6495	1	Yes

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Coefficient of Variation Normality Test

Constituent: Mercury, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.3e-16	1	Yes
	x^5	1.6e-16	1	Yes
	x^6	0	1	Yes
MW-2 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.3e-16	1	Yes
	x^5	1.6e-16	1	Yes
	x^6	0	1	Yes
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.3e-16	1	Yes
	x^5	1.6e-16	1	Yes
	x^6	0	1	Yes
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.3e-16	1	Yes
	x^5	1.6e-16	1	Yes
	x^6	0	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.3e-16	1	Yes
	x^5	1.6e-16	1	Yes
	x^6	0	1	Yes
MW-6 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	1.3e-16	1	Yes
	x^5	1.6e-16	1	Yes
	x^6	0	1	Yes
Pooled Background (bg) (n = 16)				
	no	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Mercury, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	2.5e-16	1	Yes
	square	0	1	Yes
	cube root	3.7e-16	1	Yes
	cube	2.1e-16	1	Yes
	natural log	0	1	Yes
	x^4	2.5e-16	1	Yes
	x^5	1.6e-16	1	Yes
	x^6	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Molybdenum, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	1.232	1	No
	square root	0.66	1	Yes
	square	1.738	1	No
	cube root	0.4353	1	Yes
	cube	1.865	1	No
	natural log	-0.2668	1	Yes
	x^4	1.915	1	No
	x^5	1.956	1	No
	x^6	1.998	1	No
MW-2 (n = 8)				
	no	1.115	1	No
	square root	0.6606	1	Yes
	square	1.633	1	No
	cube root	0.4587	1	Yes
	cube	1.99	1	No
	natural log	-0.3291	1	Yes
	x^4	2.263	1	No
	x^5	2.459	1	No
	x^6	2.593	1	No
MW-3 (bg) (n = 8)				
	no	0.4666	1	Yes
	square root	0.2453	1	Yes
	square	0.8764	1	Yes
	cube root	0.1671	1	Yes
	cube	1.233	1	No
	natural log	-0.1154	1	Yes
	x^4	1.511	1	No
	x^5	1.713	1	No
	x^6	1.858	1	No
MW-4 (bg) (n = 8)				
	no	0.5291	1	Yes
	square root	0.2963	1	Yes
	square	0.8923	1	Yes
	cube root	0.2055	1	Yes
	cube	1.21	1	No
	natural log	-0.1005	1	Yes
	x^4	1.507	1	No
	x^5	1.775	1	No
	x^6	2.006	1	No
MW-5 (n = 8)				
	no	0.1696	1	Yes
	square root	0.08807	1	Yes
	square	0.3145	1	Yes
	cube root	0.05945	1	Yes
	cube	0.4395	1	Yes
	natural log	-0.04482	1	Yes
	x^4	0.5506	1	Yes
	x^5	0.6538	1	Yes
	x^6	0.7539	1	Yes
MW-6 (n = 8)				
	no	0.93	1	Yes
	square root	0.544	1	Yes
	square	1.282	1	No
	cube root	0.3768	1	Yes
	cube	1.393	1	No
	natural log	-0.2089	1	Yes
	x^4	1.445	1	No
	x^5	1.487	1	No
	x^6	1.53	1	No
Pooled Background (bg) (n = 16)				
	no	0.9686	1	Yes

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Coefficient of Variation Normality Test

Constituent: Molybdenum, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.5501	1	Yes
	square	1.538	1	No
	cube root	0.3803	1	Yes
	cube	1.969	1	No
	natural log	-0.2153	1	Yes
	x^4	2.308	1	No
	x^5	2.558	1	No
	x^6	2.741	1	No

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Coefficient of Variation Normality Test

Constituent: Radium-226 Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 7)				
	no	0.554	1	Yes
	square root	0.3701	1	Yes
	square	0.6743	1	Yes
	cube root	0.2713	1	Yes
	cube	0.7104	1	Yes
	natural log	-1.814	1	Yes
	x^4	0.74	1	Yes
	x^5	0.7761	1	Yes
	x^6	0.8206	1	Yes
MW-2 (n = 7)				
	no	0.5709	1	Yes
	square root	0.3078	1	Yes
	square	1.05	1	No
	cube root	0.2111	1	Yes
	cube	1.515	1	No
	natural log	-2.796	1	Yes
	x^4	1.916	1	No
	x^5	2.209	1	No
	x^6	2.398	1	No
MW-3 (bg) (n = 7)				
	no	0.4249	1	Yes
	square root	0.2676	1	Yes
	square	0.6396	1	Yes
	cube root	0.1948	1	Yes
	cube	0.8503	1	Yes
	natural log	-2.972	1	Yes
	x^4	1.075	1	No
	x^5	1.302	1	No
	x^6	1.519	1	No
MW-4 (bg) (n = 7)				
	no	0.264	1	Yes
	square root	0.1586	1	Yes
	square	0.3739	1	Yes
	cube root	0.1124	1	Yes
	cube	0.4161	1	Yes
	natural log	-2.646	1	Yes
	x^4	0.4319	1	Yes
	x^5	0.4376	1	Yes
	x^6	0.4397	1	Yes
MW-5 (n = 7)				
	no	0.4266	1	Yes
	square root	0.221	1	Yes
	square	0.778	1	Yes
	cube root	0.1488	1	Yes
	cube	1.046	1	No
	natural log	-0.8776	1	Yes
	x^4	1.242	1	No
	x^5	1.382	1	No
	x^6	1.481	1	No
MW-6 (n = 7)				
	no	0.4937	1	Yes
	square root	0.3273	1	Yes
	square	0.6863	1	Yes
	cube root	0.2437	1	Yes
	cube	0.8187	1	Yes
	natural log	-1.604	1	Yes
	x^4	0.9144	1	Yes
	x^5	0.9836	1	Yes
	x^6	1.035	1	No
Pooled Background (bg) (n = 14)				
	no	0.3403	1	Yes

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Coefficient of Variation Normality Test

Constituent: Radium-226 Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 14) cont.				
	square root	0.2107	1	Yes
	square	0.5184	1	Yes
	cube root	0.1524	1	Yes
	cube	0.6994	1	Yes
	natural log	-2.866	1	Yes
	x^4	0.9221	1	Yes
	x^5	1.188	1	No
	x^6	1.486	1	No

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Coefficient of Variation Normality Test

Constituent: Radium-228 Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 7)				
	no	0.5566	1	Yes
	square root	0.3725	1	Yes
	square	0.6644	1	Yes
	cube root	0.2726	1	Yes
	cube	0.6804	1	Yes
	natural log	1.8	1	No
	x^4	0.6827	1	Yes
	x^5	0.6831	1	Yes
	x^6	0.6831	1	Yes
MW-2 (n = 7)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	1.7e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-3 (bg) (n = 7)				
	no	0.05794	1	Yes
	square root	0.02983	1	Yes
	square	0.1092	1	Yes
	cube root	0.02008	1	Yes
	cube	0.1544	1	Yes
	natural log	0.05712	1	Yes
	x^4	0.1939	1	Yes
	x^5	0.2284	1	Yes
	x^6	0.2584	1	Yes
MW-4 (bg) (n = 7)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	1.7e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-5 (n = 7)				
	no	0.5009	1	Yes
	square root	0.2818	1	Yes
	square	0.7754	1	Yes
	cube root	0.1946	1	Yes
	cube	0.9156	1	Yes
	natural log	1.073	1	No
	x^4	0.9943	1	Yes
	x^5	1.046	1	No
	x^6	1.084	1	No
MW-6 (n = 7)				
	no	0	1	Yes
	square root	1.4e-16	1	Yes
	square	0	1	Yes
	cube root	1.7e-16	1	Yes
	cube	0	1	Yes
	natural log	0	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
Pooled Background (bg) (n = 14)				
	no	0.04052	1	Yes

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Coefficient of Variation Normality Test

Constituent: Radium-228 Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 14) cont.				
	square root	0.02098	1	Yes
	square	0.07566	1	Yes
	cube root	0.01415	1	Yes
	cube	0.1061	1	Yes
	natural log	0.03996	1	Yes
	x^4	0.1323	1	Yes
	x^5	0.1548	1	Yes
	x^6	0.1742	1	Yes

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Coefficient of Variation Normality Test

Constituent: Selenium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-2 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
MW-6 (n = 8)				
	no	0	1	Yes
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	0	1	Yes
	natural log	-1.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	0	1	Yes
	x^6	0	1	Yes
Pooled Background (bg) (n = 16)				
	no	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Selenium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	1.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.6e-16	1	Yes
	cube	2.2e-16	1	Yes
	natural log	-1.5e-16	1	Yes
	x^4	0	1	Yes
	x^5	3.5e-16	1	Yes
	x^6	2.2e-16	1	Yes

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Coefficient of Variation Normality Test

Constituent: Sulfate Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.36	1	Yes
	square root	0.1773	1	Yes
	square	0.7257	1	Yes
	cube root	0.1174	1	Yes
	cube	1.071	1	No
	natural log	0.05746	1	Yes
	x^4	1.383	1	No
	x^5	1.655	1	No
	x^6	1.888	1	No
MW-2 (n = 8)				
	no	0.9876	1	Yes
	square root	0.661	1	Yes
	square	1.236	1	No
	cube root	0.4804	1	Yes
	cube	1.362	1	No
	natural log	0.4634	1	Yes
	x^4	1.457	1	No
	x^5	1.538	1	No
	x^6	1.613	1	No
MW-3 (bg) (n = 8)				
	no	0.369	1	Yes
	square root	0.1988	1	Yes
	square	0.6493	1	Yes
	cube root	0.136	1	Yes
	cube	0.8888	1	Yes
	natural log	0.1581	1	Yes
	x^4	1.112	1	No
	x^5	1.322	1	No
	x^6	1.518	1	No
MW-4 (bg) (n = 8)				
	no	0.2745	1	Yes
	square root	0.1403	1	Yes
	square	0.5281	1	Yes
	cube root	0.09426	1	Yes
	cube	0.7627	1	Yes
	natural log	0.2288	1	Yes
	x^4	0.9748	1	Yes
	x^5	1.16	1	No
	x^6	1.315	1	No
MW-5 (n = 8)				
	no	0.3921	1	Yes
	square root	0.2779	1	Yes
	square	0.5131	1	Yes
	cube root	0.2119	1	Yes
	cube	0.6424	1	Yes
	natural log	0.1932	1	Yes
	x^4	0.7959	1	Yes
	x^5	0.9645	1	Yes
	x^6	1.139	1	No
MW-6 (n = 8)				
	no	0.2867	1	Yes
	square root	0.1696	1	Yes
	square	0.4363	1	Yes
	cube root	0.12	1	Yes
	cube	0.5435	1	Yes
	natural log	0.2207	1	Yes
	x^4	0.6418	1	Yes
	x^5	0.7392	1	Yes
	x^6	0.8362	1	Yes
Pooled Background (bg) (n = 16)				
	no	0.7761	1	Yes

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Coefficient of Variation Normality Test

Constituent: Sulfate Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.4134	1	Yes
	square	1.264	1	No
	cube root	0.278	1	Yes
	cube	1.572	1	No
	natural log	0.4187	1	Yes
	x^4	1.831	1	No
	x^5	2.08	1	No
	x^6	2.317	1	No

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Coefficient of Variation Normality Test

Constituent: Thallium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-2 (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-3 (bg) (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-4 (bg) (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-5 (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
MW-6 (n = 8)				
	no	0	1	Yes
	square root	0	1	Yes
	square	0	1	Yes
	cube root	0	1	Yes
	cube	0	1	Yes
	natural log	-1.4e-16	1	Yes
	x^4	0	1	Yes
	x^5	1.5e-16	1	Yes
	x^6	1.5e-16	1	Yes
Pooled Background (bg) (n = 16)				
	no	0	1	Yes

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Coefficient of Variation Normality Test

Constituent: Thallium, dissolved Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	3.3e-16	1	Yes
	square	0	1	Yes
	cube root	1.8e-16	1	Yes
	cube	0	1	Yes
	natural log	-2.6e-16	1	Yes
	x^4	0	1	Yes
	x^5	1.4e-16	1	Yes
	x^6	1.5e-16	1	Yes

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Coefficient of Variation Normality Test

Constituent: Total Dissolved Solids Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
MW-1 (n = 8)				
	no	0.1432	1	Yes
	square root	0.07088	1	Yes
	square	0.2912	1	Yes
	cube root	0.04708	1	Yes
	cube	0.4416	1	Yes
	natural log	0.0196	1	Yes
	x^4	0.5912	1	Yes
	x^5	0.7371	1	Yes
	x^6	0.8764	1	Yes
MW-2 (n = 8)				
	no	0.7002	1	Yes
	square root	0.3974	1	Yes
	square	1.011	1	No
	cube root	0.2727	1	Yes
	cube	1.128	1	No
	natural log	0.1524	1	Yes
	x^4	1.193	1	No
	x^5	1.244	1	No
	x^6	1.29	1	No
MW-3 (bg) (n = 8)				
	no	0.5145	1	Yes
	square root	0.2659	1	Yes
	square	0.9207	1	Yes
	cube root	0.1783	1	Yes
	cube	1.211	1	No
	natural log	0.09146	1	Yes
	x^4	1.427	1	No
	x^5	1.601	1	No
	x^6	1.751	1	No
MW-4 (bg) (n = 8)				
	no	0.2189	1	Yes
	square root	0.1071	1	Yes
	square	0.4535	1	Yes
	cube root	0.07084	1	Yes
	cube	0.6952	1	Yes
	natural log	0.05839	1	Yes
	x^4	0.9332	1	Yes
	x^5	1.157	1	No
	x^6	1.361	1	No
MW-5 (n = 8)				
	no	0.03338	1	Yes
	square root	0.01675	1	Yes
	square	0.06633	1	Yes
	cube root	0.01118	1	Yes
	cube	0.09881	1	Yes
	natural log	0.005205	1	Yes
	x^4	0.1308	1	Yes
	x^5	0.1623	1	Yes
	x^6	0.1933	1	Yes
MW-6 (n = 8)				
	no	0.3077	1	Yes
	square root	0.1605	1	Yes
	square	0.5587	1	Yes
	cube root	0.1084	1	Yes
	cube	0.7551	1	Yes
	natural log	0.05694	1	Yes
	x^4	0.9082	1	Yes
	x^5	1.031	1	No
	x^6	1.134	1	No
Pooled Background (bg) (n = 16)				
	no	1.075	1	No

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Coefficient of Variation Normality Test

Constituent: Total Dissolved Solids Analysis Run 2/18/2020 11:16 AM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Well	Transformation	Calculated	Critical	Normal
Pooled Background (bg) (n = 16) cont.				
	square root	0.6119	1	Yes
	square	1.612	1	No
	cube root	0.4176	1	Yes
	cube	1.949	1	No
	natural log	0.2638	1	Yes
	x^4	2.206	1	No
	x^5	2.418	1	No
	x^6	2.605	1	No

APPENDIX D
Outlier Testing

Outlier Analysis

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 11/21/2019, 1:35 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	0.0025	0.0009258	unknown	ShapiroWilk
Antimony, dissolved (mg/L)	MW-2	No	n/a	n/a	EPA 1989	0.05	8	0.001559	0.001204	ln(x)	ShapiroWilk
Antimony, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.0025	0.0009258	unknown	ShapiroWilk
Antimony, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.0025	0.0009258	unknown	ShapiroWilk
Antimony, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.0025	0.0009258	unknown	ShapiroWilk
Antimony, dissolved (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	0.002144	0.001228	ln(x)	ShapiroWilk
Arsenic, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	0.0025	0.0009258	unknown	ShapiroWilk
Arsenic, dissolved (mg/L)	MW-2	No	n/a	n/a	Dixon`s	0.05	8	0.002763	0.0009942	normal	ShapiroWilk
Arsenic, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.003	0.002241	unknown	ShapiroWilk
Arsenic, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.0025	0.0009258	unknown	ShapiroWilk
Arsenic, dissolved (mg/L)	MW-5	n/a	n/a	n/a	NP (nrm)	NaN	8	0.002103	0.0008708	unknown	ShapiroWilk
Arsenic, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.00235	0.001099	unknown	ShapiroWilk
Barium, dissolved (mg/L)	**MW-1**	**Yes**	**0.14,0.0569**	**12/6/2018...**	**Dixon`s**	**0.05**	**8**	**0.1654**	**0.04778**	**normal**	**ShapiroWilk**
Barium, dissolved (mg/L)	MW-2	No	n/a	n/a	EPA 1989	0.05	8	0.1502	0.1641	ln(x)	ShapiroWilk
Barium, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.1811	0.0507	normal	ShapiroWilk
Barium, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.01121	0.004528	normal	ShapiroWilk
Barium, dissolved (mg/L)	MW-5	No	n/a	n/a	EPA 1989	0.05	8	0.2058	0.01028	normal	ShapiroWilk
Barium, dissolved (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	0.1642	0.06933	normal	ShapiroWilk
Beryllium, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	0.000625	0.0002315	unknown	ShapiroWilk
Beryllium, dissolved (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	0.000625	0.0002315	unknown	ShapiroWilk
Beryllium, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.000625	0.0002315	unknown	ShapiroWilk
Beryllium, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.00059	0.0002709	unknown	ShapiroWilk
Beryllium, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.000625	0.0002315	unknown	ShapiroWilk
Beryllium, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.000625	0.0002315	unknown	ShapiroWilk
Boron, dissolved (mg/L)	MW-1	No	n/a	n/a	EPA 1989	0.05	8	1.51	0.57	normal	ShapiroWilk
Boron, dissolved (mg/L)	MW-2	No	n/a	n/a	EPA 1989	0.05	8	0.4194	0.395	normal	ShapiroWilk
Boron, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.2159	0.07323	unknown	ShapiroWilk
Boron, dissolved (mg/L)	**MW-4 (bg)**	**Yes**	**0.5**	**8/7/2018**	**Dixon`s**	**0.05**	**8**	**0.08725**	**0.1672**	**normal**	**ShapiroWilk**
Boron, dissolved (mg/L)	MW-5	No	n/a	n/a	EPA 1989	0.05	8	0.4128	0.02323	normal	ShapiroWilk
Boron, dissolved (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	0.1704	0.05477	normal	ShapiroWilk
Cadmium, dissolved (mg/L)	MW-1	No	n/a	n/a	EPA 1989	0.05	8	0.001061	0.000667	normal	ShapiroWilk
Cadmium, dissolved (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	0.000...	0.0005117	unknown	ShapiroWilk
Cadmium, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.00125	0.0004629	unknown	ShapiroWilk
Cadmium, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.00125	0.0004629	unknown	ShapiroWilk
Cadmium, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.00125	0.0004629	unknown	ShapiroWilk
Cadmium, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.00125	0.0004629	unknown	ShapiroWilk
Calcium, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	256.4	53.68	unknown	ShapiroWilk
Calcium, dissolved (mg/L)	MW-2	No	n/a	n/a	EPA 1989	0.05	8	64.45	37.98	normal	ShapiroWilk
Calcium, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	48.54	13.53	normal	ShapiroWilk
Calcium, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	0.05	8	4.059	1.216	normal	ShapiroWilk
Calcium, dissolved (mg/L)	MW-5	No	n/a	n/a	EPA 1989	0.05	8	100.9	7.84	normal	ShapiroWilk
Calcium, dissolved (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	35.35	3.3	normal	ShapiroWilk
Chloride (mg/L)	MW-1	No	n/a	n/a	EPA 1989	0.05	8	122.7	39.77	normal	ShapiroWilk
Chloride (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	48.83	50.92	unknown	ShapiroWilk
Chloride (mg/L)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	136.3	116	normal	ShapiroWilk
Chloride (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	0.05	8	2.1	0.932	normal	ShapiroWilk
Chloride (mg/L)	MW-5	No	n/a	n/a	EPA 1989	0.05	8	101.4	9.759	normal	ShapiroWilk
Chloride (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	129.5	89.6	normal	ShapiroWilk

Outlier Analysis

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 11/21/2019, 1:35 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Chromium, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.01875	0.006944	unknown	ShapiroWilk
Chromium, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.01875	0.006944	unknown	ShapiroWilk
Chromium, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.01875	0.006944	unknown	ShapiroWilk
Chromium, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.01875	0.006944	unknown	ShapiroWilk
Cobalt, dissolved (mg/L)	MW-1	n/a	n/a	n/a	NP (nrm)	NaN	8	0.007375	0.003889	unknown	ShapiroWilk
Cobalt, dissolved (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	0.00575	0.001438	unknown	ShapiroWilk
Cobalt, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	Dixon`s	0.05	8	0.007787	0.007667	ln(x)	ShapiroWilk
Cobalt, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.003525	0.001601	unknown	ShapiroWilk
Cobalt, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.00625	0.002315	unknown	ShapiroWilk
Cobalt, dissolved (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	0.004937	0.003335	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-1	n/a	n/a	n/a	NP (nrm)	NaN	8	0.4863	0.03889	unknown	ShapiroWilk
Fluoride (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	0.5438	0.08141	unknown	ShapiroWilk
Fluoride (mg/L)	MW-3 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	8	0.5075	0.09721	unknown	ShapiroWilk
Fluoride (mg/L)	MW-4 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	8	0.52	0.05657	unknown	ShapiroWilk
Fluoride (mg/L)	MW-5	No	n/a	n/a	EPA 1989	0.05	8	0.5438	0.09471	normal	ShapiroWilk
Fluoride (mg/L)	MW-6	n/a	n/a	n/a	NP (nrm)	NaN	8	0.5213	0.0601	unknown	ShapiroWilk
Lead, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	0.00375	0.001389	unknown	ShapiroWilk
Lead, dissolved (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	0.00375	0.001389	unknown	ShapiroWilk
Lead, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.00375	0.001389	unknown	ShapiroWilk
Lead, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.00375	0.001389	unknown	ShapiroWilk
Lead, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.00375	0.001389	unknown	ShapiroWilk
Lead, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.00375	0.001389	unknown	ShapiroWilk
Lithium, dissolved (mg/L)	MW-1	No	n/a	n/a	EPA 1989	0.05	8	0.05335	0.03126	normal	ShapiroWilk
Lithium, dissolved (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	0.06368	0.01724	unknown	ShapiroWilk
Lithium, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.03538	0.01355	normal	ShapiroWilk
Lithium, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.0625	0.02315	unknown	ShapiroWilk
Lithium, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.0625	0.02315	unknown	ShapiroWilk
Lithium, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.05813	0.02853	unknown	ShapiroWilk
Mercury, dissolved (mg/L)	MW-1	n/a	n/a	n/a	NP (nrm)	NaN	8	0.0002	0	unknown	ShapiroWilk
Mercury, dissolved (mg/L)	MW-2	n/a	n/a	n/a	NP (nrm)	NaN	8	0.0002	0	unknown	ShapiroWilk
Mercury, dissolved (mg/L)	MW-3 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	8	0.0002	0	unknown	ShapiroWilk
Mercury, dissolved (mg/L)	MW-4 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	8	0.0002	0	unknown	ShapiroWilk
Mercury, dissolved (mg/L)	MW-5	n/a	n/a	n/a	NP (nrm)	NaN	8	0.0002	0	unknown	ShapiroWilk
Mercury, dissolved (mg/L)	MW-6	n/a	n/a	n/a	NP (nrm)	NaN	8	0.0002	0	unknown	ShapiroWilk
Molybdenum, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	0.02074	0.02555	unknown	ShapiroWilk
Molybdenum, dissolved (mg/L)	MW-2	No	n/a	n/a	EPA 1989	0.05	8	0.0282	0.03145	ln(x)	ShapiroWilk
Molybdenum, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.01146	0.005349	normal	ShapiroWilk
Molybdenum, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.001564	0.0008274	normal	ShapiroWilk
Molybdenum, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.01719	0.002915	unknown	ShapiroWilk
Molybdenum, dissolved (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	0.005823	0.005415	ln(x)	ShapiroWilk
pH (SU)	MW-1	No	n/a	n/a	EPA 1989	0.05	8	7.5	0.3505	normal	ShapiroWilk
pH (SU)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	7.6	0.4276	unknown	ShapiroWilk
pH (SU)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	7.325	0.4528	normal	ShapiroWilk
pH (SU)	MW-4 (bg)	No	n/a	n/a	EPA 1989	0.05	8	6.675	0.3919	normal	ShapiroWilk
pH (SU)	**MW-5**	**Yes**	**0.3**	**12/6/2018**	**Dixon`s**	**0.05**	**8**	**6.725**	**2.624**	**normal**	**ShapiroWilk**
pH (SU)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	7.325	0.4713	normal	ShapiroWilk
Radium-226 (pCi/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	7	0.7761	0.43	unknown	ShapiroWilk
Radium-226 (pCi/L)	MW-2	No	n/a	n/a	EPA 1989	0.05	7	0.9316	0.5319	normal	ShapiroWilk

Outlier Analysis

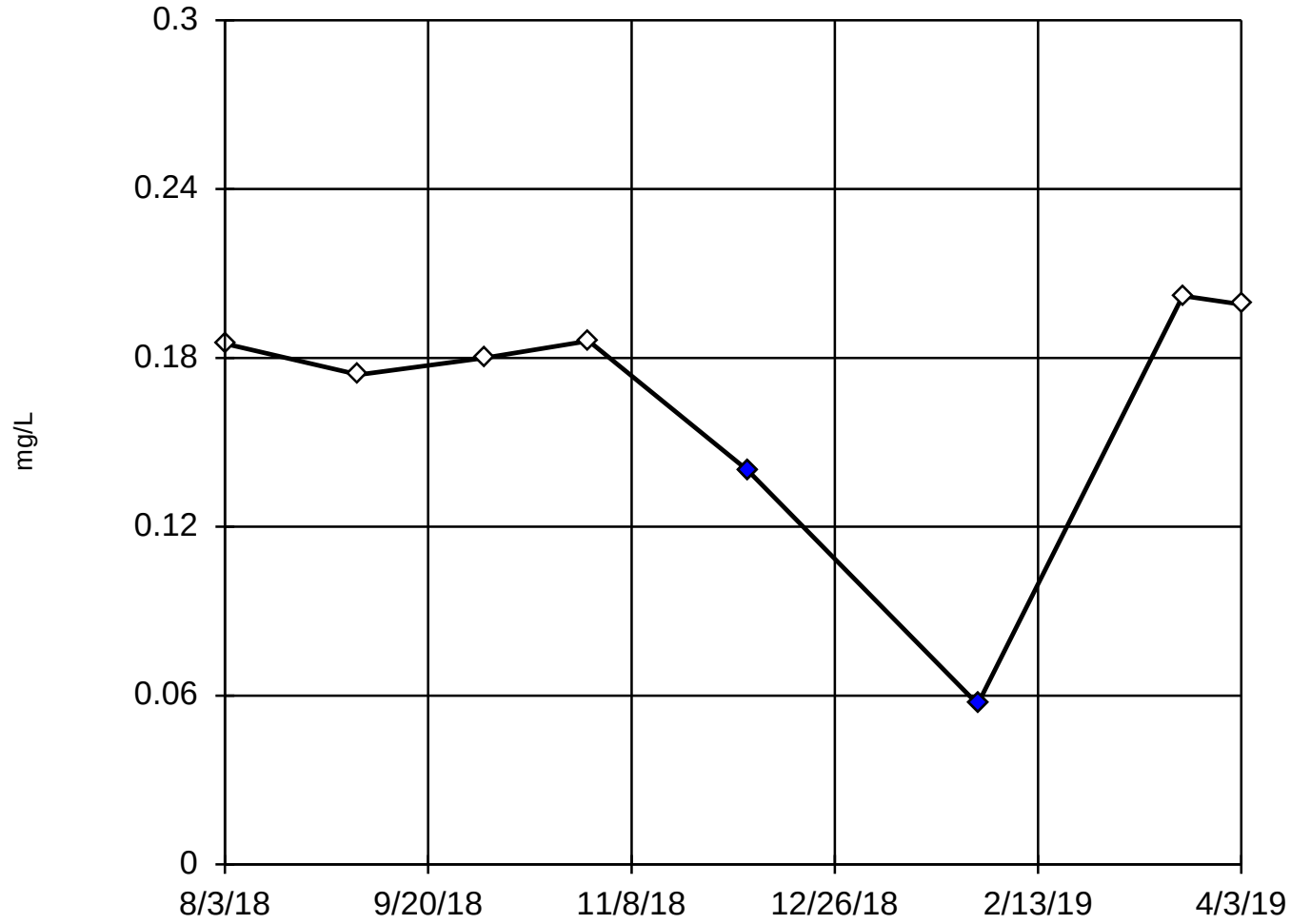
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 11/21/2019, 1:35 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Radium-226 (pCi/L)	MW-5	No	n/a	n/a	EPA 1989	0.05	7	0.6486	0.2767	normal	ShapiroWilk
Radium-226 (pCi/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	7	0.709	0.35	unknown	ShapiroWilk
Radium-228 (pCi/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	7	2.263	1.259	unknown	ShapiroWilk
Radium-228 (pCi/L)	MW-2	n/a	n/a	n/a	NP (nrm)	NaN	7	2.429	0.9759	unknown	ShapiroWilk
Radium-228 (pCi/L)	MW-3 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	7	2.364	0.9464	unknown	ShapiroWilk
Radium-228 (pCi/L)	MW-4 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	7	2.429	0.9759	unknown	ShapiroWilk
Radium-228 (pCi/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	7	2.058	1.031	unknown	ShapiroWilk
Radium-228 (pCi/L)	MW-6	n/a	n/a	n/a	NP (nrm)	NaN	7	2.429	0.9759	unknown	ShapiroWilk
Selenium, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	0.0625	0.02315	unknown	ShapiroWilk
Selenium, dissolved (mg/L)	**MW-2**	**Yes**	**0.5**	**9/4/2018**	**NP (nrm)**	**NaN**	**8**	**0.1125**	**0.1575**	**unknown**	**ShapiroWilk**
Selenium, dissolved (mg/L)	**MW-3 (bg)**	**Yes**	**0.5**	**8/7/2018**	**NP (nrm)**	**NaN**	**8**	**0.1125**	**0.1575**	**unknown**	**ShapiroWilk**
Selenium, dissolved (mg/L)	**MW-4 (bg)**	**Yes**	**0.5**	**8/7/2018**	**NP (nrm)**	**NaN**	**8**	**0.1125**	**0.1575**	**unknown**	**ShapiroWilk**
Selenium, dissolved (mg/L)	**MW-5**	**Yes**	**0.5**	**8/7/2018**	**NP (nrm)**	**NaN**	**8**	**0.1125**	**0.1575**	**unknown**	**ShapiroWilk**
Selenium, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.0625	0.02315	unknown	ShapiroWilk
Sulfate (mg/L)	MW-1	No	n/a	n/a	EPA 1989	0.05	8	439.9	158.3	normal	ShapiroWilk
Sulfate (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	73.15	72.24	unknown	ShapiroWilk
Sulfate (mg/L)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	16.21	5.982	normal	ShapiroWilk
Sulfate (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	0.05	8	3.638	0.9985	normal	ShapiroWilk
Sulfate (mg/L)	**MW-5**	**Yes**	**10**	**9/4/2018**	**Dixon`s**	**0.05**	**8**	**94.49**	**37.05**	**normal**	**ShapiroWilk**
Sulfate (mg/L)	**MW-6**	**Yes**	**2.4**	**9/4/2018**	**Dixon`s**	**0.05**	**8**	**6.675**	**1.914**	**normal**	**ShapiroWilk**
Thallium, dissolved (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	NaN	8	0.0375	0.01389	unknown	ShapiroWilk
Thallium, dissolved (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	0.0375	0.01389	unknown	ShapiroWilk
Thallium, dissolved (mg/L)	MW-3 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.0375	0.01389	unknown	ShapiroWilk
Thallium, dissolved (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.0375	0.01389	unknown	ShapiroWilk
Thallium, dissolved (mg/L)	MW-5	No	n/a	n/a	NP (nrm)	NaN	8	0.0375	0.01389	unknown	ShapiroWilk
Thallium, dissolved (mg/L)	MW-6	No	n/a	n/a	NP (nrm)	NaN	8	0.0375	0.01389	unknown	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-1	No	n/a	n/a	EPA 1989	0.05	8	1289	184.6	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	NaN	8	336.4	235.6	unknown	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-3 (bg)	No	n/a	n/a	EPA 1989	0.05	8	401.4	206.5	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	0.05	8	36.63	8.017	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-5	No	n/a	n/a	EPA 1989	0.05	8	636.1	21.24	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-6	No	n/a	n/a	EPA 1989	0.05	8	361.5	111.2	normal	ShapiroWilk

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Dixon's Outlier Test

MW-1



n = 8

Statistical outliers are drawn as solid.
Testing for 2 low outliers.
Mean = 0.1654.
Std. Dev. = 0.04778.
0.14: c = 0.5763
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9312
Critical = 0.826
The distribution, after removal of suspect values, was found to be normally distributed.

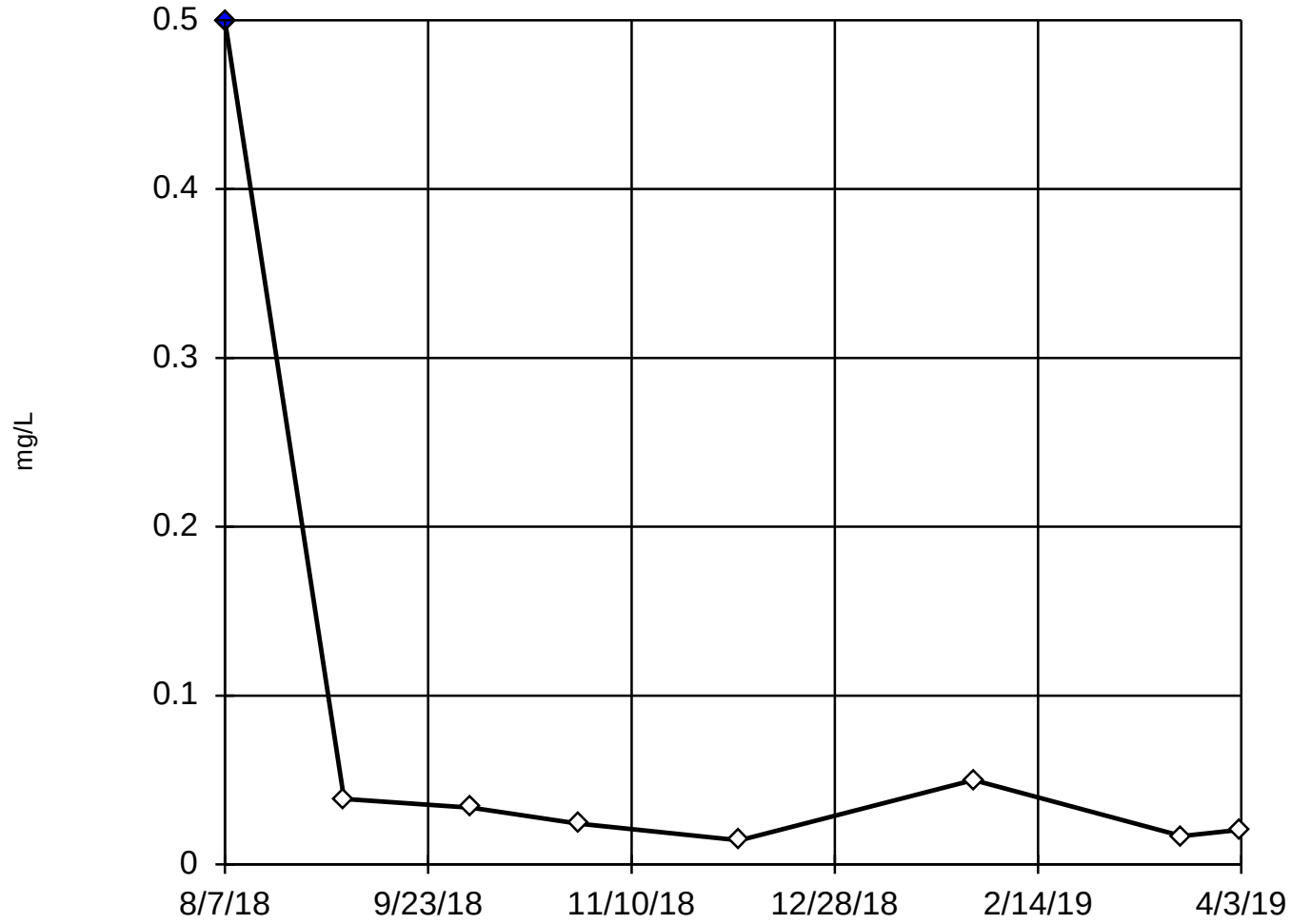
Constituent: Barium, dissolved Analysis Run 11/21/2019 1:27 PM

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Dixon's Outlier Test

MW-4 (bg)



n = 8

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 0.08725.
Std. Dev. = 0.1672.
<0.5: c = 0.9311
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9325
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

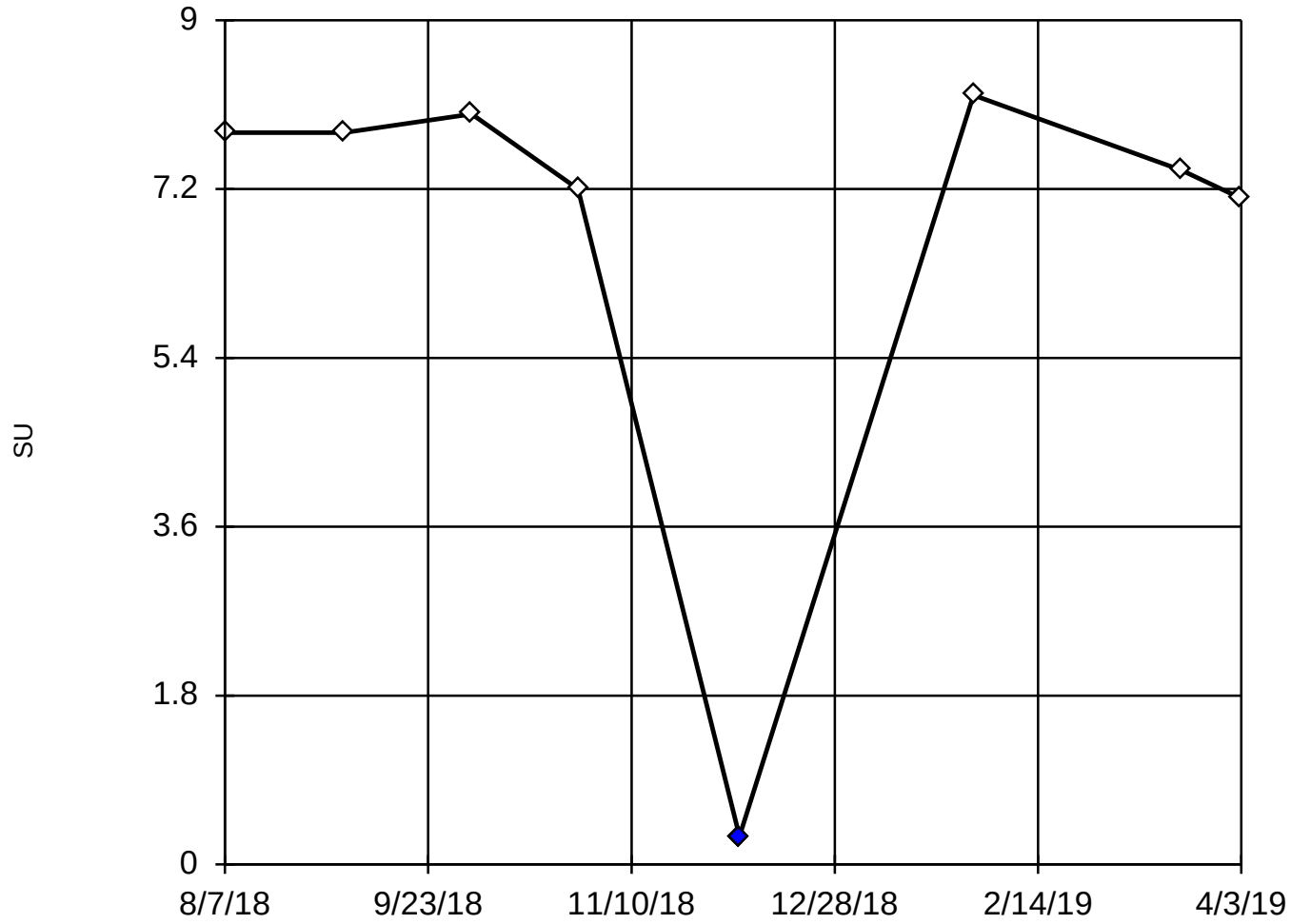
Constituent: Boron, dissolved Analysis Run 11/21/2019 1:27 PM

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Dixon's Outlier Test

MW-5



n = 8

Statistical outlier is drawn as solid.
Testing for 1 low outlier.
Mean = 6.725.
Std. Dev. = 2.624.
0.3: c = 0.8831
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9339
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

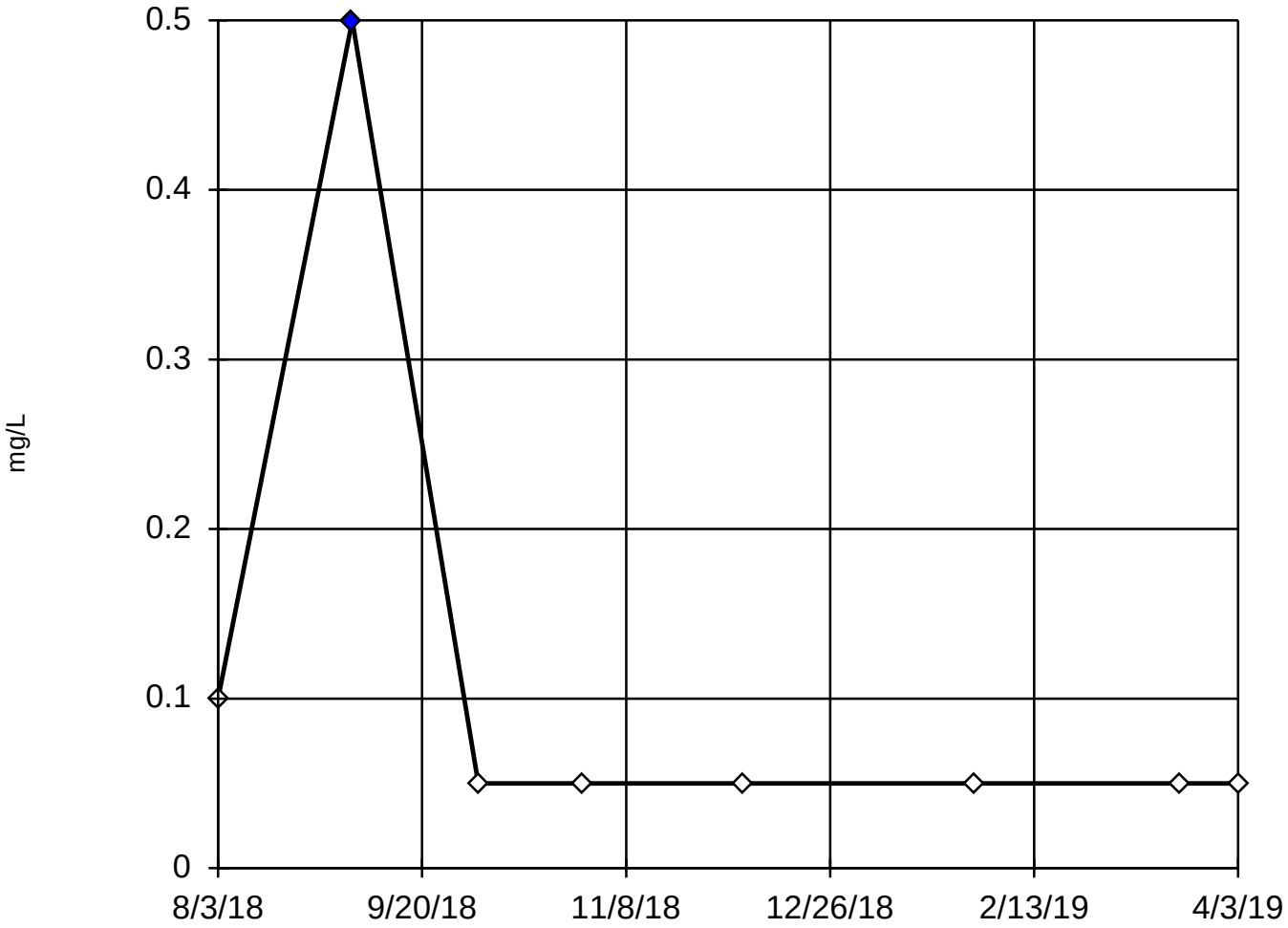
Constituent: pH Analysis Run 11/21/2019 1:29 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Tukey's Outlier Screening

MW-2



n = 8

Outlier is drawn as solid. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.2, low cutoff = 0.01768, based on IQR multiplier of 3.

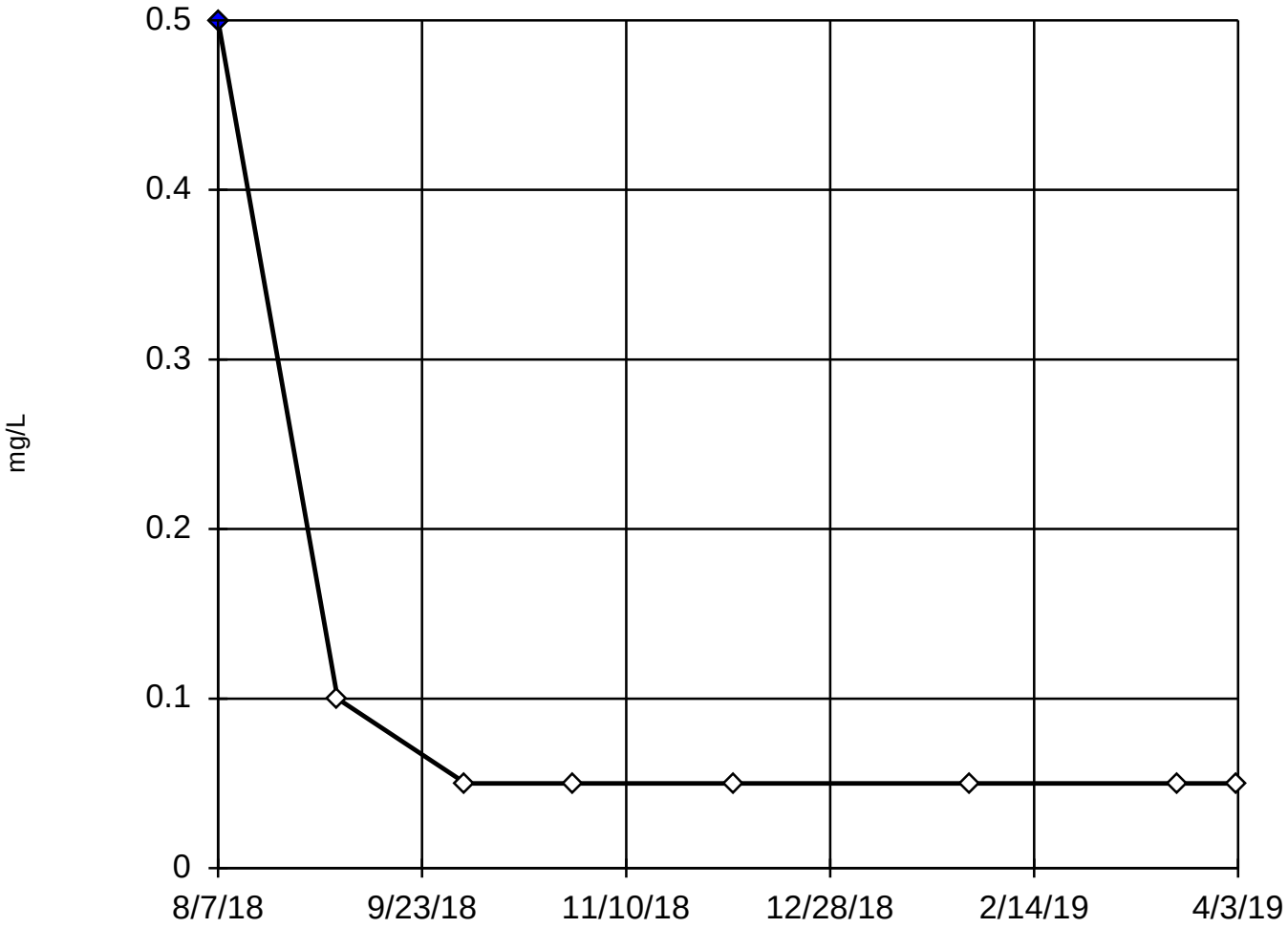
Constituent: Selenium, dissolved Analysis Run 11/21/2019 1:29 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Tukey's Outlier Screening

MW-3 (bg)



n = 8

Outlier is drawn as solid.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.2, low cutoff = 0.01768, based on IQR multiplier of 3.

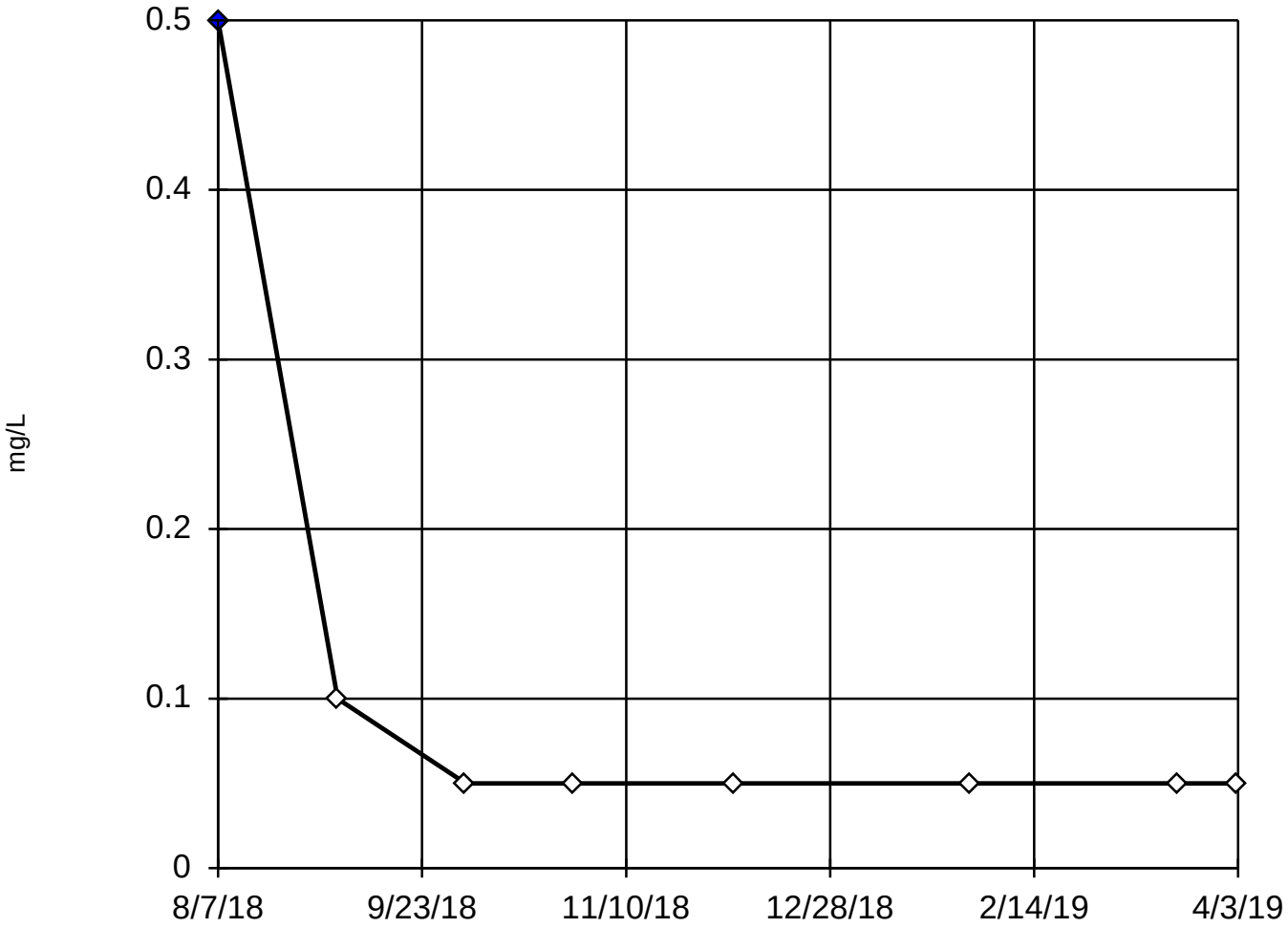
Constituent: Selenium, dissolved Analysis Run 11/21/2019 1:29 PM

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Tukey's Outlier Screening

MW-4 (bg)



n = 8

Outlier is drawn as solid. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.2, low cutoff = 0.01768, based on IQR multiplier of 3.

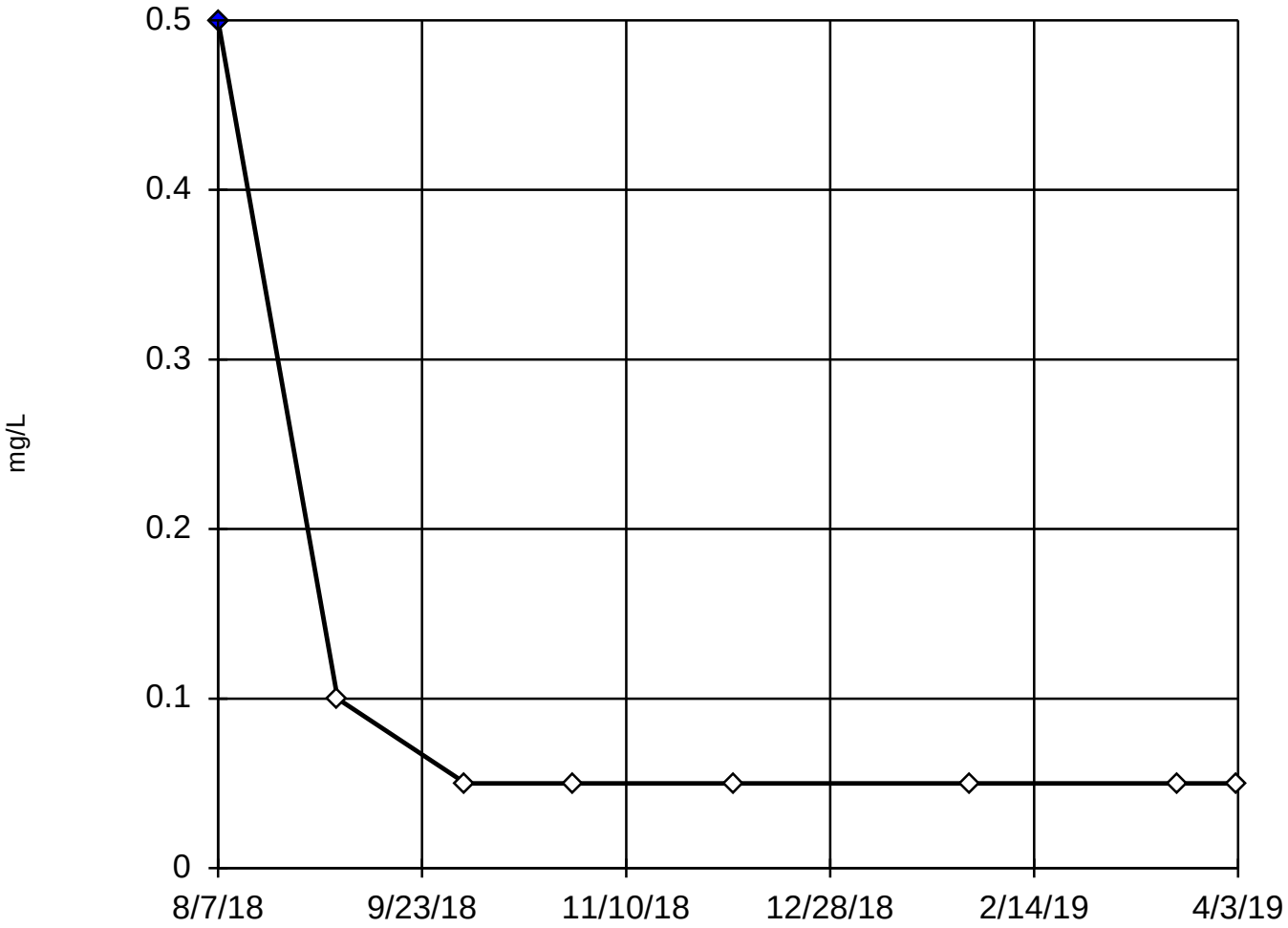
Constituent: Selenium, dissolved Analysis Run 11/21/2019 1:29 PM

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Tukey's Outlier Screening

MW-5



n = 8

Outlier is drawn as solid.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.2, low cutoff = 0.01768, based on IQR multiplier of 3.

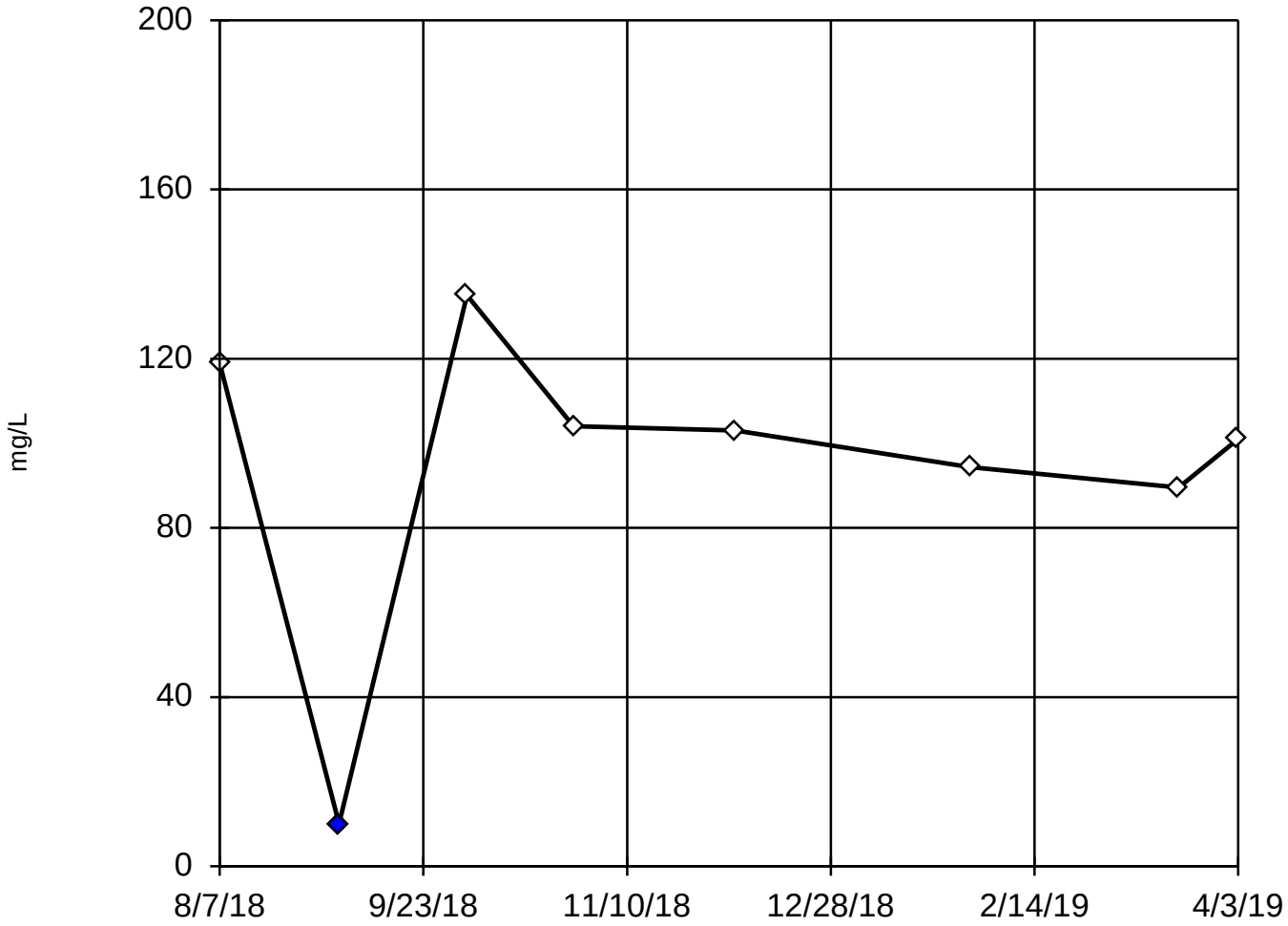
Constituent: Selenium, dissolved Analysis Run 11/21/2019 1:29 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Dixon's Outlier Test

MW-5



n = 8

Statistical outlier is drawn as solid.
Testing for 1 low outlier.
Mean = 94.49.
Std. Dev. = 37.05.
10: c = 0.7294
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9039
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

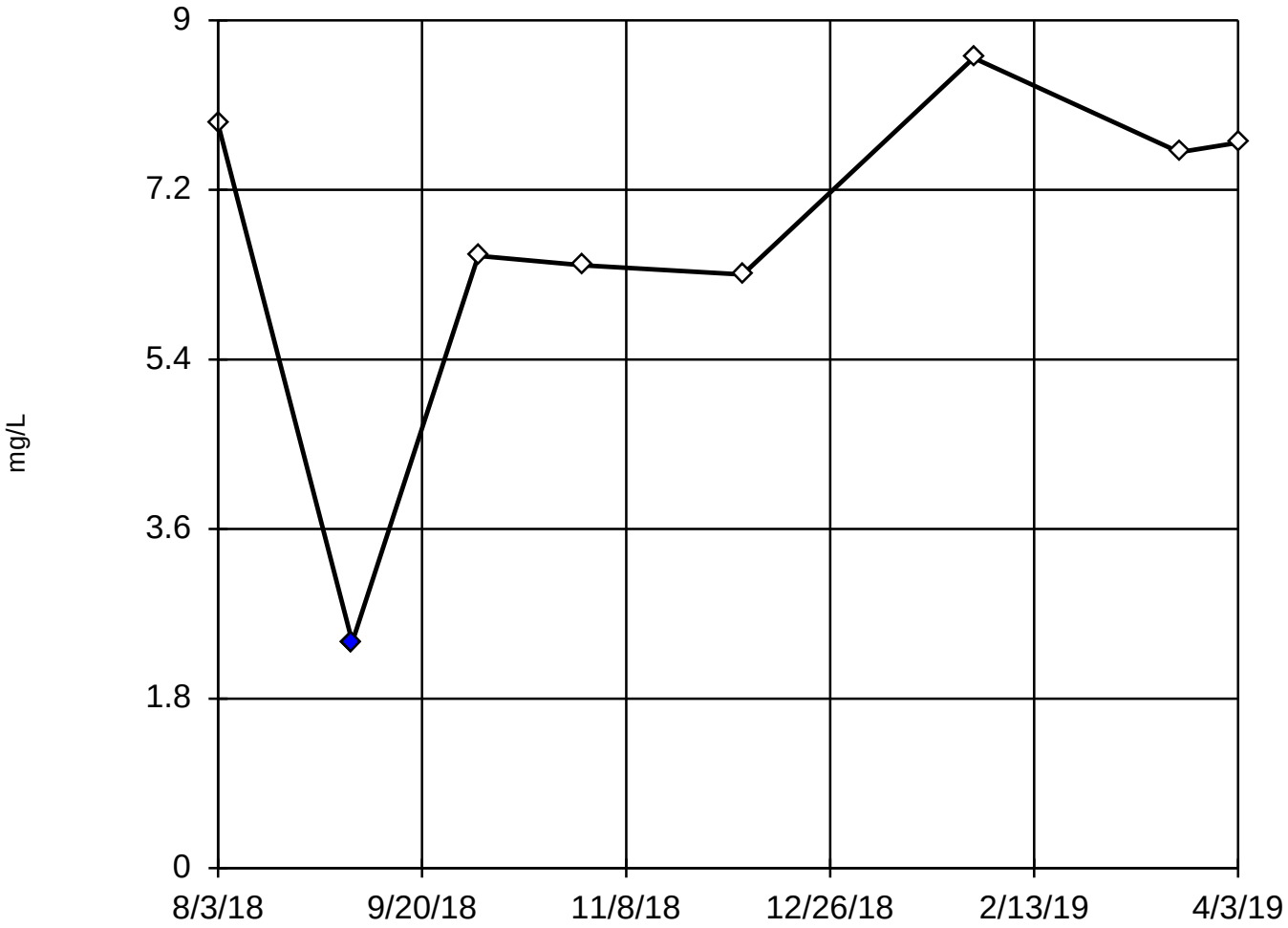
Constituent: Sulfate Analysis Run 11/21/2019 1:29 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Dixon's Outlier Test

MW-6



n = 8

Statistical outlier is drawn as solid.
Testing for 1 low outlier.
Mean = 6.675.
Std. Dev. = 1.914.
2.4 (J): c = 0.7091
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8905
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Sulfate Analysis Run 11/21/2019 1:29 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

APPENDIX E

Summary Statistics, Box Plots, and Time Series Plots

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Summary Report

Constituent: Antimony, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.00046
Maximum Value = 0.004
Mean Value = 0.002284
Median Value = 0.002
Standard Deviation = 0.001037
Coefficient of Variation = 0.4542
Skewness = 0.5859

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.002	0.004	0.0025	0.002	0.0009258	0.3703	1.155
MW-2	8	4	0.00046	0.004	0.001559	0.0014	0.001204	0.7726	0.9873
MW-3 (bg)	8	8	0.002	0.004	0.0025	0.002	0.0009258	0.3703	1.155
MW-4 (bg)	8	8	0.002	0.004	0.0025	0.002	0.0009258	0.3703	1.155
MW-5	8	8	0.002	0.004	0.0025	0.002	0.0009258	0.3703	1.155
MW-6	8	5	0.00095	0.004	0.002144	0.002	0.001228	0.5729	0.7263

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Summary Report

Constituent: Arsenic, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 40
Wells = 6
Minimum Value = 0.0008
Maximum Value = 0.0072
Mean Value = 0.002536
Median Value = 0.002
Standard Deviation = 0.001236
Coefficient of Variation = 0.4873
Skewness = 1.634

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.002	0.004	0.0025	0.002	0.0009258	0.3703	1.155
MW-2	8	0	0.0008	0.0039	0.002763	0.00295	0.0009942	0.3599	-0.8119
MW-3 (bg)	8	3	0.0013	0.0072	0.003	0.002	0.002241	0.7468	1.167
MW-4 (bg)	8	8	0.002	0.004	0.0025	0.002	0.0009258	0.3703	1.155
MW-5	8	7	0.00082	0.004	0.002103	0.002	0.0008708	0.4142	1.091
MW-6	8	7	0.0008	0.004	0.00235	0.002	0.001099	0.4678	0.58

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Summary Report

Constituent: Barium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 0
Wells = 6
Minimum Value = 0.0057
Maximum Value = 0.49
Mean Value = 0.1463
Median Value = 0.1825
Standard Deviation = 0.09748
Coefficient of Variation = 0.6662
Skewness = 0.4578

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	0.0569	0.202	0.1654	0.1825	0.04778	0.289	-1.659
MW-2	8	0	0.0155	0.49	0.1502	0.1104	0.1641	1.092	1.1
MW-3 (bg)	8	0	0.112	0.25	0.1811	0.1835	0.0507	0.2799	0.1575
MW-4 (bg)	8	0	0.0057	0.0186	0.01121	0.01055	0.004528	0.4038	0.4844
MW-5	8	0	0.195	0.226	0.2058	0.2015	0.01028	0.04996	0.9301
MW-6	8	0	0.0759	0.254	0.1642	0.1795	0.06933	0.4222	-0.1671

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Summary Report

Constituent: Beryllium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.00022
Maximum Value = 0.001
Mean Value = 0.0006192
Median Value = 0.0005
Standard Deviation = 0.0002258
Coefficient of Variation = 0.3647
Skewness = 1.008

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.0005	0.001	0.000625	0.0005	0.0002315	0.3703	1.155
MW-2	8	8	0.0005	0.001	0.000625	0.0005	0.0002315	0.3703	1.155
MW-3 (bg)	8	8	0.0005	0.001	0.000625	0.0005	0.0002315	0.3703	1.155
MW-4 (bg)	8	7	0.00022	0.001	0.00059	0.0005	0.0002709	0.4591	0.642
MW-5	8	8	0.0005	0.001	0.000625	0.0005	0.0002315	0.3703	1.155
MW-6	8	8	0.0005	0.001	0.000625	0.0005	0.0002315	0.3703	1.155

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Summary Report

Constituent: Boron, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 7
Wells = 6
Minimum Value = 0.0142
Maximum Value = 2.51
Mean Value = 0.4693
Median Value = 0.2635
Standard Deviation = 0.5598
Coefficient of Variation = 1.193
Skewness = 1.963

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	1	2.51	1.51	1.32	0.57	0.3775	0.767
MW-2	8	0	0.0264	0.983	0.4194	0.3345	0.395	0.9418	0.3316
MW-3 (bg)	8	0	0.105	0.285	0.2159	0.249	0.07323	0.3392	-0.6759
MW-4 (bg)	8	2	0.0142	0.5	0.08725	0.02885	0.1672	1.916	2.244
MW-5	8	0	0.377	0.444	0.4128	0.416	0.02323	0.05628	-0.2333
MW-6	8	0	0.0981	0.248	0.1704	0.1645	0.05477	0.3214	-0.06649

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Summary Report

Constituent: Cadmium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.0002
Maximum Value = 0.002
Mean Value = 0.001171
Median Value = 0.001
Standard Deviation = 0.0004965
Coefficient of Variation = 0.4241
Skewness = 0.5963

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	6	0.0002	0.002	0.001061	0.001	0.000667	0.6285	0.2862
MW-2	8	6	0.00028	0.002	0.0009638	0.001	0.0005117	0.5309	0.731
MW-3 (bg)	8	8	0.001	0.002	0.00125	0.001	0.0004629	0.3703	1.155
MW-4 (bg)	8	8	0.001	0.002	0.00125	0.001	0.0004629	0.3703	1.155
MW-5	8	8	0.001	0.002	0.00125	0.001	0.0004629	0.3703	1.155
MW-6	8	8	0.001	0.002	0.00125	0.001	0.0004629	0.3703	1.155

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Summary Report

Constituent: Calcium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 0
Wells = 6
Minimum Value = 2.65
Maximum Value = 314
Mean Value = 84.95
Median Value = 47.9
Standard Deviation = 86.93
Coefficient of Variation = 1.023
Skewness = 1.453

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	197	314	256.4	249.5	53.68	0.2094	0.04797
MW-2	8	0	23.1	113	64.45	55.5	37.98	0.5893	0.1811
MW-3 (bg)	8	0	30.9	69.9	48.54	47.9	13.53	0.2788	0.1229
MW-4 (bg)	8	0	2.65	6.17	4.059	4.09	1.216	0.2996	0.4197
MW-5	8	0	90.7	116	100.9	99.7	7.84	0.0777	0.6907
MW-6	8	0	29.9	40.5	35.35	34.95	3.3	0.09336	-0.01426

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Summary Report

Constituent: Chloride Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 7
Wells = 6
Minimum Value = 1.1
Maximum Value = 334
Mean Value = 90.13
Median Value = 86.9
Standard Deviation = 79.2
Coefficient of Variation = 0.8787
Skewness = 0.9154

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	55.7	163	122.7	136.5	39.77	0.3242	-0.5445
MW-2	8	0	1.5	110	48.83	40.65	50.92	1.043	0.1145
MW-3 (bg)	8	0	10.1	334	136.3	90.75	116	0.8512	0.6061
MW-4 (bg)	8	1	1.1	3.7	2.1	1.9	0.932	0.4438	0.7754
MW-5	8	0	85.3	115	101.4	101	9.759	0.09624	-0.0832
MW-6	8	0	26.1	246	129.5	106.4	89.6	0.6919	0.2172

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Summary Report

Constituent: Chromium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.015
Maximum Value = 0.03
Mean Value = 0.01875
Median Value = 0.015
Standard Deviation = 0.006564
Coefficient of Variation = 0.3501
Skewness = 1.155

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.015	0.03	0.01875	0.015	0.006944	0.3703	1.155
MW-2	8	8	0.015	0.03	0.01875	0.015	0.006944	0.3703	1.155
MW-3 (bg)	8	8	0.015	0.03	0.01875	0.015	0.006944	0.3703	1.155
MW-4 (bg)	8	8	0.015	0.03	0.01875	0.015	0.006944	0.3703	1.155
MW-5	8	8	0.015	0.03	0.01875	0.015	0.006944	0.3703	1.155
MW-6	8	8	0.015	0.03	0.01875	0.015	0.006944	0.3703	1.155

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Summary Report

Constituent: Cobalt, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 46
Wells = 6
Minimum Value = 0.0015
Maximum Value = 0.026
Mean Value = 0.005937
Median Value = 0.005
Standard Deviation = 0.004034
Coefficient of Variation = 0.6794
Skewness = 2.886

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	6	0.004	0.015	0.007375	0.005	0.003889	0.5273	1.006
MW-2	8	6	0.005	0.0087	0.00575	0.005	0.001438	0.2501	1.379
MW-3 (bg)	8	5	0.0025	0.026	0.007787	0.005	0.007667	0.9846	1.949
MW-4 (bg)	8	4	0.0015	0.005	0.003525	0.00375	0.001601	0.4541	-0.09001
MW-5	8	8	0.005	0.01	0.00625	0.005	0.002315	0.3703	1.155
MW-6	8	4	0.002	0.01	0.004937	0.0039	0.003335	0.6755	0.781

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Summary Report

Constituent: Fluoride Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 40
Wells = 6
Minimum Value = 0.35
Maximum Value = 0.72
Mean Value = 0.5204
Median Value = 0.5
Standard Deviation = 0.07337
Coefficient of Variation = 0.141
Skewness = 1.168

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	7	0.39	0.5	0.4863	0.5	0.03889	0.07998	-2.268
MW-2	8	6	0.5	0.69	0.5438	0.5	0.08141	0.1497	1.188
MW-3 (bg)	8	6	0.35	0.71	0.5075	0.5	0.09721	0.1915	0.7305
MW-4 (bg)	8	7	0.5	0.66	0.52	0.5	0.05657	0.1088	2.268
MW-5	8	4	0.42	0.72	0.5438	0.5	0.09471	0.1742	0.7073
MW-6	8	7	0.5	0.67	0.5213	0.5	0.0601	0.1153	2.268

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Summary Report

Constituent: Lead, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.003
Maximum Value = 0.006
Mean Value = 0.00375
Median Value = 0.003
Standard Deviation = 0.001313
Coefficient of Variation = 0.3501
Skewness = 1.155

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.003	0.006	0.00375	0.003	0.001389	0.3703	1.155
MW-2	8	8	0.003	0.006	0.00375	0.003	0.001389	0.3703	1.155
MW-3 (bg)	8	8	0.003	0.006	0.00375	0.003	0.001389	0.3703	1.155
MW-4 (bg)	8	8	0.003	0.006	0.00375	0.003	0.001389	0.3703	1.155
MW-5	8	8	0.003	0.006	0.00375	0.003	0.001389	0.3703	1.155
MW-6	8	8	0.003	0.006	0.00375	0.003	0.001389	0.3703	1.155

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Summary Report

Constituent: Lithium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 46
Wells = 6
Minimum Value = 0.015
Maximum Value = 0.1
Mean Value = 0.05592
Median Value = 0.05
Standard Deviation = 0.02443
Coefficient of Variation = 0.4368
Skewness = 0.6489

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	5	0.0158	0.1	0.05335	0.05	0.03126	0.5859	0.6305
MW-2	8	4	0.05	0.0927	0.06368	0.055	0.01724	0.2707	0.6704
MW-3 (bg)	8	3	0.0156	0.05	0.03538	0.03445	0.01355	0.383	-0.07327
MW-4 (bg)	8	8	0.05	0.1	0.0625	0.05	0.02315	0.3703	1.155
MW-5	8	8	0.05	0.1	0.0625	0.05	0.02315	0.3703	1.155
MW-6	8	7	0.015	0.1	0.05813	0.05	0.02853	0.4908	0.4208

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Summary Report

Constituent: Mercury, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.0002
Maximum Value = 0.0002
Mean Value = 0.0002
Median Value = 0.0002
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.0002	0.0002	0.0002	0.0002	0	0	NaN
MW-2	8	8	0.0002	0.0002	0.0002	0.0002	0	0	NaN
MW-3 (bg)	8	8	0.0002	0.0002	0.0002	0.0002	0	0	NaN
MW-4 (bg)	8	8	0.0002	0.0002	0.0002	0.0002	0	0	NaN
MW-5	8	8	0.0002	0.0002	0.0002	0.0002	0	0	NaN
MW-6	8	8	0.0002	0.0002	0.0002	0.0002	0	0	NaN

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Summary Report

Constituent: Molybdenum, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 10
Wells = 6
Minimum Value = 0.00042
Maximum Value = 0.088
Mean Value = 0.01416
Median Value = 0.0094
Standard Deviation = 0.01836
Coefficient of Variation = 1.296
Skewness = 2.37

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	0.0035	0.0652	0.02074	0.00915	0.02555	1.232	1.088
MW-2	8	0	0.0023	0.088	0.0282	0.01435	0.03145	1.115	0.8998
MW-3 (bg)	8	0	0.0036	0.0203	0.01146	0.01005	0.005349	0.4666	0.4259
MW-4 (bg)	8	0	0.00042	0.0029	0.001564	0.0016	0.0008274	0.5291	0.07042
MW-5	8	0	0.0124	0.0211	0.01719	0.0182	0.002915	0.1696	-0.6598
MW-6	8	0	0.00072	0.0132	0.005823	0.0031	0.005415	0.93	0.4576

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Summary Report

Constituent: pH Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 0
Wells = 6
Minimum Value = 0.3
Maximum Value = 8.2
Mean Value = 7.192
Median Value = 7.3
Standard Deviation = 1.136
Coefficient of Variation = 0.158
Skewness = -4.746

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	7.1	8	7.5	7.45	0.3505	0.04673	0.1915
MW-2	8	0	6.8	8	7.6	7.75	0.4276	0.05627	-0.9961
MW-3 (bg)	8	0	6.8	7.9	7.325	7.2	0.4528	0.06181	0.211
MW-4 (bg)	8	0	6.1	7.3	6.675	6.75	0.3919	0.05871	0.04758
MW-5	8	0	0.3	8.2	6.725	7.6	2.624	0.3903	-2.171
MW-6	8	0	6.8	8.1	7.325	7.3	0.4713	0.06434	0.3052

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Summary Report

Constituent: Radium-226 Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 3/20/2019, a summary of the selected data set:

Observations = 42
ND/Trace = 21
Wells = 6
Minimum Value = 0.0768
Maximum Value = 1.89
Mean Value = 0.8149
Median Value = 1
Standard Deviation = 0.3749
Coefficient of Variation = 0.4601
Skewness = -0.1089

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	7	4	0.11	1.13	0.7761	1	0.43	0.554	-0.9163
MW-2	7	4	0.294	1.89	0.9316	1	0.5319	0.5709	0.4933
MW-3 (bg)	7	2	0.171	1.42	0.9149	1	0.3887	0.4249	-0.8375
MW-4 (bg)	7	6	0.365	1	0.9093	1	0.24	0.264	-2.041
MW-5	7	2	0.298	1	0.6486	0.661	0.2767	0.4266	0.2183
MW-6	7	3	0.0768	1	0.709	0.824	0.35	0.4937	-0.8018

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Summary Report

Constituent: Radium-228 Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 3/20/2019, a summary of the selected data set:

Observations = 42
ND/Trace = 35
Wells = 6
Minimum Value = 0.38
Maximum Value = 3
Mean Value = 2.328
Median Value = 3
Standard Deviation = 0.9774
Coefficient of Variation = 0.4198
Skewness = -0.8584

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	7	5	0.38	3	2.263	3	1.259	0.5566	-0.9498
MW-2	7	7	1	3	2.429	3	0.9759	0.4018	-0.9487
MW-3 (bg)	7	6	1	3	2.364	3	0.9464	0.4003	-0.8591
MW-4 (bg)	7	7	1	3	2.429	3	0.9759	0.4018	-0.9487
MW-5	7	3	0.663	3	2.058	2.4	1.031	0.5009	-0.288
MW-6	7	7	1	3	2.429	3	0.9759	0.4018	-0.9487

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Summary Report

Constituent: Selenium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.05
Maximum Value = 0.5
Mean Value = 0.09583
Median Value = 0.05
Standard Deviation = 0.1246
Coefficient of Variation = 1.3
Skewness = 2.9

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.05	0.1	0.0625	0.05	0.02315	0.3703	1.155
MW-2	8	8	0.05	0.5	0.1125	0.05	0.1575	1.4	2.215
MW-3 (bg)	8	8	0.05	0.5	0.1125	0.05	0.1575	1.4	2.215
MW-4 (bg)	8	8	0.05	0.5	0.1125	0.05	0.1575	1.4	2.215
MW-5	8	8	0.05	0.5	0.1125	0.05	0.1575	1.4	2.215
MW-6	8	8	0.05	0.1	0.0625	0.05	0.02315	0.3703	1.155

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Summary Report

Constituent: Sulfate Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 11
Wells = 6
Minimum Value = 2.1
Maximum Value = 729
Mean Value = 105.7
Median Value = 16.95
Standard Deviation = 169.5
Coefficient of Variation = 1.604
Skewness = 2.056

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	280	729	439.9	402	158.3	0.36	0.6653
MW-2	8	1	4.6	171	73.15	52.6	72.24	0.9876	0.2948
MW-3 (bg)	8	0	7	25.1	16.21	16.95	5.982	0.369	-0.1859
MW-4 (bg)	8	2	2.1	5	3.638	3.45	0.9985	0.2745	0.1266
MW-5	8	0	10	135	94.49	102	37.05	0.3921	-1.562
MW-6	8	0	2.4	8.6	6.675	7.05	1.914	0.2867	-1.468

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Summary Report

Constituent: Thallium, dissolved Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 48
Wells = 6
Minimum Value = 0.03
Maximum Value = 0.06
Mean Value = 0.0375
Median Value = 0.03
Standard Deviation = 0.01313
Coefficient of Variation = 0.3501
Skewness = 1.155

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	8	0.03	0.06	0.0375	0.03	0.01389	0.3703	1.155
MW-2	8	8	0.03	0.06	0.0375	0.03	0.01389	0.3703	1.155
MW-3 (bg)	8	8	0.03	0.06	0.0375	0.03	0.01389	0.3703	1.155
MW-4 (bg)	8	8	0.03	0.06	0.0375	0.03	0.01389	0.3703	1.155
MW-5	8	8	0.03	0.06	0.0375	0.03	0.01389	0.3703	1.155
MW-6	8	8	0.03	0.06	0.0375	0.03	0.01389	0.3703	1.155

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Summary Report

Constituent: Total Dissolved Solids Analysis Run 11/21/2019 1:14 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

For observations made between 8/3/2018 and 4/3/2019, a summary of the selected data set:

Observations = 48
ND/Trace = 8
Wells = 6
Minimum Value = 28
Maximum Value = 1570
Mean Value = 510.1
Median Value = 460.5
Standard Deviation = 420.2
Coefficient of Variation = 0.8237
Skewness = 0.9072

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-1	8	0	1070	1570	1289	1265	184.6	0.1432	0.5007
MW-2	8	0	87.5	603	336.4	304.5	235.6	0.7002	0.07544
MW-3 (bg)	8	0	189	724	401.4	363	206.5	0.5145	0.3674
MW-4 (bg)	8	0	28	51	36.63	34.25	8.017	0.2189	0.7391
MW-5	8	0	602	660	636.1	638	21.24	0.03338	-0.3668
MW-6	8	0	201	504	361.5	369.5	111.2	0.3077	-0.1564

Box & Whiskers Plot

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 11/21/2019, 1:44 PM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Antimony, dissolved (mg/L)	MW-1	8	0.0025	0.0009258	0.0003273	0.002	0.002	0.004	100
Antimony, dissolved (mg/L)	MW-2	8	0.001559	0.001204	0.0004258	0.0014	0.00046	0.004	50
Antimony, dissolved (mg/L)	MW-3 (bg)	8	0.0025	0.0009258	0.0003273	0.002	0.002	0.004	100
Antimony, dissolved (mg/L)	MW-4 (bg)	8	0.0025	0.0009258	0.0003273	0.002	0.002	0.004	100
Antimony, dissolved (mg/L)	MW-5	8	0.0025	0.0009258	0.0003273	0.002	0.002	0.004	100
Antimony, dissolved (mg/L)	MW-6	8	0.002144	0.001228	0.0004342	0.002	0.00095	0.004	62.5
Arsenic, dissolved (mg/L)	MW-1	8	0.0025	0.0009258	0.0003273	0.002	0.002	0.004	100
Arsenic, dissolved (mg/L)	MW-2	8	0.002763	0.0009942	0.0003515	0.00295	0.0008	0.0039	0
Arsenic, dissolved (mg/L)	MW-3 (bg)	8	0.003	0.002241	0.0007921	0.002	0.0013	0.0072	37.5
Arsenic, dissolved (mg/L)	MW-4 (bg)	8	0.0025	0.0009258	0.0003273	0.002	0.002	0.004	100
Arsenic, dissolved (mg/L)	MW-5	8	0.002103	0.0008708	0.0003079	0.002	0.00082	0.004	87.5
Arsenic, dissolved (mg/L)	MW-6	8	0.00235	0.001099	0.0003887	0.002	0.0008	0.004	87.5
Barium, dissolved (mg/L)	MW-1	8	0.1654	0.04778	0.01689	0.1825	0.0569	0.202	0
Barium, dissolved (mg/L)	MW-2	8	0.1502	0.1641	0.05803	0.1104	0.0155	0.49	0
Barium, dissolved (mg/L)	MW-3 (bg)	8	0.1811	0.0507	0.01792	0.1835	0.112	0.25	0
Barium, dissolved (mg/L)	MW-4 (bg)	8	0.01121	0.004528	0.001601	0.01055	0.0057	0.0186	0
Barium, dissolved (mg/L)	MW-5	8	0.2058	0.01028	0.003634	0.2015	0.195	0.226	0
Barium, dissolved (mg/L)	MW-6	8	0.1642	0.06933	0.02451	0.1795	0.0759	0.254	0
Beryllium, dissolved (mg/L)	MW-1	8	0.000625	0.0002315	0.0000...	0.0005	0.0005	0.001	100
Beryllium, dissolved (mg/L)	MW-2	8	0.000625	0.0002315	0.0000...	0.0005	0.0005	0.001	100
Beryllium, dissolved (mg/L)	MW-3 (bg)	8	0.000625	0.0002315	0.0000...	0.0005	0.0005	0.001	100
Beryllium, dissolved (mg/L)	MW-4 (bg)	8	0.00059	0.0002709	0.0000...	0.0005	0.00022	0.001	87.5
Beryllium, dissolved (mg/L)	MW-5	8	0.000625	0.0002315	0.0000...	0.0005	0.0005	0.001	100
Beryllium, dissolved (mg/L)	MW-6	8	0.000625	0.0002315	0.0000...	0.0005	0.0005	0.001	100
Boron, dissolved (mg/L)	MW-1	8	1.51	0.57	0.2015	1.32	1	2.51	0
Boron, dissolved (mg/L)	MW-2	8	0.4194	0.395	0.1397	0.3345	0.0264	0.983	0
Boron, dissolved (mg/L)	MW-3 (bg)	8	0.2159	0.07323	0.02589	0.249	0.105	0.285	0
Boron, dissolved (mg/L)	MW-4 (bg)	8	0.08725	0.1672	0.05912	0.02885	0.0142	0.5	25
Boron, dissolved (mg/L)	MW-5	8	0.4128	0.02323	0.008213	0.416	0.377	0.444	0
Boron, dissolved (mg/L)	MW-6	8	0.1704	0.05477	0.01936	0.1645	0.0981	0.248	0
Cadmium, dissolved (mg/L)	MW-1	8	0.001061	0.000667	0.0002358	0.001	0.0002	0.002	75
Cadmium, dissolved (mg/L)	MW-2	8	0.000...	0.0005117	0.0001809	0.001	0.00028	0.002	75
Cadmium, dissolved (mg/L)	MW-3 (bg)	8	0.00125	0.0004629	0.0001637	0.001	0.001	0.002	100
Cadmium, dissolved (mg/L)	MW-4 (bg)	8	0.00125	0.0004629	0.0001637	0.001	0.001	0.002	100
Cadmium, dissolved (mg/L)	MW-5	8	0.00125	0.0004629	0.0001637	0.001	0.001	0.002	100
Cadmium, dissolved (mg/L)	MW-6	8	0.00125	0.0004629	0.0001637	0.001	0.001	0.002	100
Calcium, dissolved (mg/L)	MW-1	8	256.4	53.68	18.98	249.5	197	314	0
Calcium, dissolved (mg/L)	MW-2	8	64.45	37.98	13.43	55.5	23.1	113	0
Calcium, dissolved (mg/L)	MW-3 (bg)	8	48.54	13.53	4.784	47.9	30.9	69.9	0
Calcium, dissolved (mg/L)	MW-4 (bg)	8	4.059	1.216	0.4299	4.09	2.65	6.17	0
Calcium, dissolved (mg/L)	MW-5	8	100.9	7.84	2.772	99.7	90.7	116	0
Calcium, dissolved (mg/L)	MW-6	8	35.35	3.3	1.167	34.95	29.9	40.5	0
Chloride (mg/L)	MW-1	8	122.7	39.77	14.06	136.5	55.7	163	0
Chloride (mg/L)	MW-2	8	48.83	50.92	18	40.65	1.5	110	0
Chloride (mg/L)	MW-3 (bg)	8	136.3	116	41.01	90.75	10.1	334	0
Chloride (mg/L)	MW-4 (bg)	8	2.1	0.932	0.3295	1.9	1.1	3.7	12.5
Chloride (mg/L)	MW-5	8	101.4	9.759	3.45	101	85.3	115	0
Chloride (mg/L)	MW-6	8	129.5	89.6	31.68	106.4	26.1	246	0

Box & Whiskers Plot

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 11/21/2019, 1:44 PM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Chromium, dissolved (mg/L)	MW-3 (bg)	8	0.01875	0.006944	0.002455	0.015	0.015	0.03	100
Chromium, dissolved (mg/L)	MW-4 (bg)	8	0.01875	0.006944	0.002455	0.015	0.015	0.03	100
Chromium, dissolved (mg/L)	MW-5	8	0.01875	0.006944	0.002455	0.015	0.015	0.03	100
Chromium, dissolved (mg/L)	MW-6	8	0.01875	0.006944	0.002455	0.015	0.015	0.03	100
Cobalt, dissolved (mg/L)	MW-1	8	0.007375	0.003889	0.001375	0.005	0.004	0.015	75
Cobalt, dissolved (mg/L)	MW-2	8	0.00575	0.001438	0.0005085	0.005	0.005	0.0087	75
Cobalt, dissolved (mg/L)	MW-3 (bg)	8	0.007787	0.007667	0.002711	0.005	0.0025	0.026	62.5
Cobalt, dissolved (mg/L)	MW-4 (bg)	8	0.003525	0.001601	0.0005659	0.00375	0.0015	0.005	50
Cobalt, dissolved (mg/L)	MW-5	8	0.00625	0.002315	0.0008183	0.005	0.005	0.01	100
Cobalt, dissolved (mg/L)	MW-6	8	0.004937	0.003335	0.001179	0.0039	0.002	0.01	50
Fluoride (mg/L)	MW-1	8	0.4863	0.03889	0.01375	0.5	0.39	0.5	87.5
Fluoride (mg/L)	MW-2	8	0.5438	0.08141	0.02878	0.5	0.5	0.69	75
Fluoride (mg/L)	MW-3 (bg)	8	0.5075	0.09721	0.03437	0.5	0.35	0.71	75
Fluoride (mg/L)	MW-4 (bg)	8	0.52	0.05657	0.02	0.5	0.5	0.66	87.5
Fluoride (mg/L)	MW-5	8	0.5438	0.09471	0.03348	0.5	0.42	0.72	50
Fluoride (mg/L)	MW-6	8	0.5213	0.0601	0.02125	0.5	0.5	0.67	87.5
Lead, dissolved (mg/L)	MW-1	8	0.00375	0.001389	0.000491	0.003	0.003	0.006	100
Lead, dissolved (mg/L)	MW-2	8	0.00375	0.001389	0.000491	0.003	0.003	0.006	100
Lead, dissolved (mg/L)	MW-3 (bg)	8	0.00375	0.001389	0.000491	0.003	0.003	0.006	100
Lead, dissolved (mg/L)	MW-4 (bg)	8	0.00375	0.001389	0.000491	0.003	0.003	0.006	100
Lead, dissolved (mg/L)	MW-5	8	0.00375	0.001389	0.000491	0.003	0.003	0.006	100
Lead, dissolved (mg/L)	MW-6	8	0.00375	0.001389	0.000491	0.003	0.003	0.006	100
Lithium, dissolved (mg/L)	MW-1	8	0.05335	0.03126	0.01105	0.05	0.0158	0.1	62.5
Lithium, dissolved (mg/L)	MW-2	8	0.06368	0.01724	0.006094	0.055	0.05	0.0927	50
Lithium, dissolved (mg/L)	MW-3 (bg)	8	0.03538	0.01355	0.00479	0.03445	0.0156	0.05	37.5
Lithium, dissolved (mg/L)	MW-4 (bg)	8	0.0625	0.02315	0.008183	0.05	0.05	0.1	100
Lithium, dissolved (mg/L)	MW-5	8	0.0625	0.02315	0.008183	0.05	0.05	0.1	100
Lithium, dissolved (mg/L)	MW-6	8	0.05813	0.02853	0.01009	0.05	0.015	0.1	87.5
Mercury, dissolved (mg/L)	MW-1	8	0.0002	0	0	0.0002	0.0002	0.0002	100
Mercury, dissolved (mg/L)	MW-2	8	0.0002	0	0	0.0002	0.0002	0.0002	100
Mercury, dissolved (mg/L)	MW-3 (bg)	8	0.0002	0	0	0.0002	0.0002	0.0002	100
Mercury, dissolved (mg/L)	MW-4 (bg)	8	0.0002	0	0	0.0002	0.0002	0.0002	100
Mercury, dissolved (mg/L)	MW-5	8	0.0002	0	0	0.0002	0.0002	0.0002	100
Mercury, dissolved (mg/L)	MW-6	8	0.0002	0	0	0.0002	0.0002	0.0002	100
Molybdenum, dissolved (mg/L)	MW-1	8	0.02074	0.02555	0.009033	0.00915	0.0035	0.0652	0
Molybdenum, dissolved (mg/L)	MW-2	8	0.0282	0.03145	0.01112	0.01435	0.0023	0.088	0
Molybdenum, dissolved (mg/L)	MW-3 (bg)	8	0.01146	0.005349	0.001891	0.01005	0.0036	0.0203	0
Molybdenum, dissolved (mg/L)	MW-4 (bg)	8	0.001564	0.0008274	0.0002925	0.0016	0.00042	0.0029	0
Molybdenum, dissolved (mg/L)	MW-5	8	0.01719	0.002915	0.001031	0.0182	0.0124	0.0211	0
Molybdenum, dissolved (mg/L)	MW-6	8	0.005823	0.005415	0.001914	0.0031	0.00072	0.0132	0
pH (SU)	MW-1	8	7.5	0.3505	0.1239	7.45	7.1	8	0
pH (SU)	MW-2	8	7.6	0.4276	0.1512	7.75	6.8	8	0
pH (SU)	MW-3 (bg)	8	7.325	0.4528	0.1601	7.2	6.8	7.9	0
pH (SU)	MW-4 (bg)	8	6.675	0.3919	0.1386	6.75	6.1	7.3	0
pH (SU)	MW-5	8	6.725	2.624	0.9279	7.6	0.3	8.2	0
pH (SU)	MW-6	8	7.325	0.4713	0.1666	7.3	6.8	8.1	0
Radium-226 (pCi/L)	MW-1	7	0.7761	0.43	0.1625	1	0.11	1.13	57.14
Radium-226 (pCi/L)	MW-2	7	0.9316	0.5319	0.201	1	0.294	1.89	57.14

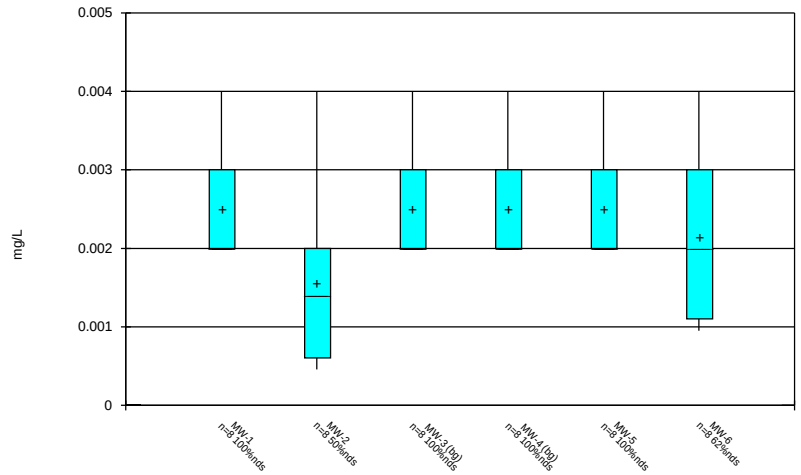
Box & Whiskers Plot

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 11/21/2019, 1:44 PM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Radium-226 (pCi/L)	MW-5	7	0.6486	0.2767	0.1046	0.661	0.298	1	28.57
Radium-226 (pCi/L)	MW-6	7	0.709	0.35	0.1323	0.824	0.0768	1	42.86
Radium-228 (pCi/L)	MW-1	7	2.263	1.259	0.476	3	0.38	3	71.43
Radium-228 (pCi/L)	MW-2	7	2.429	0.9759	0.3689	3	1	3	100
Radium-228 (pCi/L)	MW-3 (bg)	7	2.364	0.9464	0.3577	3	1	3	85.71
Radium-228 (pCi/L)	MW-4 (bg)	7	2.429	0.9759	0.3689	3	1	3	100
Radium-228 (pCi/L)	MW-5	7	2.058	1.031	0.3896	2.4	0.663	3	42.86
Radium-228 (pCi/L)	MW-6	7	2.429	0.9759	0.3689	3	1	3	100
Selenium, dissolved (mg/L)	MW-1	8	0.0625	0.02315	0.008183	0.05	0.05	0.1	100
Selenium, dissolved (mg/L)	MW-2	8	0.1125	0.1575	0.0557	0.05	0.05	0.5	100
Selenium, dissolved (mg/L)	MW-3 (bg)	8	0.1125	0.1575	0.0557	0.05	0.05	0.5	100
Selenium, dissolved (mg/L)	MW-4 (bg)	8	0.1125	0.1575	0.0557	0.05	0.05	0.5	100
Selenium, dissolved (mg/L)	MW-5	8	0.1125	0.1575	0.0557	0.05	0.05	0.5	100
Selenium, dissolved (mg/L)	MW-6	8	0.0625	0.02315	0.008183	0.05	0.05	0.1	100
Sulfate (mg/L)	MW-1	8	439.9	158.3	55.98	402	280	729	0
Sulfate (mg/L)	MW-2	8	73.15	72.24	25.54	52.6	4.6	171	12.5
Sulfate (mg/L)	MW-3 (bg)	8	16.21	5.982	2.115	16.95	7	25.1	0
Sulfate (mg/L)	MW-4 (bg)	8	3.638	0.9985	0.353	3.45	2.1	5	25
Sulfate (mg/L)	MW-5	8	94.49	37.05	13.1	102	10	135	0
Sulfate (mg/L)	MW-6	8	6.675	1.914	0.6766	7.05	2.4	8.6	0
Thallium, dissolved (mg/L)	MW-1	8	0.0375	0.01389	0.00491	0.03	0.03	0.06	100
Thallium, dissolved (mg/L)	MW-2	8	0.0375	0.01389	0.00491	0.03	0.03	0.06	100
Thallium, dissolved (mg/L)	MW-3 (bg)	8	0.0375	0.01389	0.00491	0.03	0.03	0.06	100
Thallium, dissolved (mg/L)	MW-4 (bg)	8	0.0375	0.01389	0.00491	0.03	0.03	0.06	100
Thallium, dissolved (mg/L)	MW-5	8	0.0375	0.01389	0.00491	0.03	0.03	0.06	100
Thallium, dissolved (mg/L)	MW-6	8	0.0375	0.01389	0.00491	0.03	0.03	0.06	100
Total Dissolved Solids (mg/L)	MW-1	8	1289	184.6	65.26	1265	1070	1570	0
Total Dissolved Solids (mg/L)	MW-2	8	336.4	235.6	83.28	304.5	87.5	603	0
Total Dissolved Solids (mg/L)	MW-3 (bg)	8	401.4	206.5	73.01	363	189	724	0
Total Dissolved Solids (mg/L)	MW-4 (bg)	8	36.63	8.017	2.834	34.25	28	51	0
Total Dissolved Solids (mg/L)	MW-5	8	636.1	21.24	7.508	638	602	660	0
Total Dissolved Solids (mg/L)	MW-6	8	361.5	111.2	39.33	369.5	201	504	0

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Box & Whiskers Plot

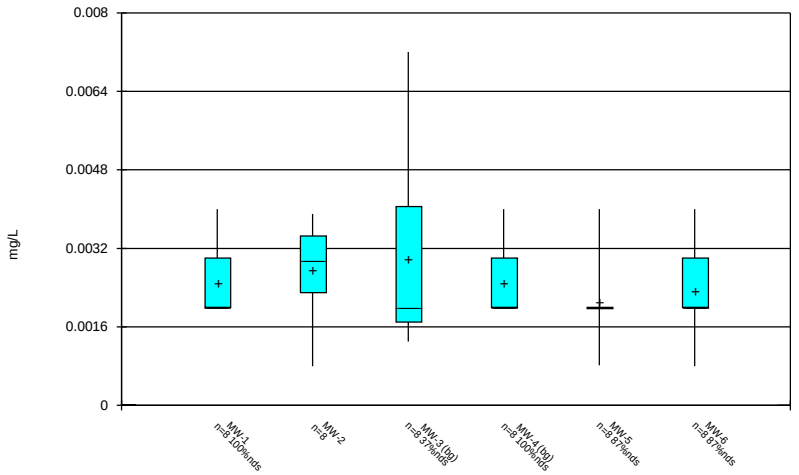


Constituent: Antimony, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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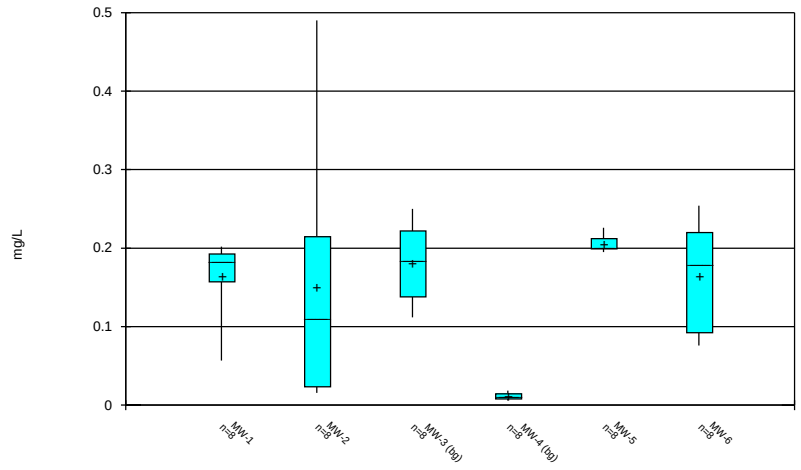


Constituent: Arsenic, dissolved Analysis Run 11/21/2019 1:42 PM

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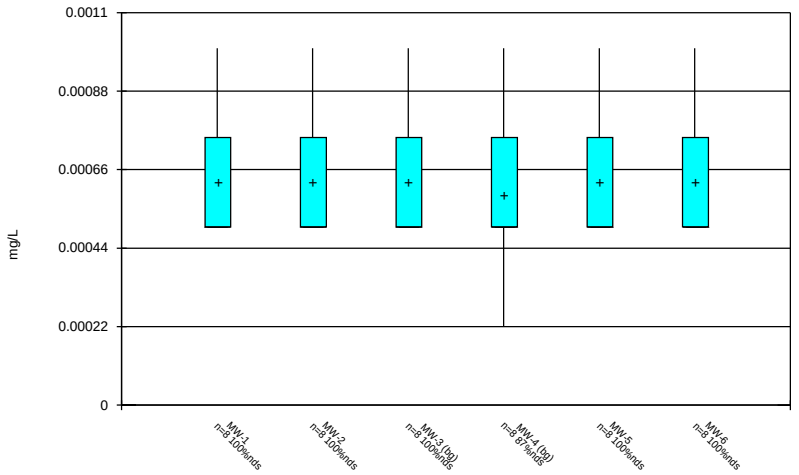


Constituent: Barium, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Box & Whiskers Plot

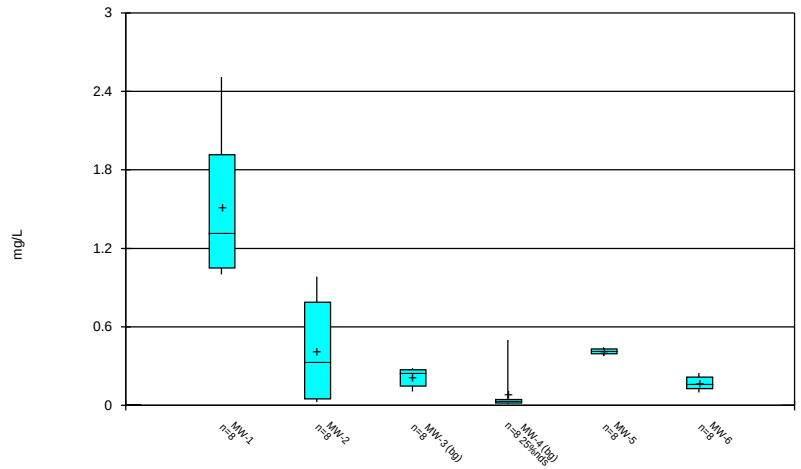


Constituent: Beryllium, dissolved Analysis Run 11/21/2019 1:42 PM

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Box & Whiskers Plot

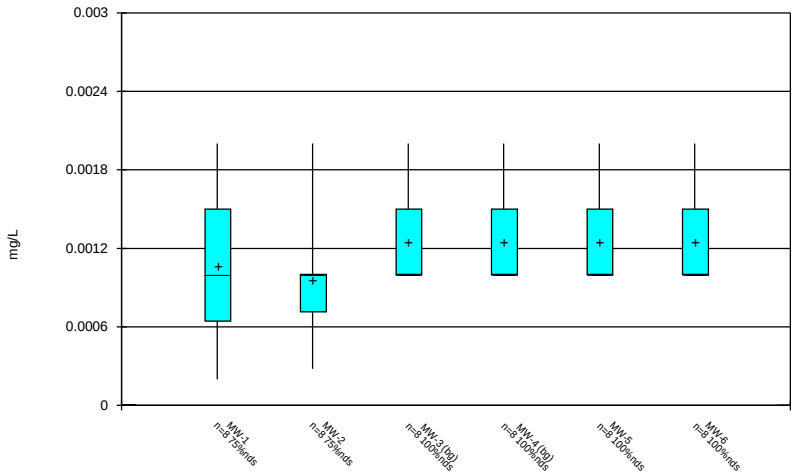


Constituent: Boron, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Box & Whiskers Plot

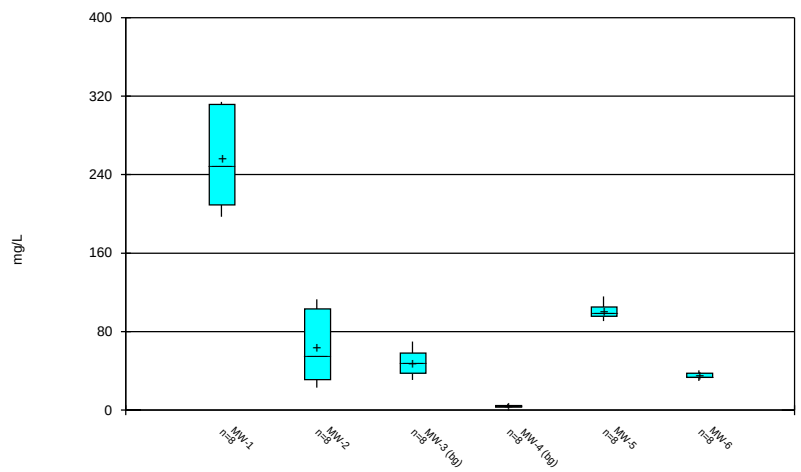


Constituent: Cadmium, dissolved Analysis Run 11/21/2019 1:42 PM

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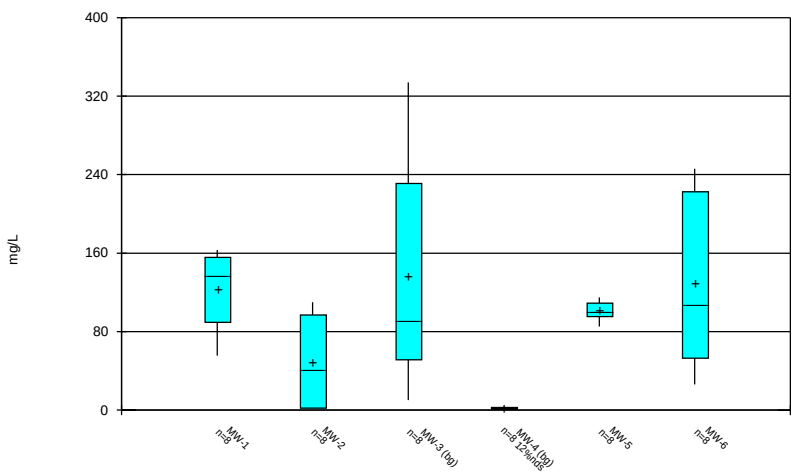


Constituent: Calcium, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Box & Whiskers Plot

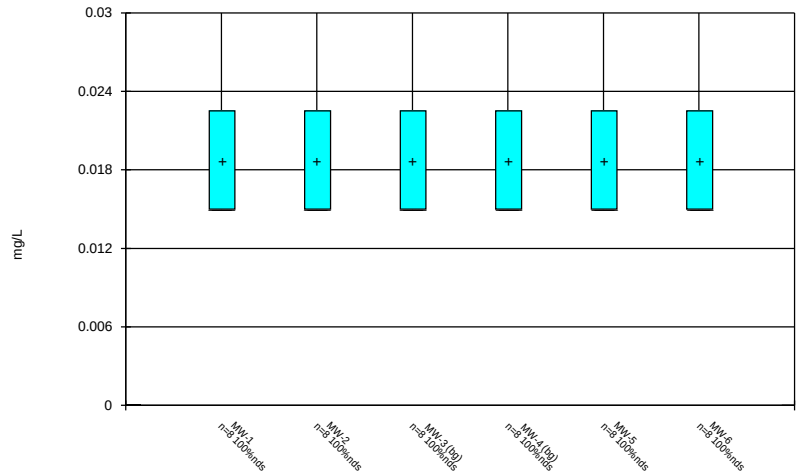


Constituent: Chloride Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

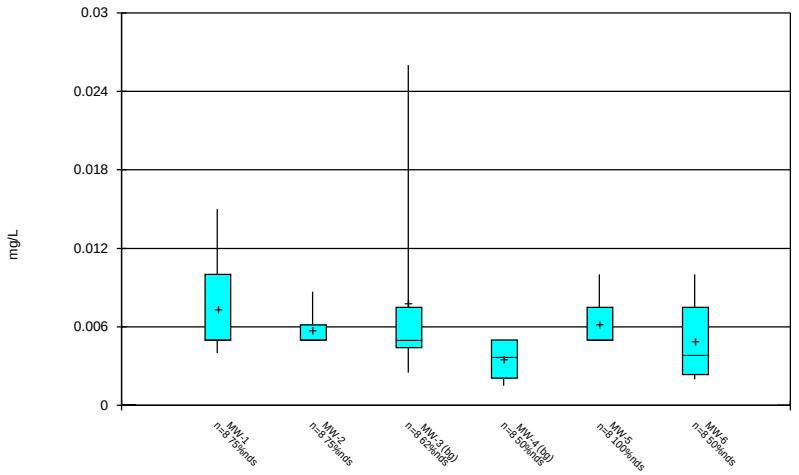


Constituent: Chromium, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

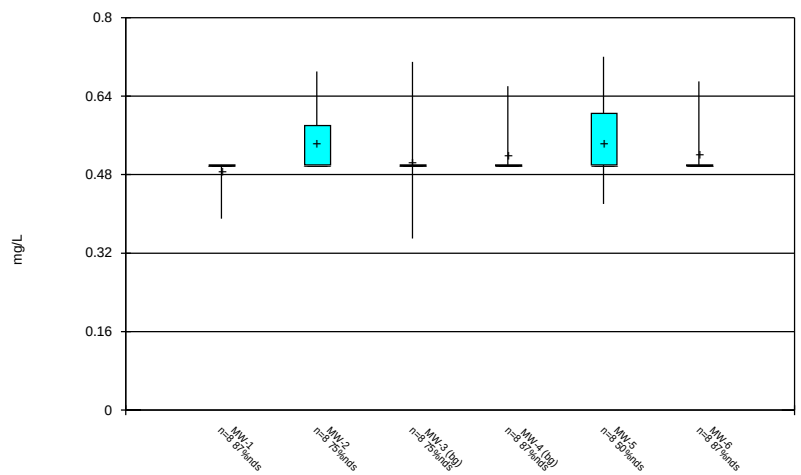


Constituent: Cobalt, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

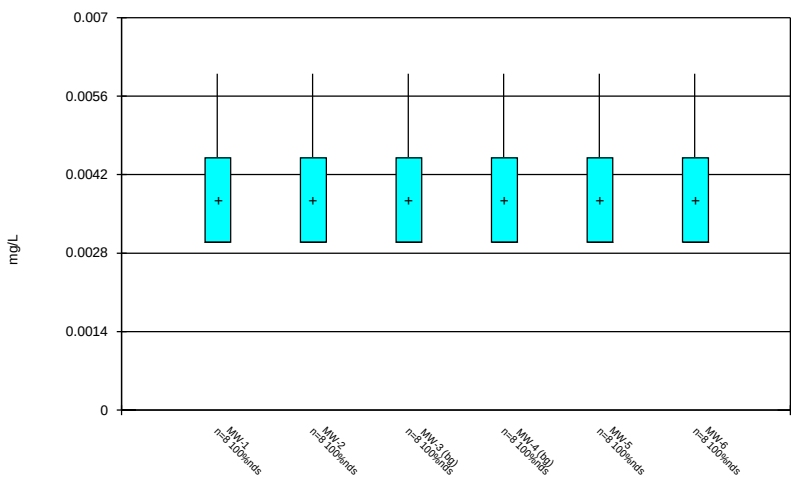


Constituent: Fluoride Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

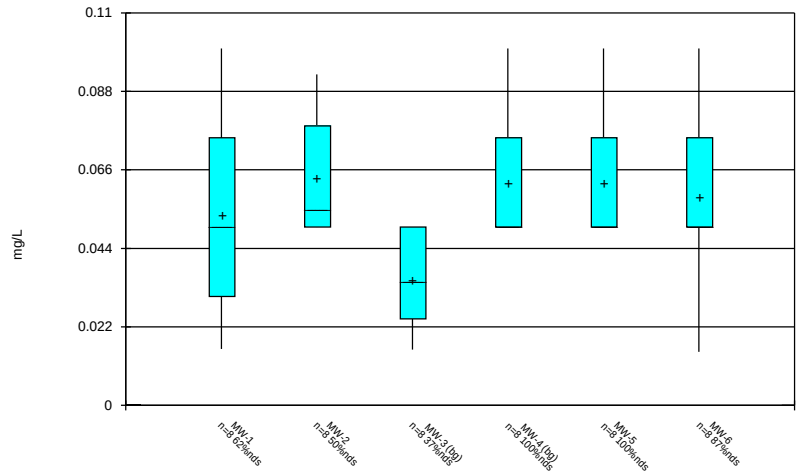


Constituent: Lead, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

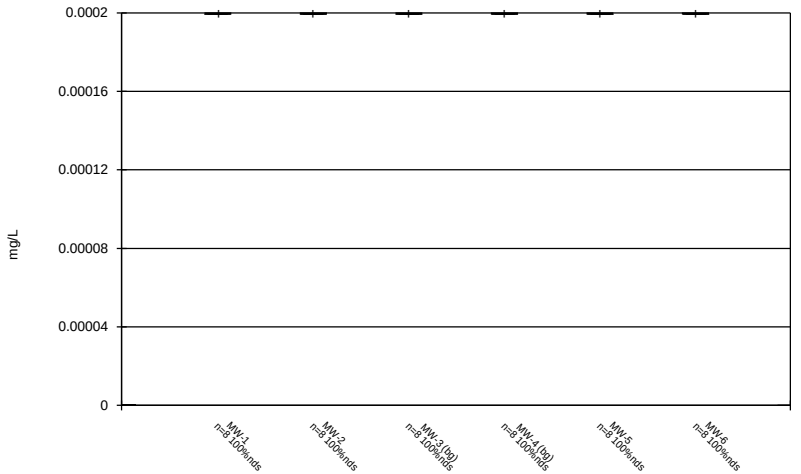


Constituent: Lithium, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

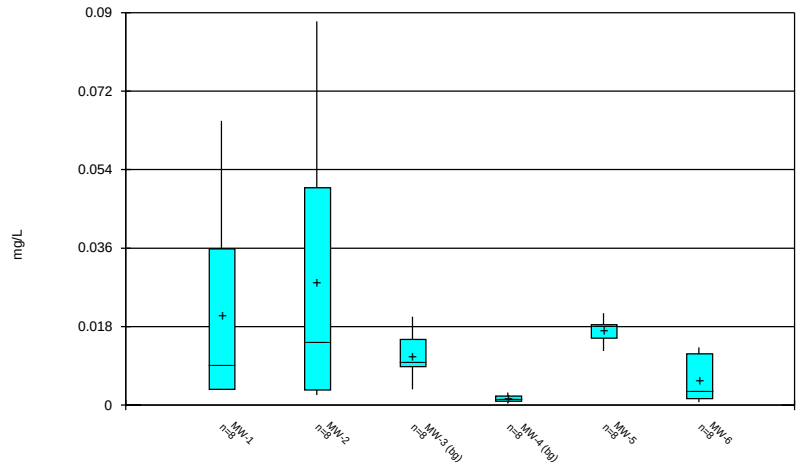


Constituent: Mercury, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

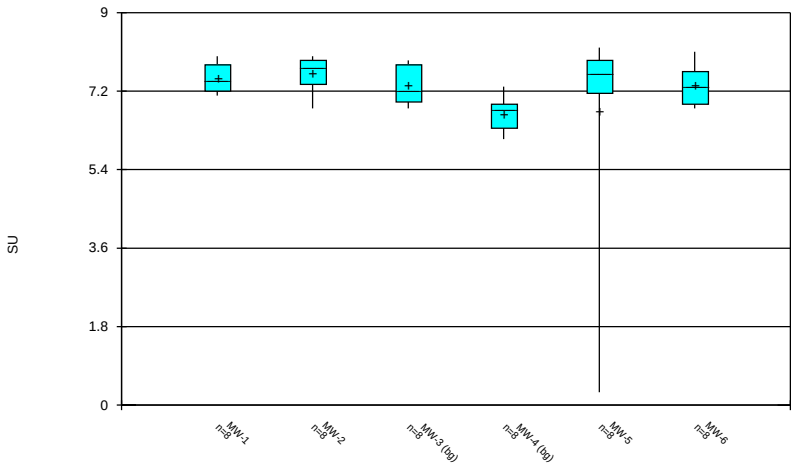


Constituent: Molybdenum, dissolved Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

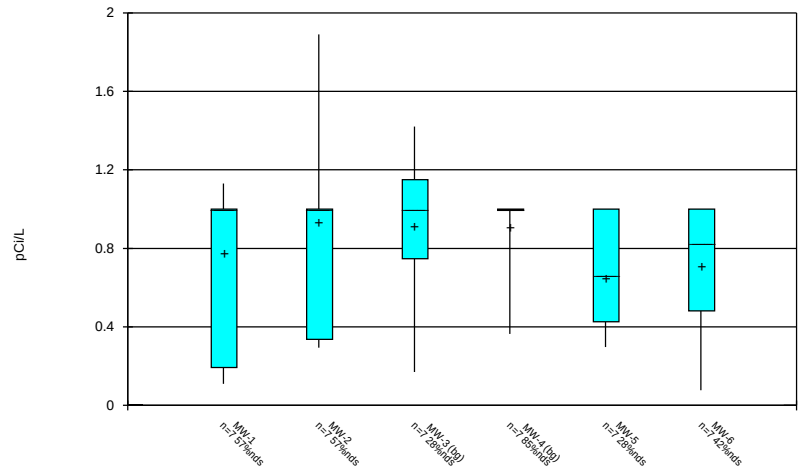


Constituent: pH Analysis Run 11/21/2019 1:42 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

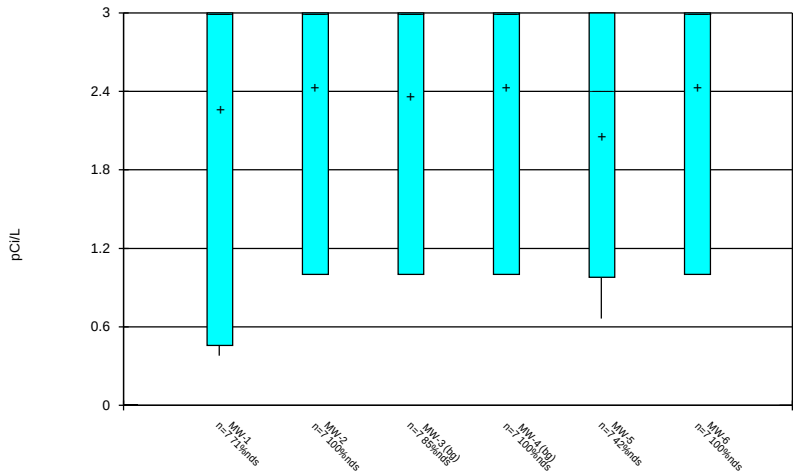


Constituent: Radium-226 Analysis Run 11/21/2019 1:43 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

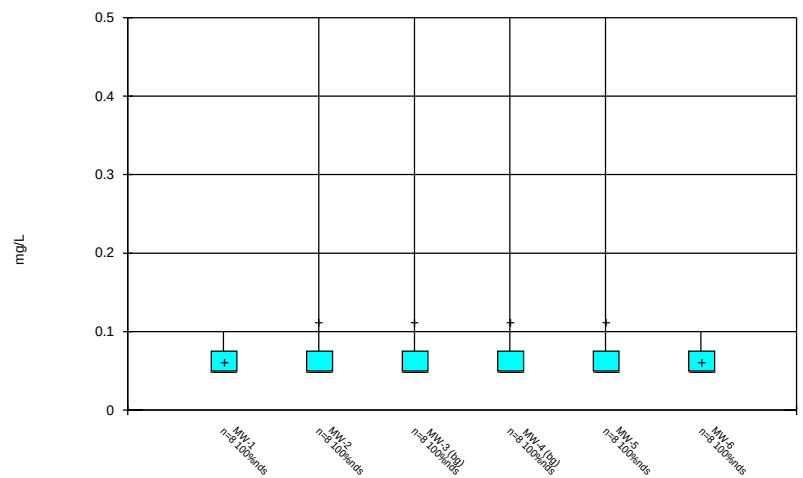


Constituent: Radium-228 Analysis Run 11/21/2019 1:43 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

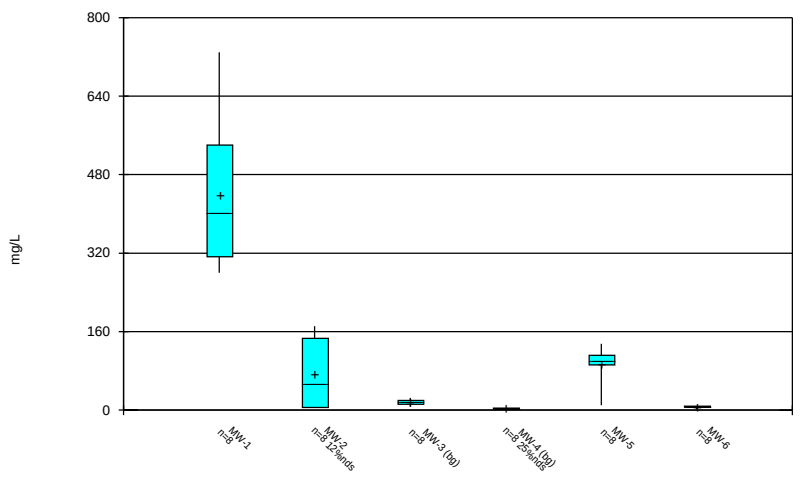


Constituent: Selenium, dissolved Analysis Run 11/21/2019 1:43 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

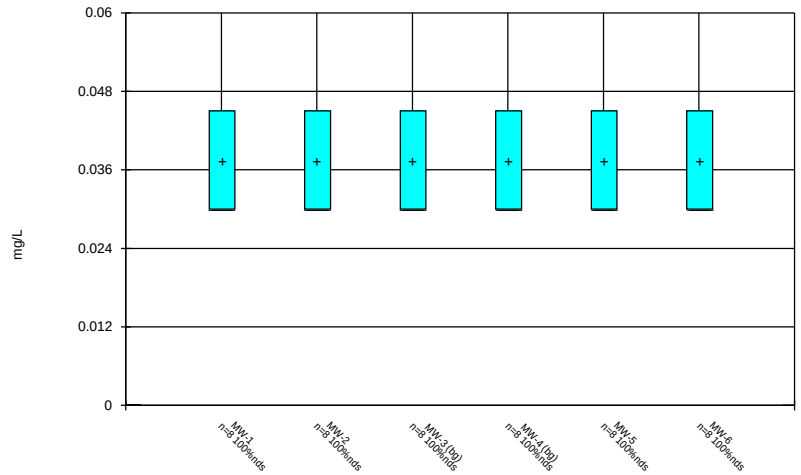


Constituent: Sulfate Analysis Run 11/21/2019 1:43 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

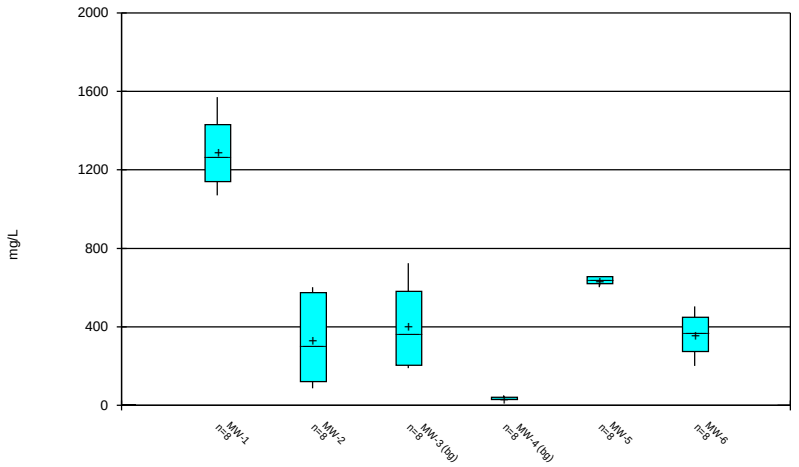


Constituent: Thallium, dissolved Analysis Run 11/21/2019 1:43 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Box & Whiskers Plot

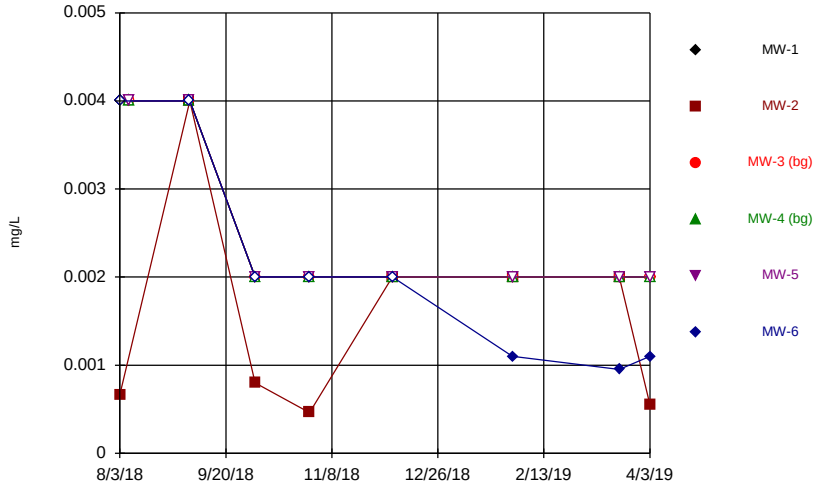


Constituent: Total Dissolved Solids Analysis Run 11/21/2019 1:43 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

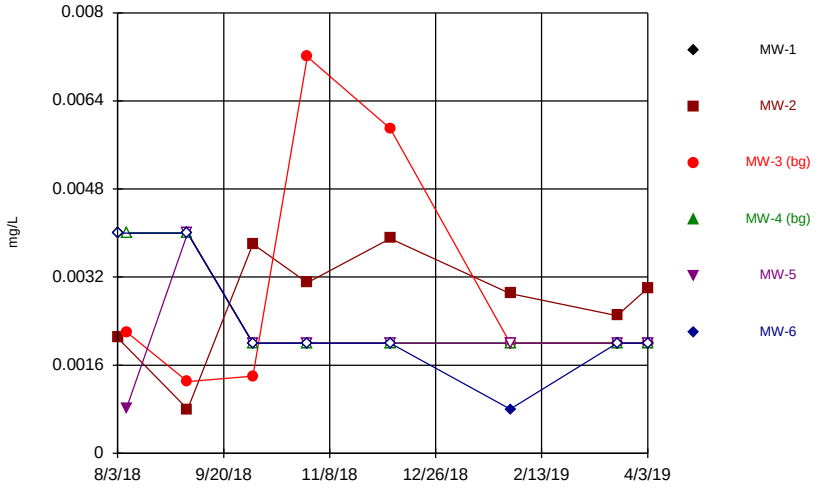


Constituent: Antimony, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

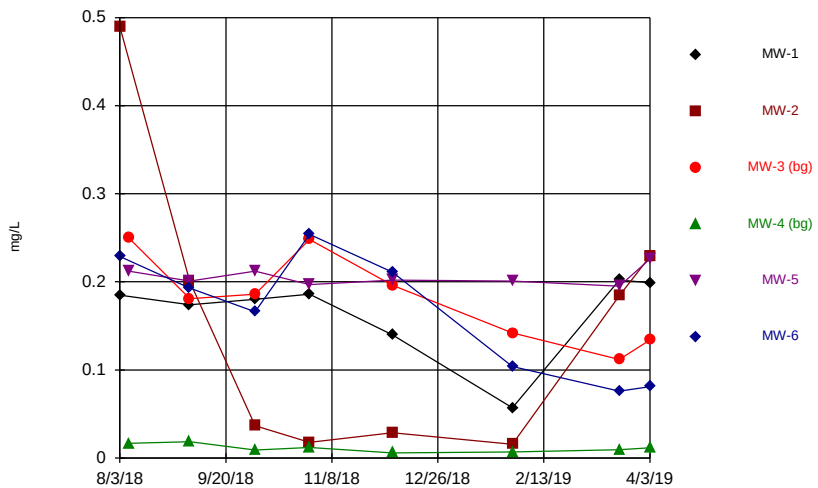


Constituent: Arsenic, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Time Series

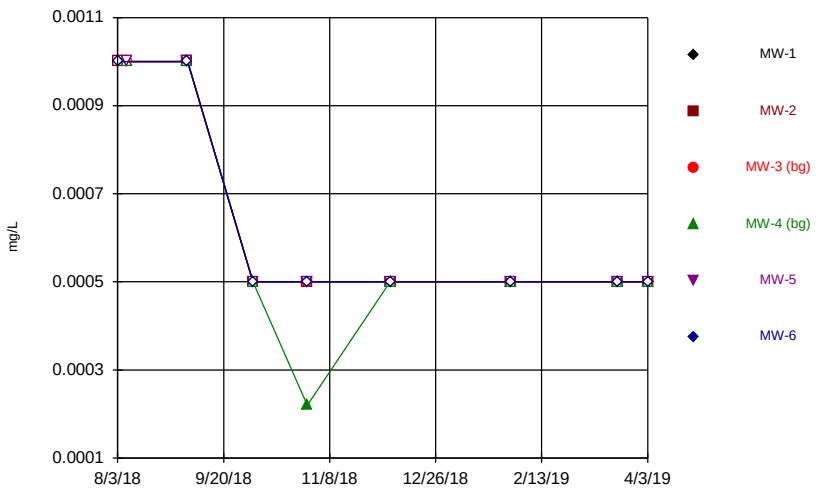


Constituent: Barium, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

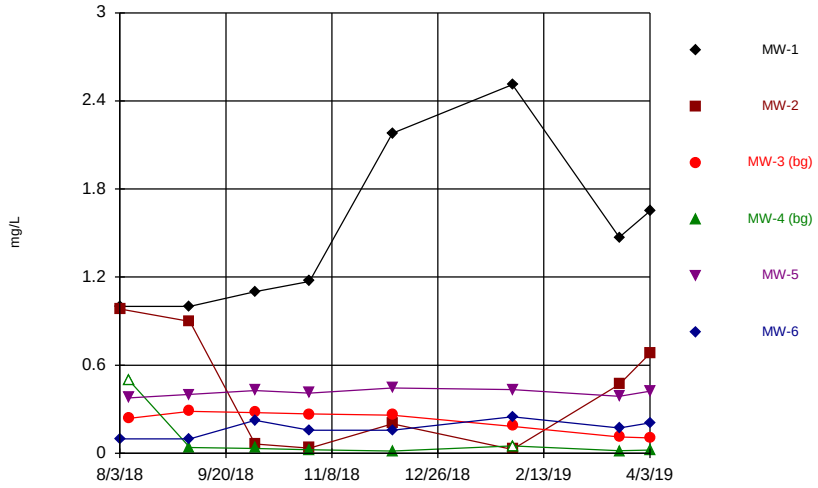


Constituent: Beryllium, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

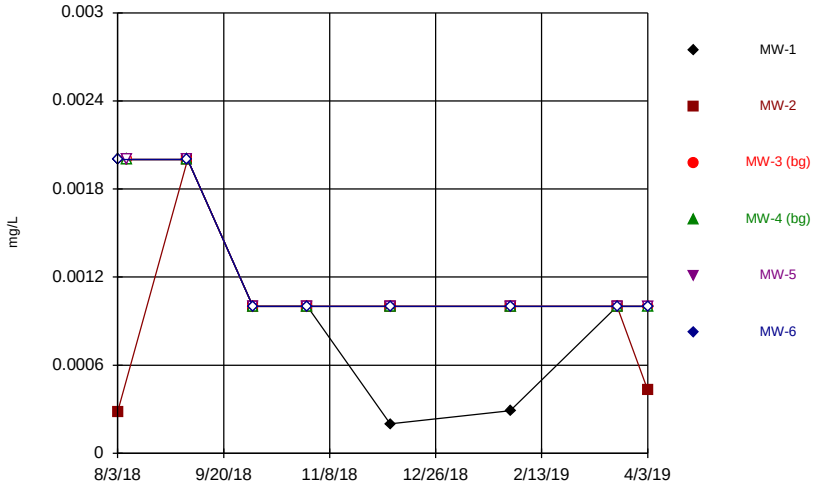


Constituent: Boron, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

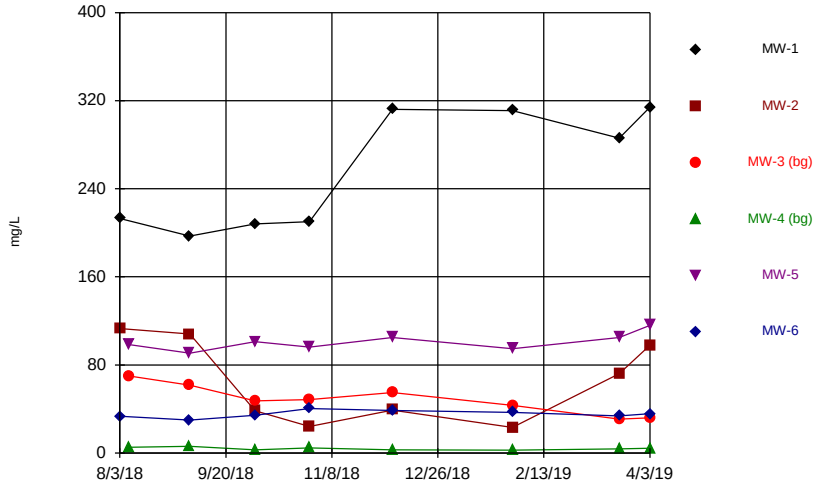


Constituent: Cadmium, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Time Series

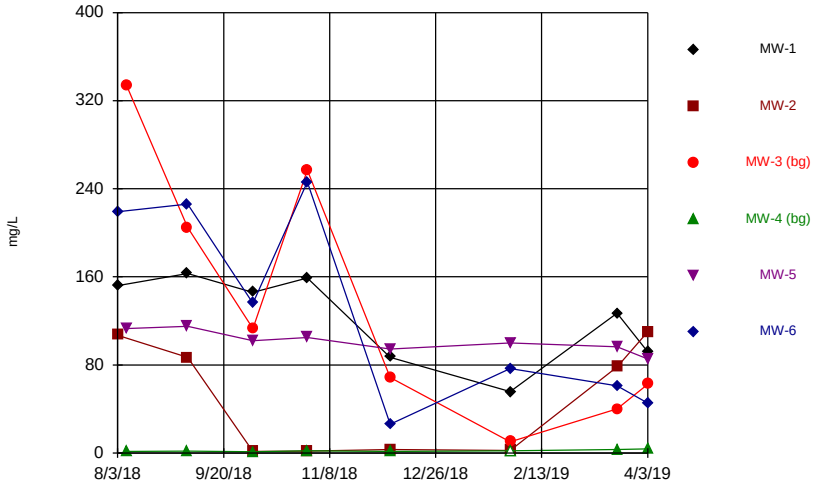


Constituent: Calcium, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

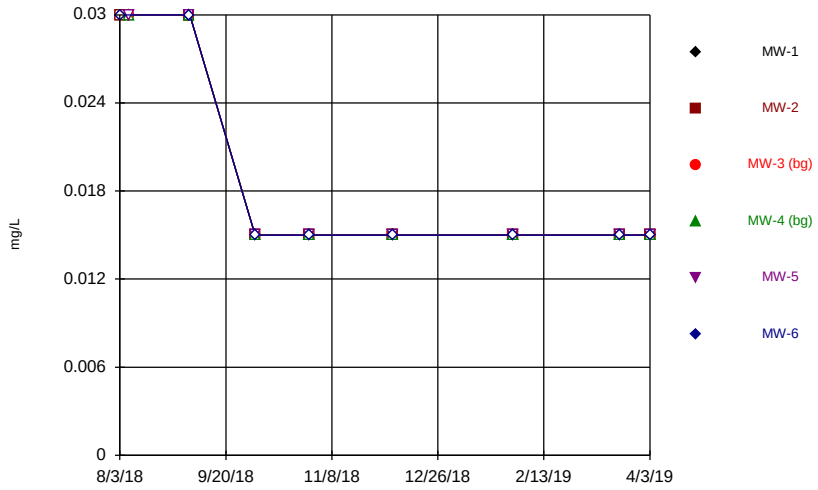


Constituent: Chloride Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

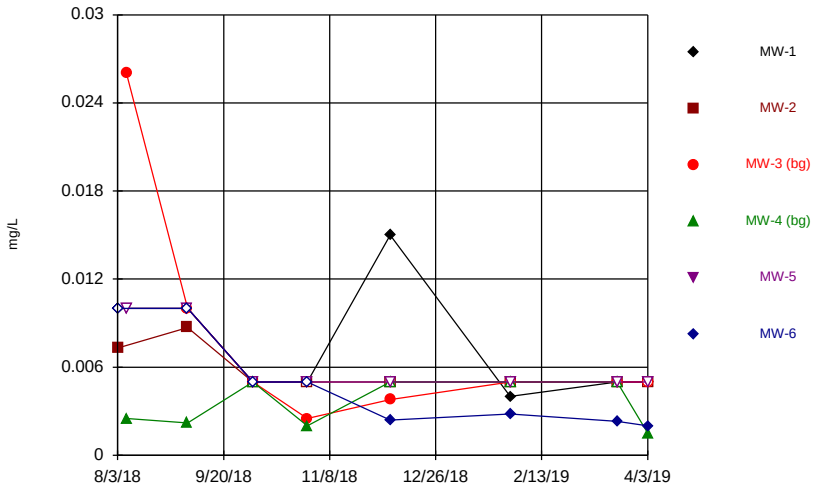


Constituent: Chromium, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

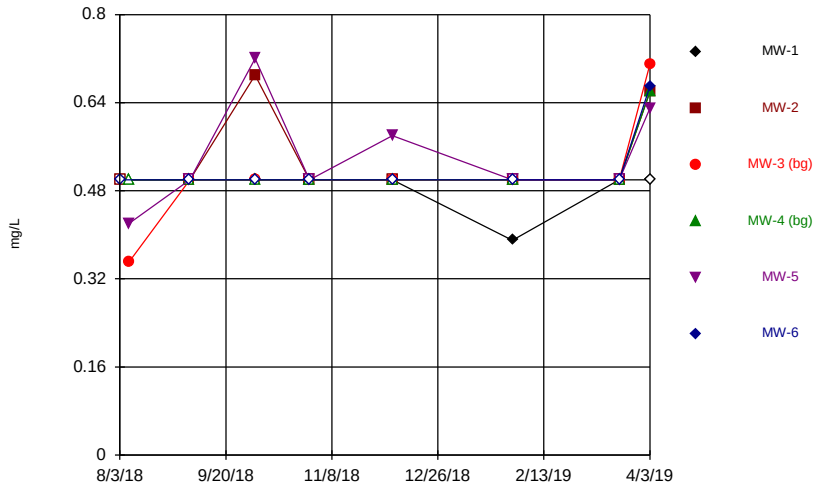


Constituent: Cobalt, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

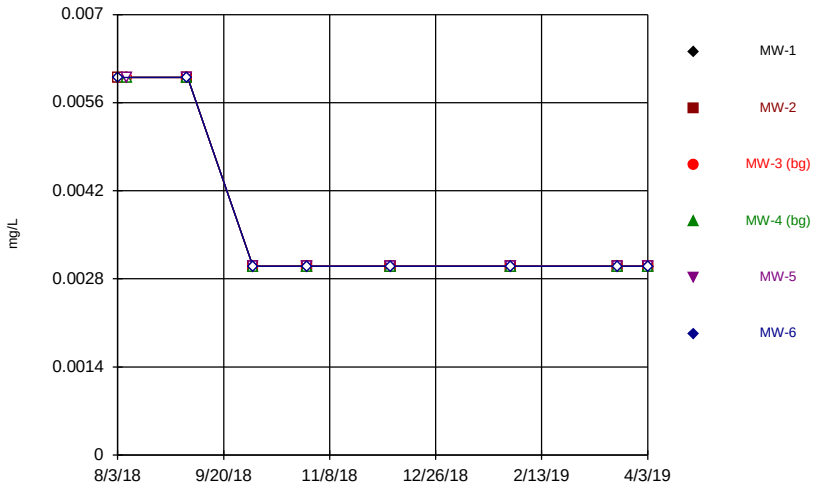


Constituent: Fluoride Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

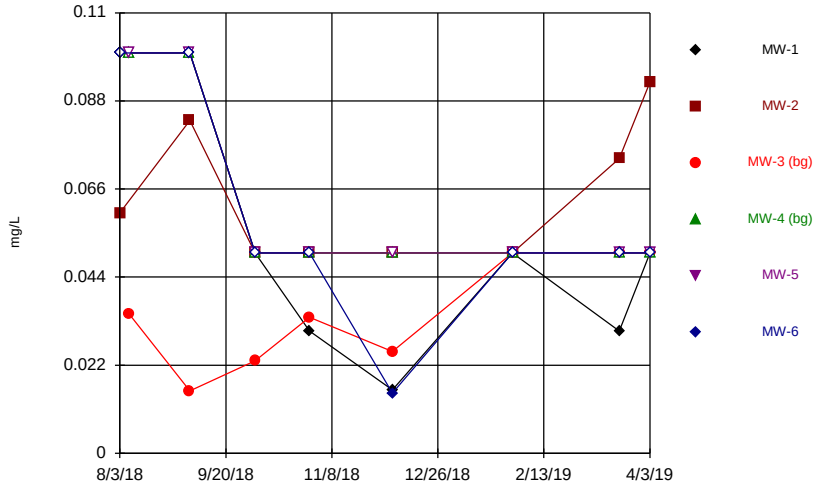


Constituent: Lead, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

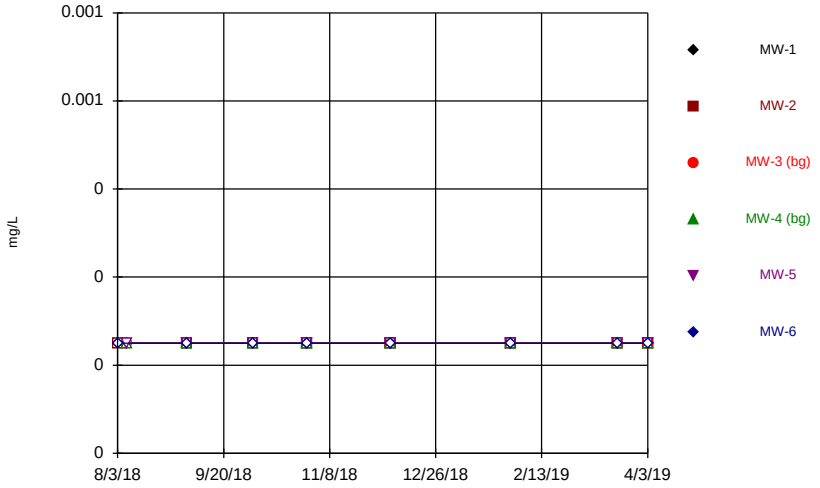


Constituent: Lithium, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

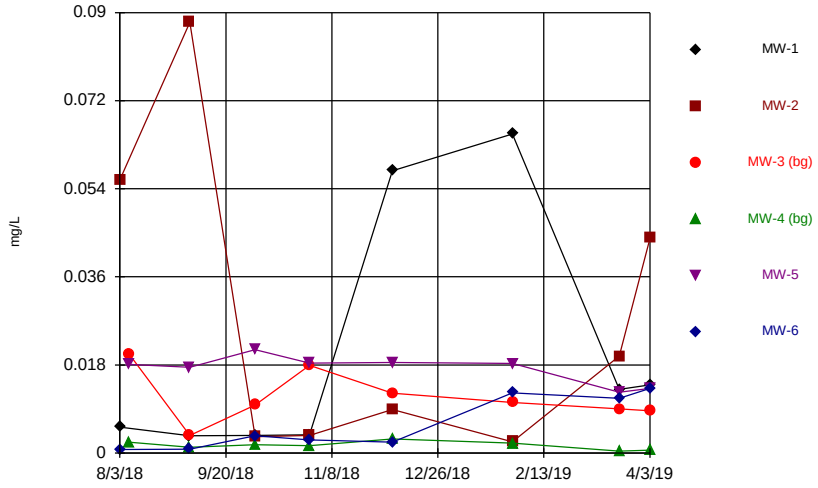


Constituent: Mercury, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Time Series

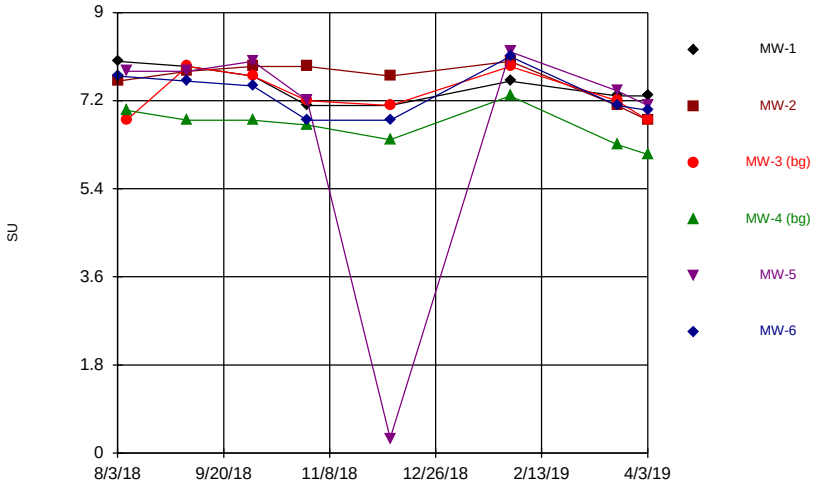


Constituent: Molybdenum, dissolved Analysis Run 11/21/2019 1:46 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Time Series

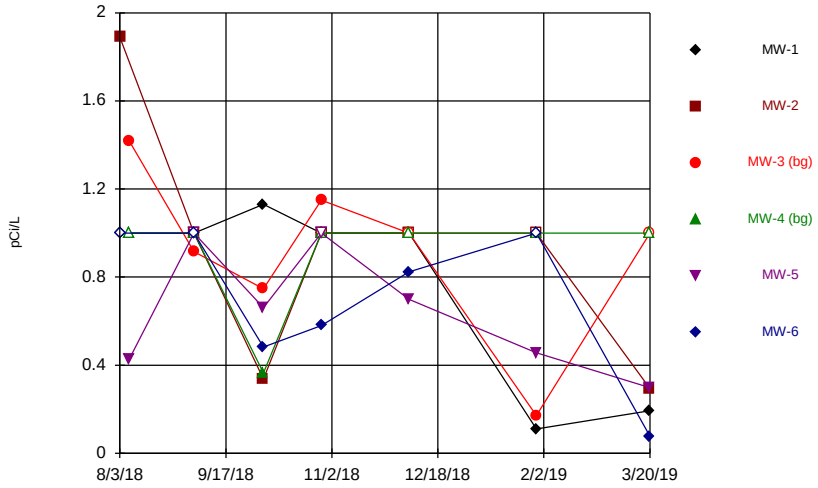


Constituent: pH Analysis Run 11/21/2019 1:47 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

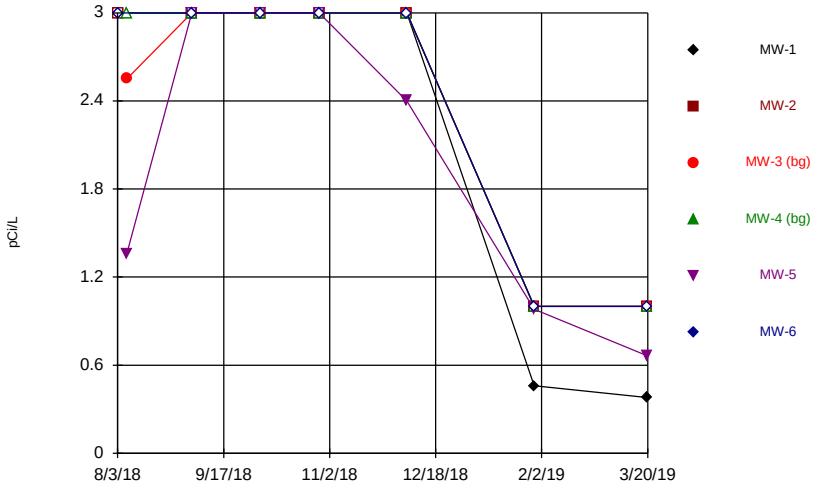


Constituent: Radium-226 Analysis Run 11/21/2019 1:47 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

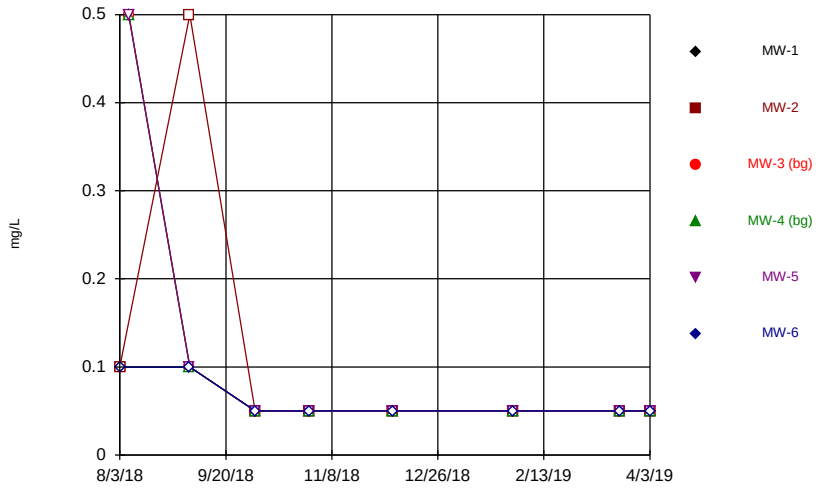


Constituent: Radium-228 Analysis Run 11/21/2019 1:47 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

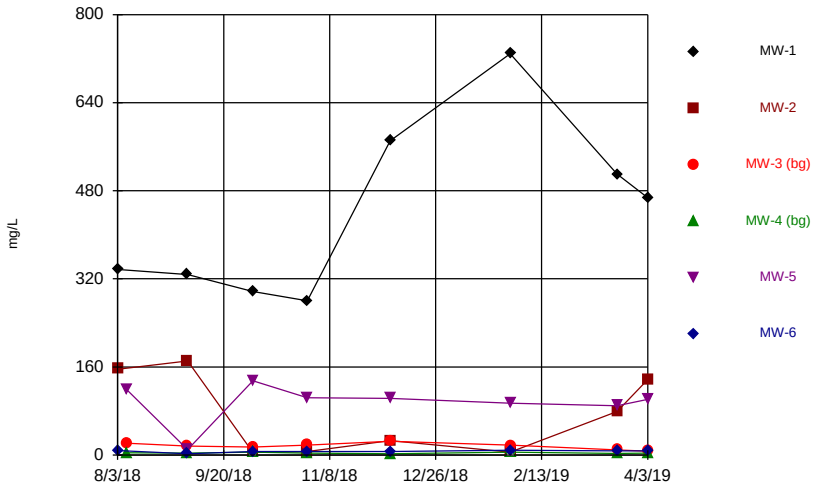


Constituent: Selenium, dissolved Analysis Run 11/21/2019 1:47 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

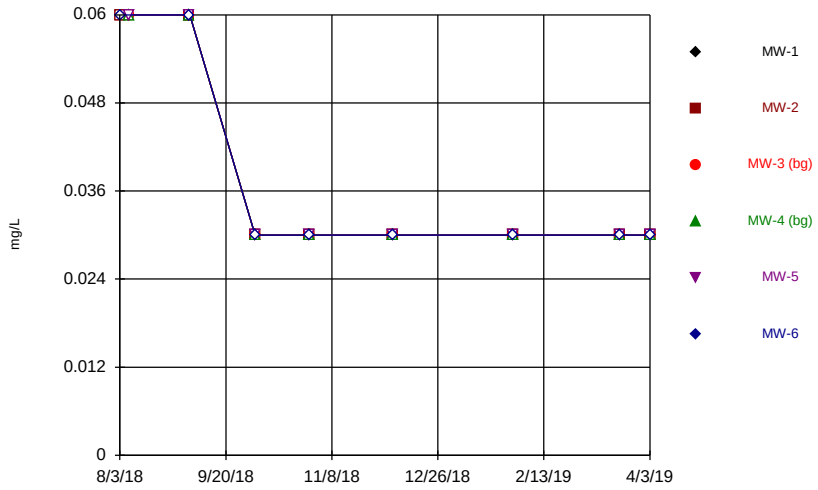


Constituent: Sulfate Analysis Run 11/21/2019 1:47 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Time Series

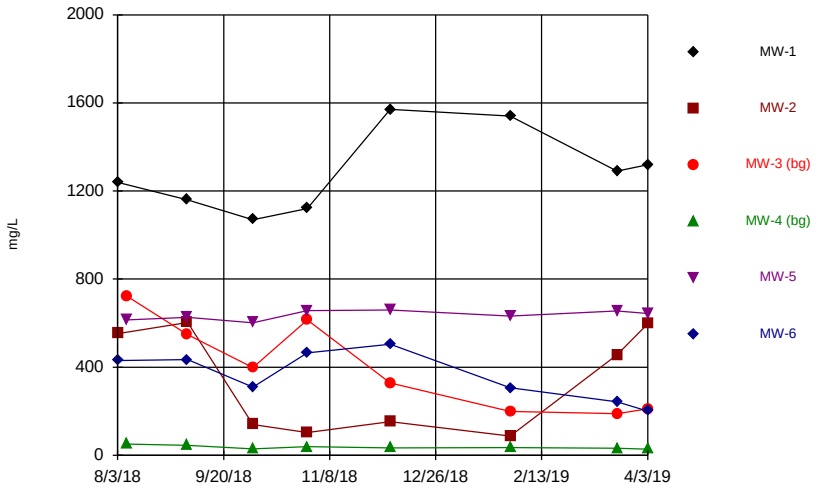


Constituent: Thallium, dissolved Analysis Run 11/21/2019 1:47 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.23 Software licensed to Weaver Consultants Group. UG

Time Series



Constituent: Total Dissolved Solids Analysis Run 11/21/2019 1:47 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

APPENDIX F

Appendix III Constituent Mann-Kendall Trend Tests

Trend Test

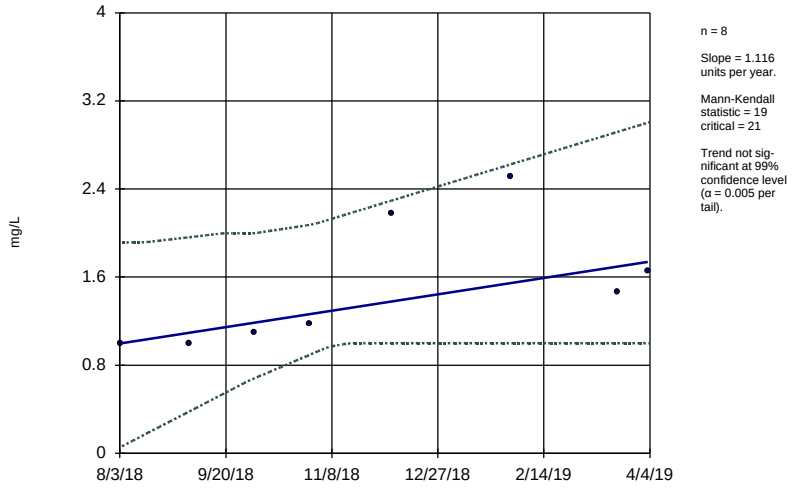
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 2/18/2020, 1:13 PM

Constituent	Well	Slope	Critical	Sig.	N	%NDs	Alpha
Boron, dissolved (mg/L)	MW-1	1.116	21	No	8	0	0.01
Boron, dissolved (mg/L)	MW-2	-0.3945	-21	No	8	0	0.01
Boron, dissolved (mg/L)	MW-3 (bg)	-0.2267	-21	No	8	0	0.01
Boron, dissolved (mg/L)	MW-4 (bg)	-0.05211	-21	No	8	25	0.01
Boron, dissolved (mg/L)	MW-5	0.05221	21	No	8	0	0.01
Boron, dissolved (mg/L)	MW-6	0.1465	21	No	8	0	0.01
Calcium, dissolved (mg/L)	MW-1	167.7	21	No	8	0	0.01
Calcium, dissolved (mg/L)	MW-2	-34.77	-21	No	8	0	0.01
Calcium, dissolved (mg/L)	MW-3 (bg)	-53.17	-21	No	8	0	0.01
Calcium, dissolved (mg/L)	MW-4 (bg)	-1.772	-21	No	8	0	0.01
Calcium, dissolved (mg/L)	MW-5	22.77	21	No	8	0	0.01
Calcium, dissolved (mg/L)	MW-6	4.301	21	No	8	0	0.01
Chloride (mg/L)	MW-1	-99.69	-21	No	8	0	0.01
Chloride (mg/L)	MW-2	2.697	21	No	8	0	0.01
Chloride (mg/L)	MW-3 (bg)	-363.1	-21	No	8	0	0.01
Chloride (mg/L)	MW-4 (bg)	3.083	21	No	8	12.5	0.01
Chloride (mg/L)	MW-5	-34.82	-21	No	8	0	0.01
Chloride (mg/L)	MW-6	-274.6	-21	No	8	0	0.01
Fluoride (mg/L)	MW-1	0	-21	No	8	87.5	0.01
Fluoride (mg/L)	MW-2	0	21	No	8	75	0.01
Fluoride (mg/L)	MW-3 (bg)	0	21	No	8	75	0.01
Fluoride (mg/L)	MW-4 (bg)	0	21	No	8	87.5	0.01
Fluoride (mg/L)	MW-5	0.1422	21	No	8	50	0.01
Fluoride (mg/L)	MW-6	0	21	No	8	87.5	0.01
pH (SU)	MW-1	-1.045	-21	No	8	0	0.01
pH (SU)	MW-2	-0.9778	-21	No	8	0	0.01
pH (SU)	MW-3 (bg)	-0.9319	-21	No	8	0	0.01
pH (SU)	MW-4 (bg)	-1.235	-21	No	8	0	0.01
pH (SU)	MW-5	-0.9051	-21	No	8	0	0.01
pH (SU)	MW-6	-1.023	-21	No	8	0	0.01
Sulfate (mg/L)	MW-1	306.5	21	No	8	0	0.01
Sulfate (mg/L)	MW-2	-2.129	21	No	8	12.5	0.01
Sulfate (mg/L)	MW-3 (bg)	-15.72	-21	No	8	0	0.01
Sulfate (mg/L)	MW-4 (bg)	-1.03	-21	No	8	25	0.01
Sulfate (mg/L)	MW-5	-36.89	-21	No	8	0	0.01
Sulfate (mg/L)	MW-6	2.514	21	No	8	0	0.01
Total Dissolved Solids (mg/L)	MW-1	356.9	21	No	8	0	0.01
Total Dissolved Solids (mg/L)	MW-2	-35.61	-21	No	8	0	0.01
Total Dissolved Solids (mg/L)	MW-3 (bg)	-724.3	-21	No	8	0	0.01
Total Dissolved Solids (mg/L)	MW-4 (bg)	-28.57	-21	No	8	0	0.01
Total Dissolved Solids (mg/L)	MW-5	49.77	21	No	8	0	0.01
Total Dissolved Solids (mg/L)	MW-6	-329.8	-21	No	8	0	0.01

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Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 1.116 units per year.

Mann-Kendall statistic = 19
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

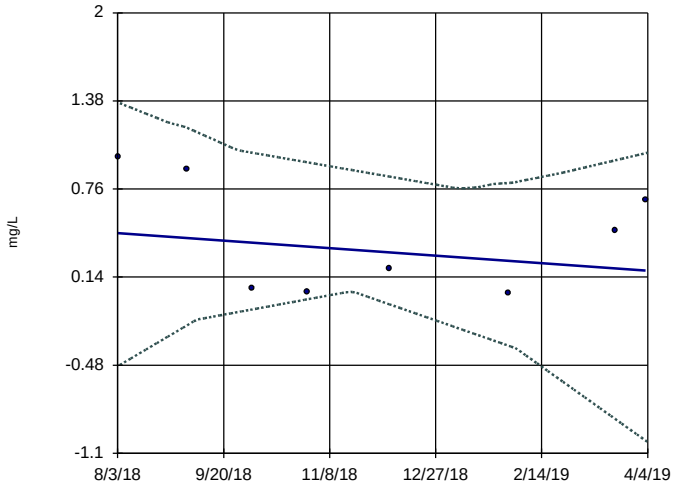
Constituent: Boron, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = -0.3945 units per year.

Mann-Kendall statistic = -6
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

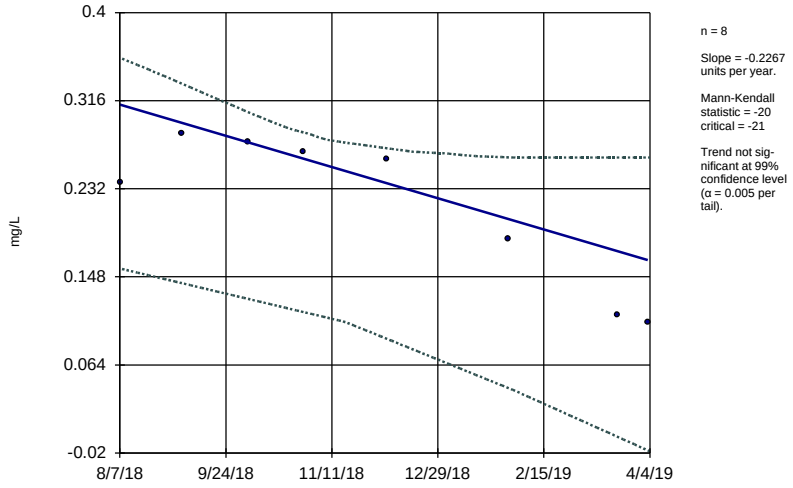
Constituent: Boron, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -0.2267 units per year.

Mann-Kendall statistic = -20
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron, dissolved Analysis Run 2/18/2020 1:12 PM

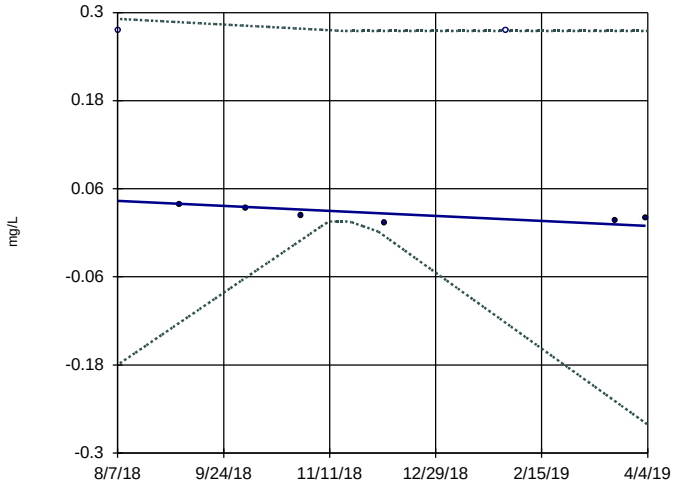
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = -0.05211 units per year.

Mann-Kendall statistic = -13
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

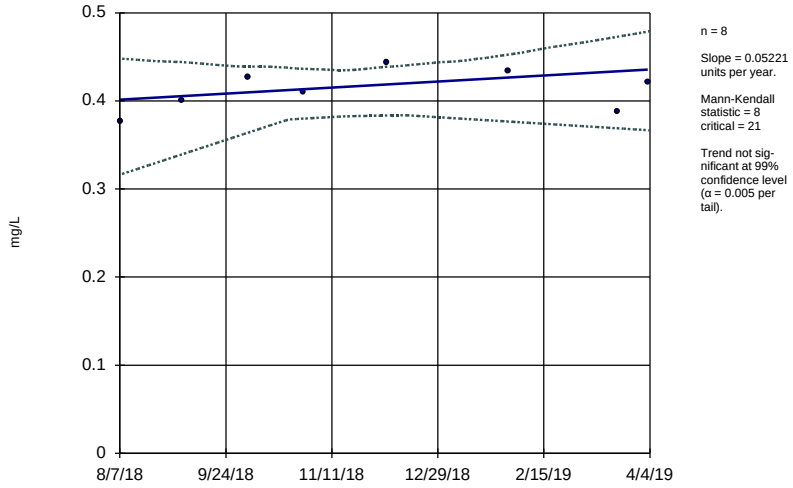
Constituent: Boron, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0.05221 units per year.

Mann-Kendall statistic = 8
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

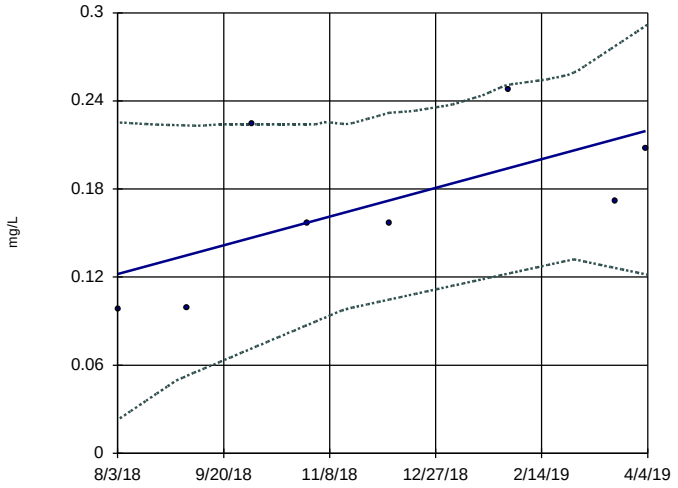
Constituent: Boron, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0.1465 units per year.

Mann-Kendall statistic = 15
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

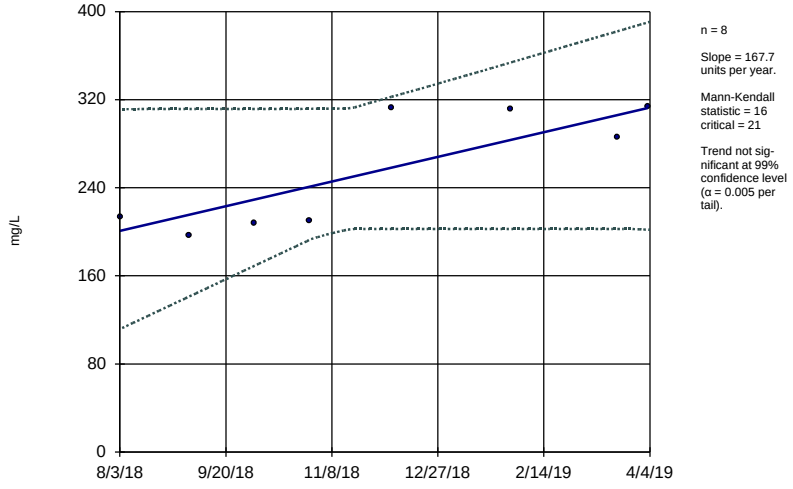
Constituent: Boron, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 167.7 units per year.

Mann-Kendall statistic = 16
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

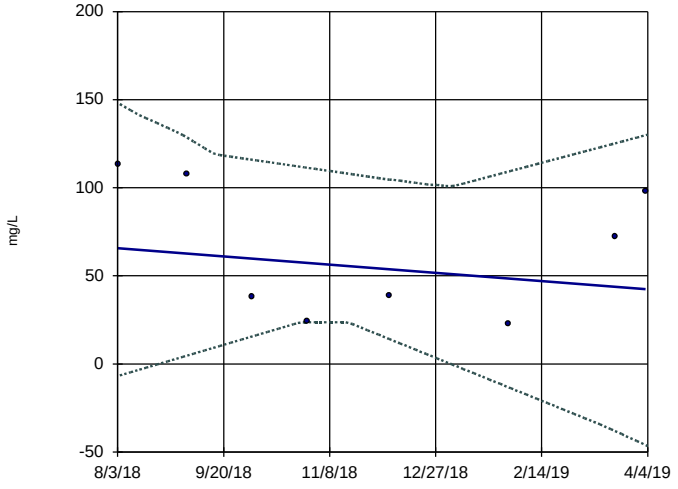
Constituent: Calcium, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = -34.77 units per year.

Mann-Kendall statistic = -6
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

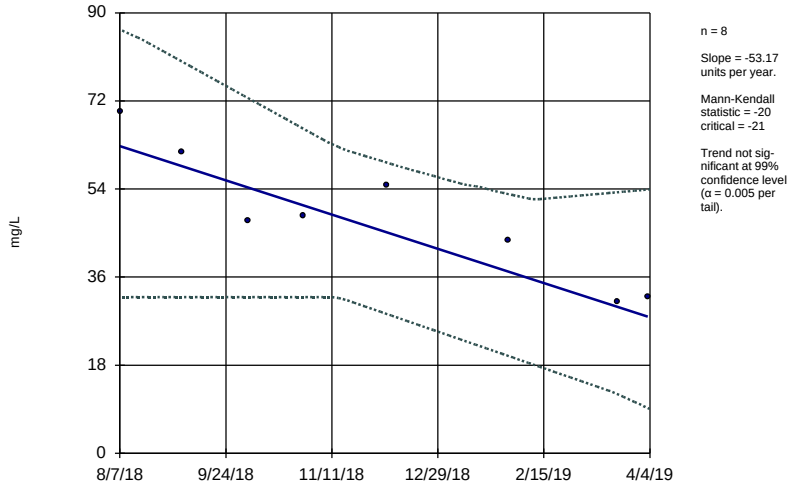
Constituent: Calcium, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -53.17 units per year.

Mann-Kendall statistic = -20 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

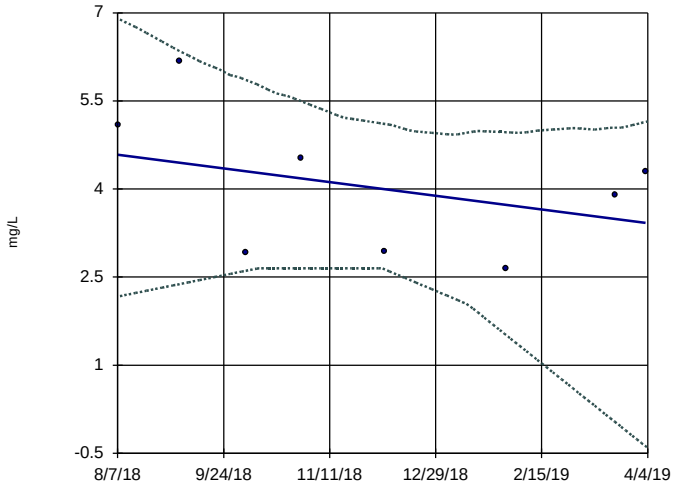
Constituent: Calcium, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = -1.772 units per year.

Mann-Kendall statistic = -8 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

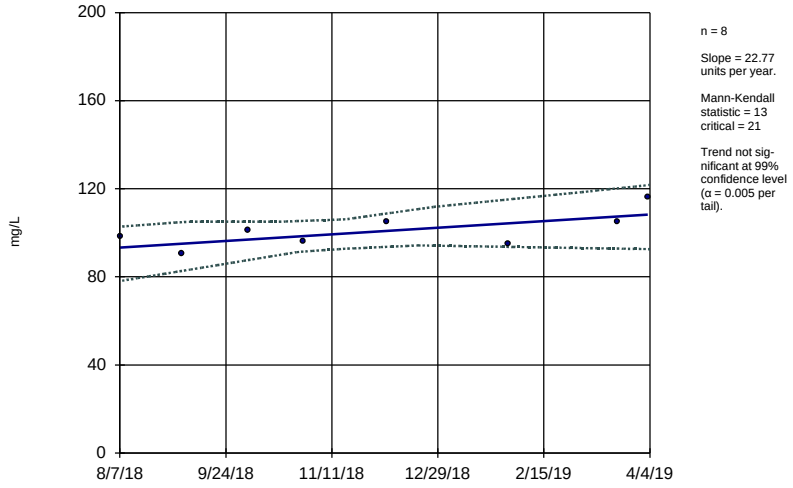
Constituent: Calcium, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 22.77 units per year.

Mann-Kendall statistic = 13 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

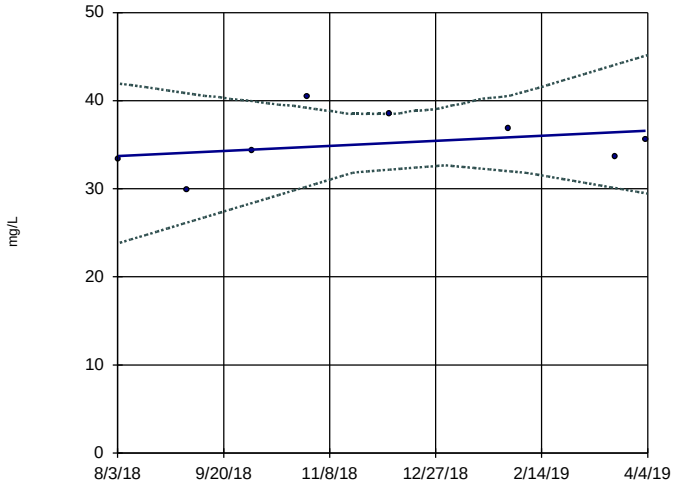
Constituent: Calcium, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 4.301 units per year.

Mann-Kendall statistic = 6 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

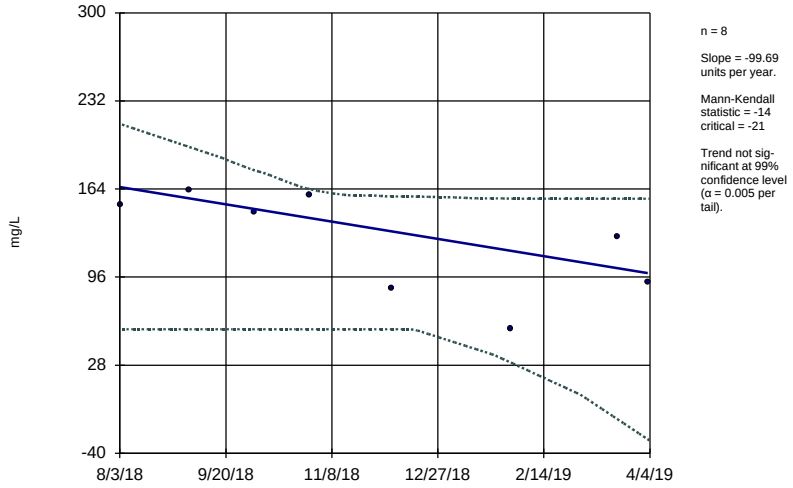
Constituent: Calcium, dissolved Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = -99.69 units per year.

Mann-Kendall statistic = -14 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

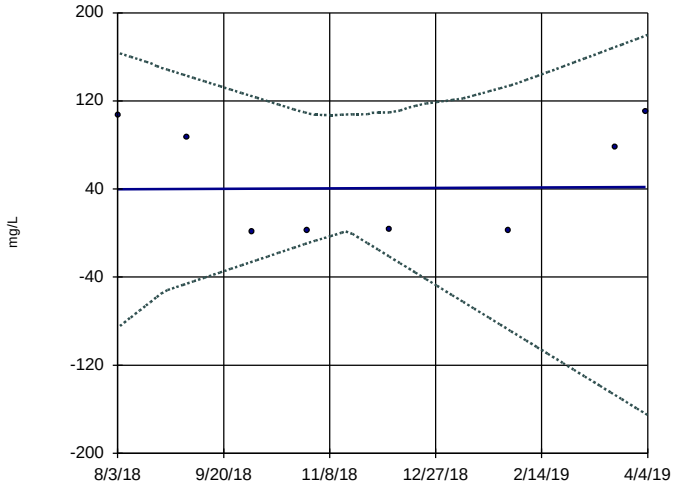
Constituent: Chloride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = 2.697 units per year.

Mann-Kendall statistic = 4 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

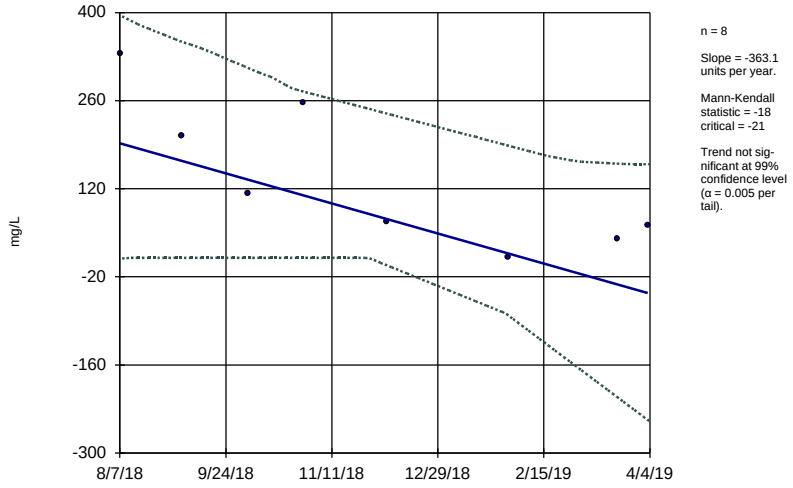
Constituent: Chloride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -363.1 units per year.

Mann-Kendall statistic = -18 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 2/18/2020 1:12 PM

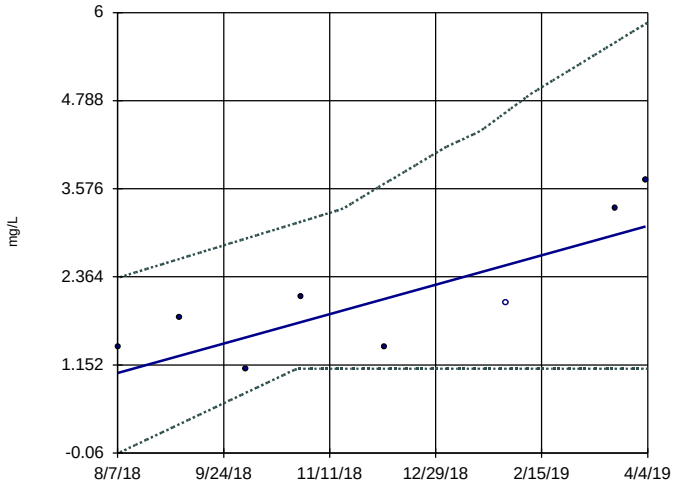
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 3.083 units per year.

Mann-Kendall statistic = 17 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

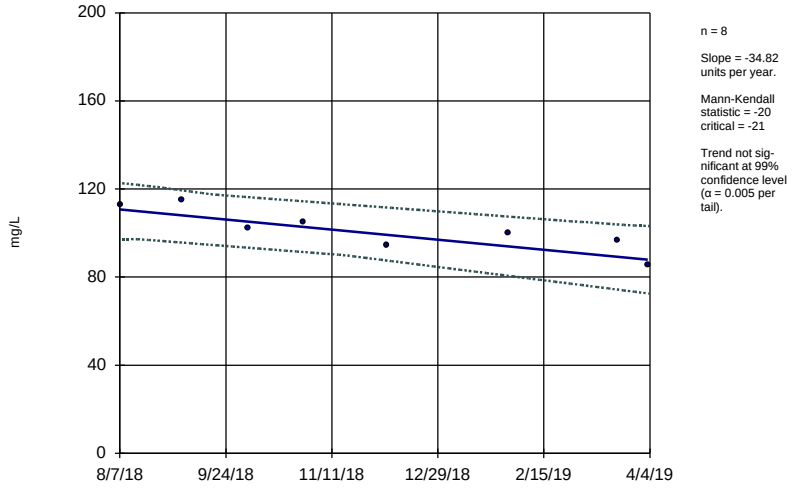
Constituent: Chloride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-5



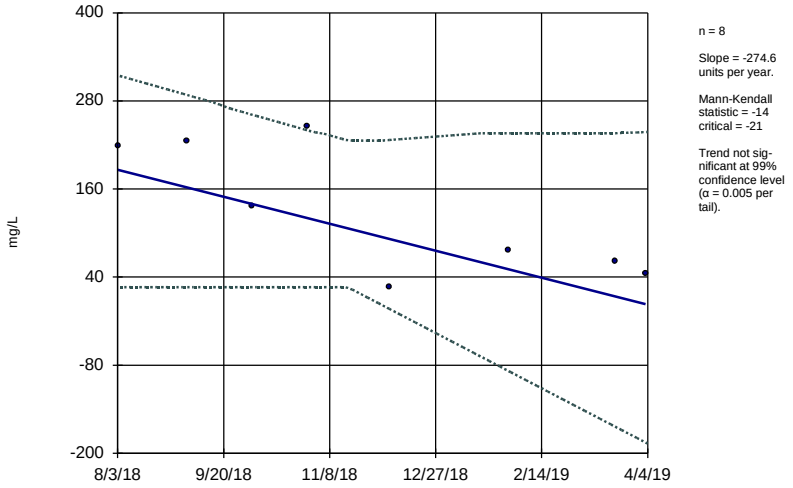
Constituent: Chloride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-6



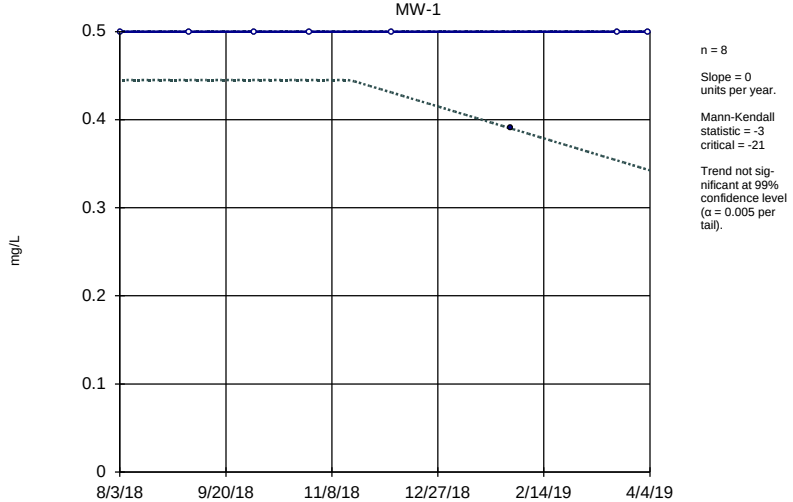
Constituent: Chloride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



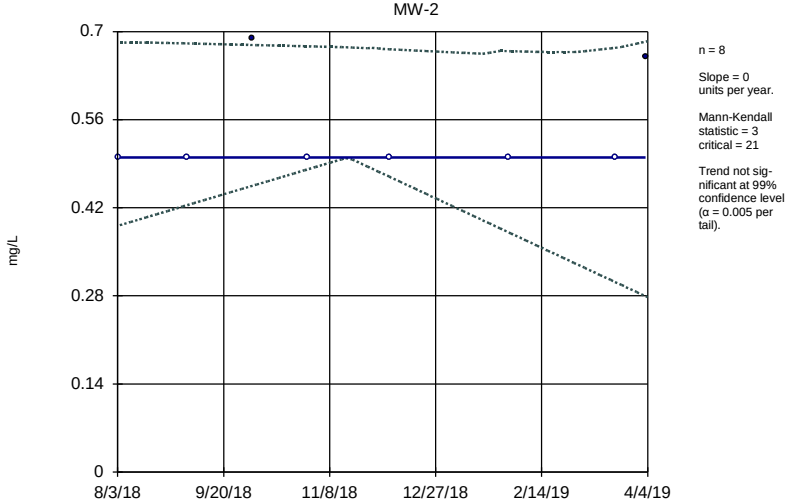
Constituent: Fluoride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



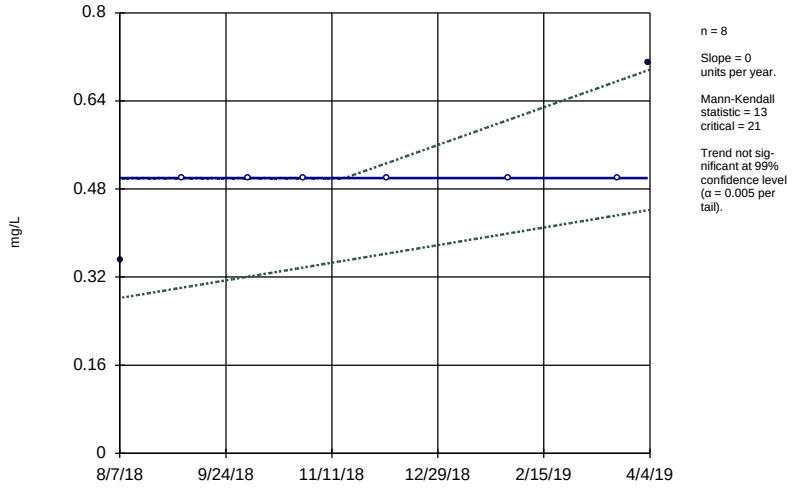
Constituent: Fluoride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 13 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

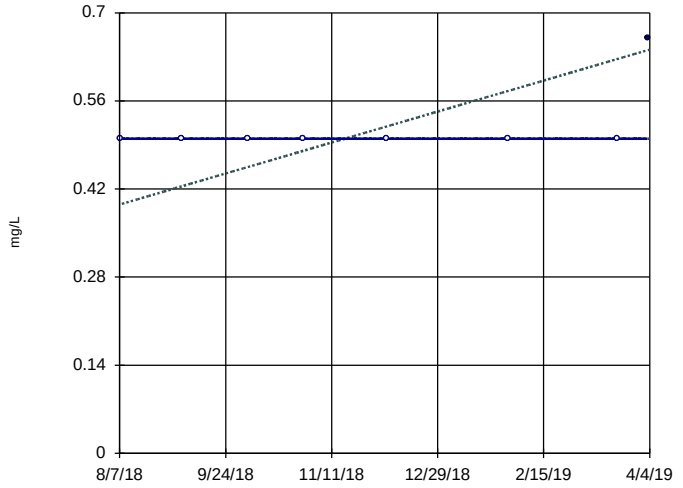
Constituent: Fluoride Analysis Run 2/18/2020 1:12 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 7 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

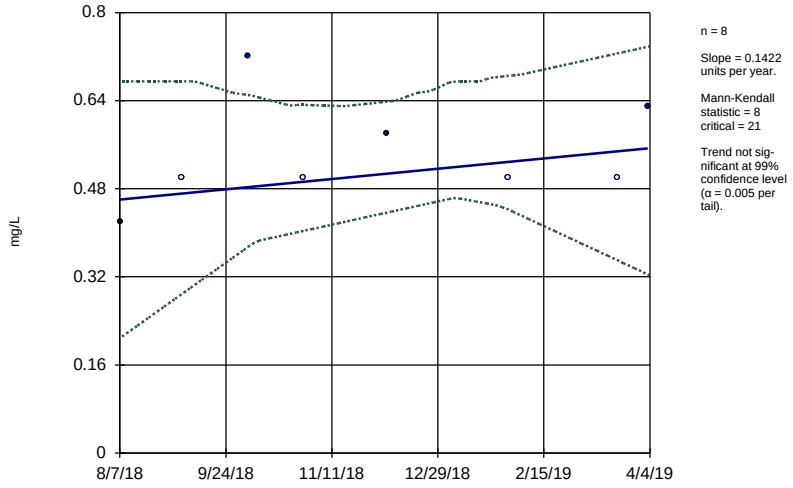
Constituent: Fluoride Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0.1422 units per year.

Mann-Kendall statistic = 8 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

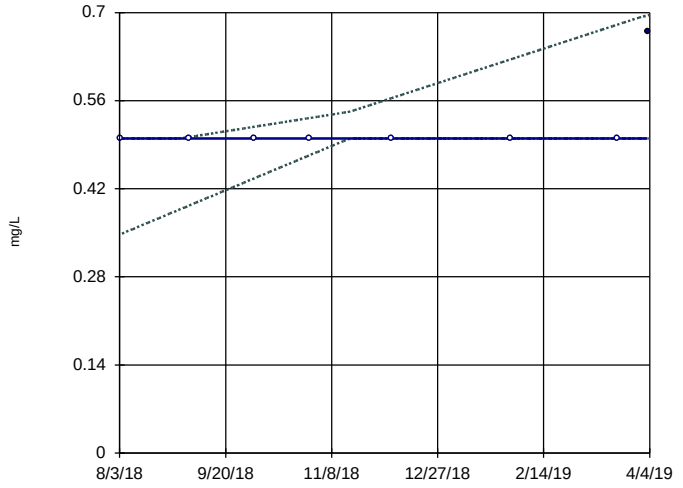
Constituent: Fluoride Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 7 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

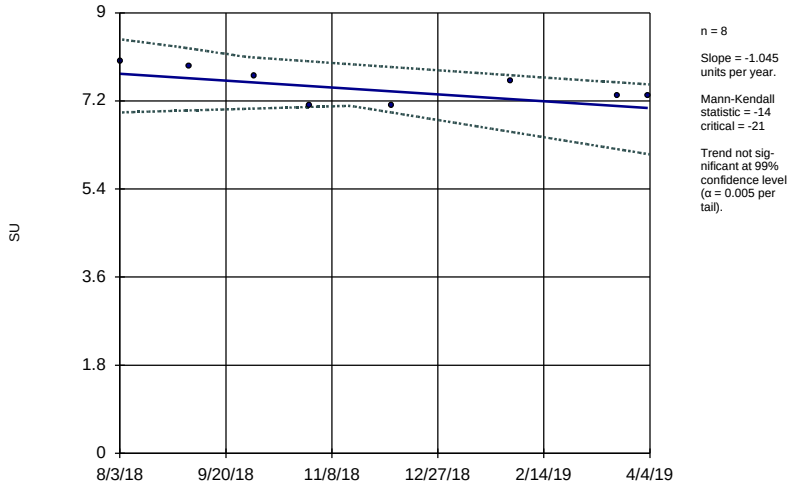
Constituent: Fluoride Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = -1.045 units per year.

Mann-Kendall statistic = -14 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

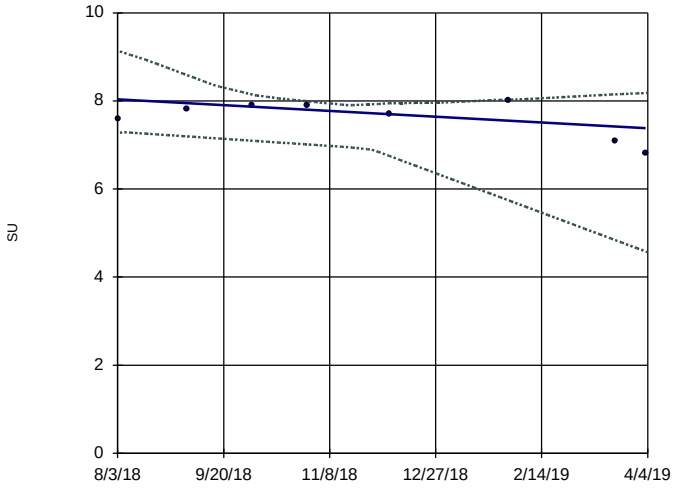
Constituent: pH Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = -0.9778 units per year.

Mann-Kendall statistic = -5 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

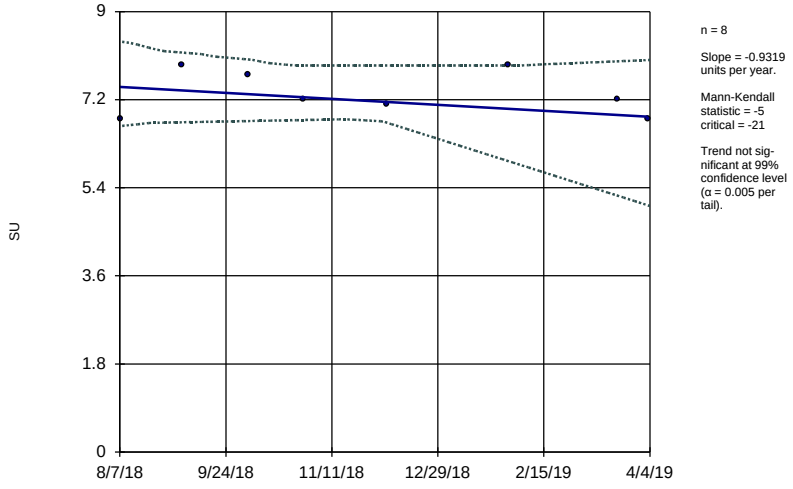
Constituent: pH Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -0.9319 units per year.

Mann-Kendall statistic = -5 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

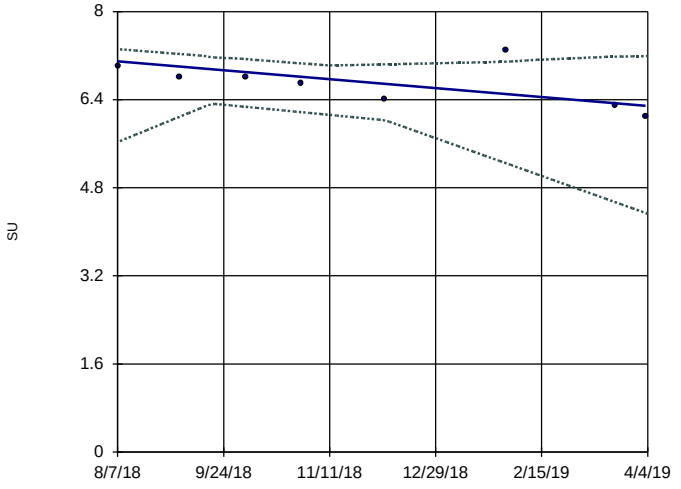
Constituent: pH Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = -1.235 units per year.

Mann-Kendall statistic = -17 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

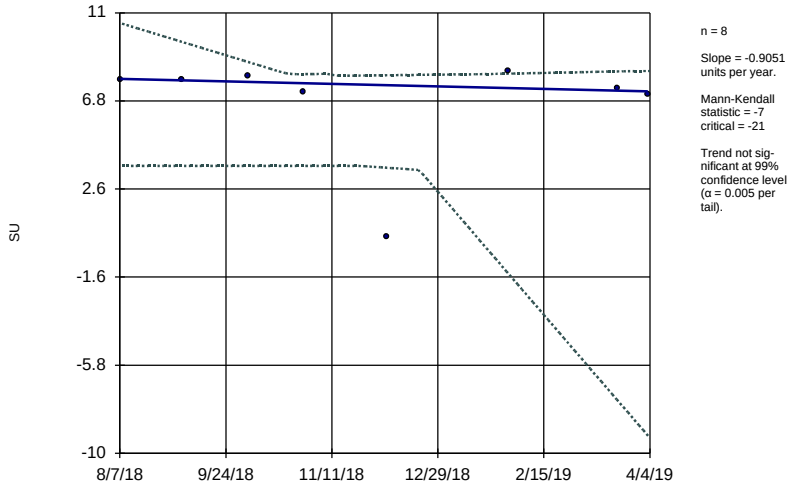
Constituent: pH Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = -0.9051 units per year.

Mann-Kendall statistic = -7 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

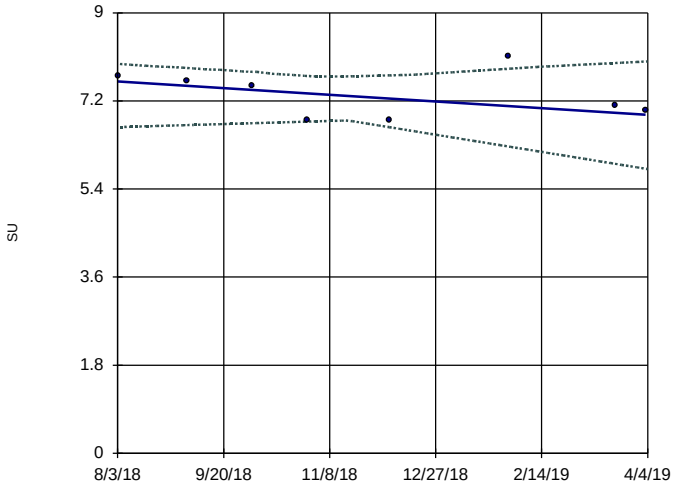
Constituent: pH Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = -1.023 units per year.

Mann-Kendall statistic = -9 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

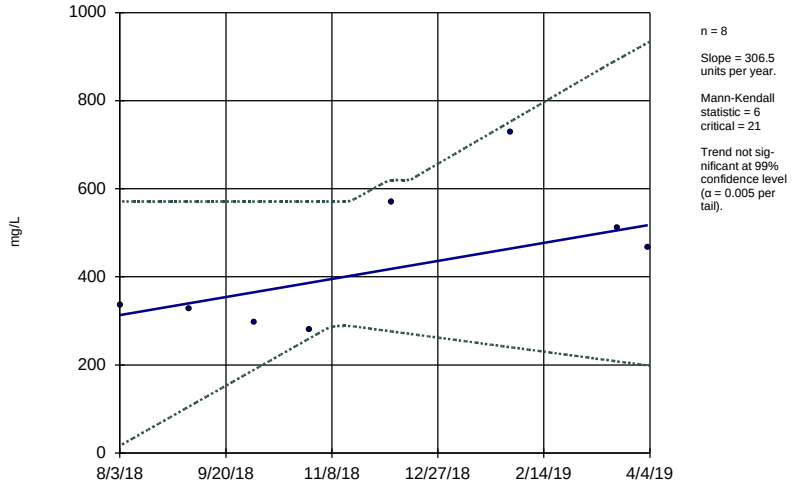
Constituent: pH Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 306.5 units per year.

Mann-Kendall statistic = 6 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate Analysis Run 2/18/2020 1:13 PM

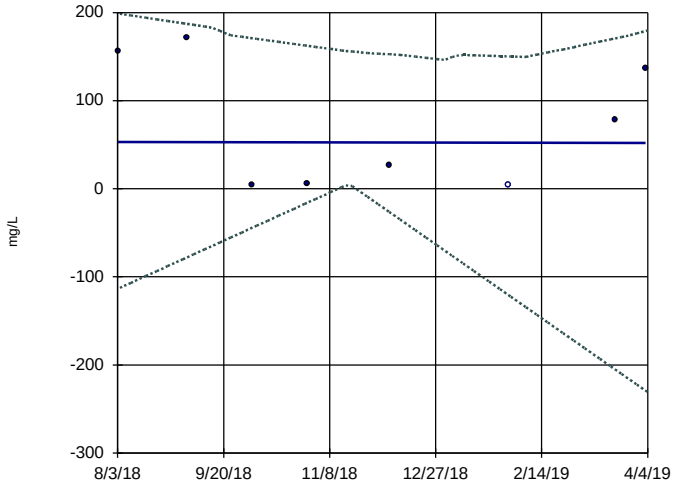
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = -2.129 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

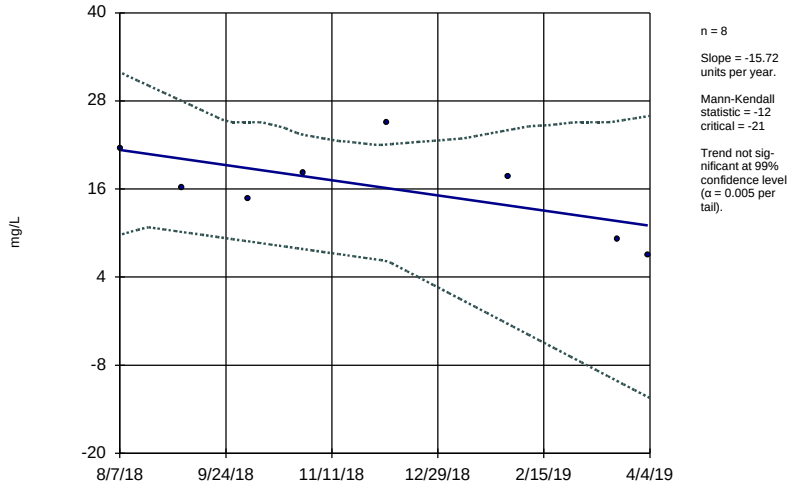
Constituent: Sulfate Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -15.72 units per year.

Mann-Kendall statistic = -12 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate Analysis Run 2/18/2020 1:13 PM

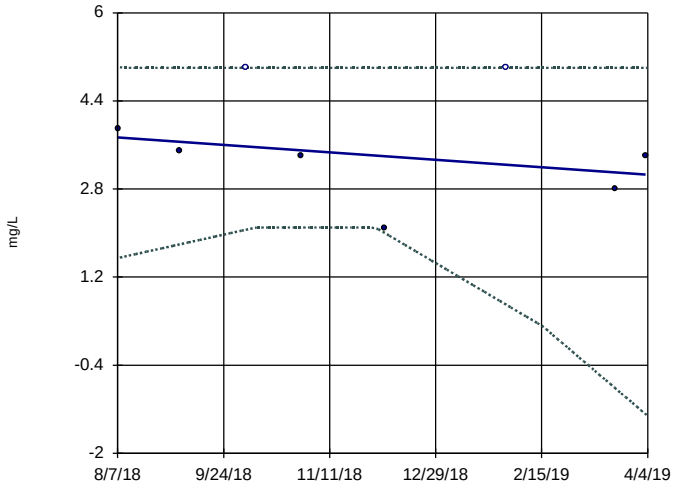
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = -1.03 units per year.

Mann-Kendall statistic = -8 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

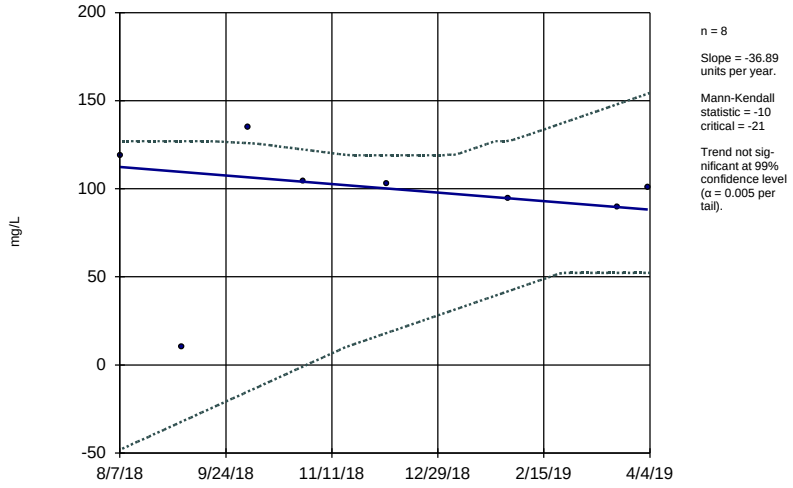
Constituent: Sulfate Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = -36.89 units per year.

Mann-Kendall statistic = -10 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

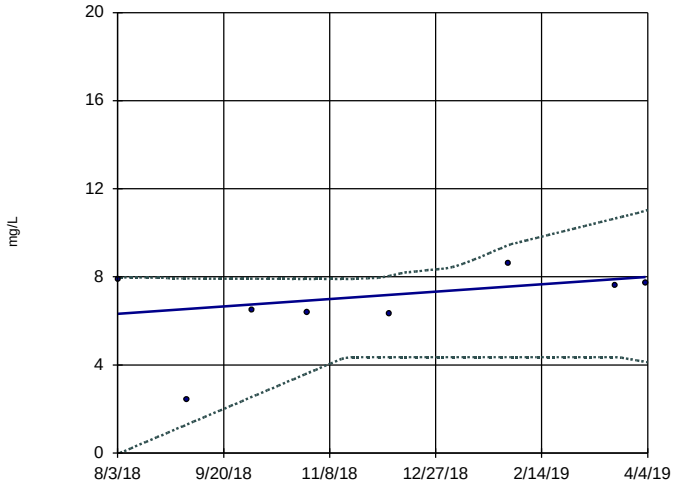
Constituent: Sulfate Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 2.514 units per year.

Mann-Kendall statistic = 6 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

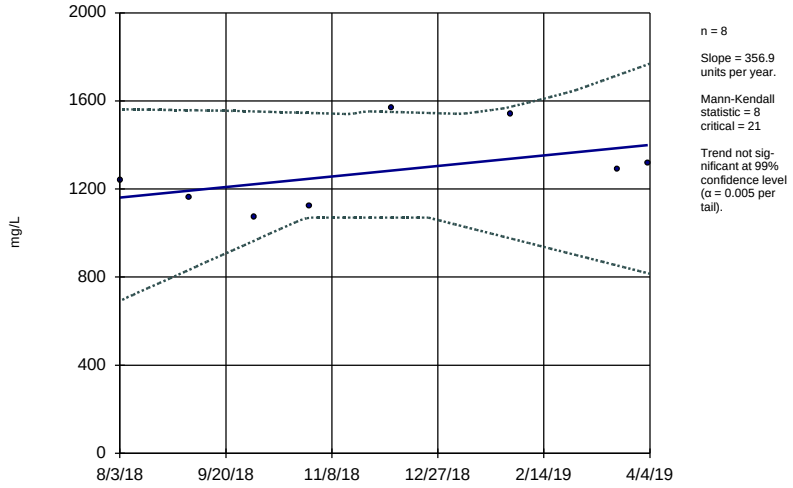
Constituent: Sulfate Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 356.9 units per year.

Mann-Kendall statistic = 8
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

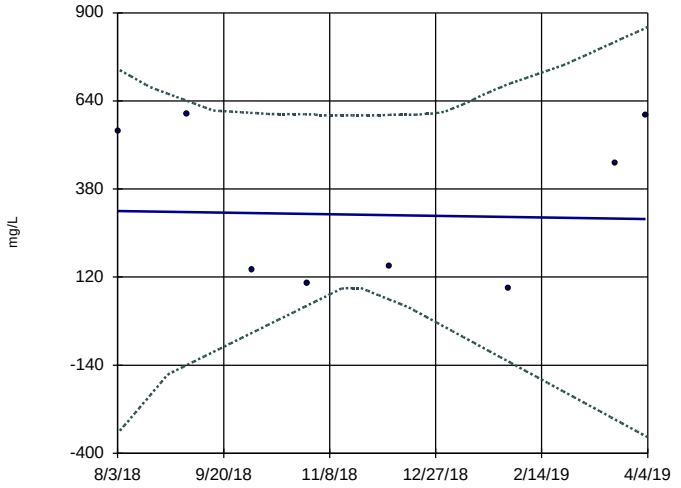
Constituent: Total Dissolved Solids Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = -35.61 units per year.

Mann-Kendall statistic = -2
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

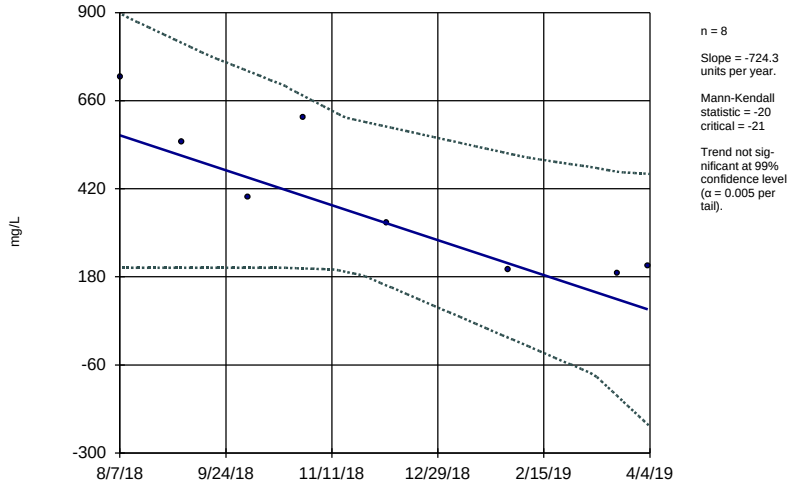
Constituent: Total Dissolved Solids Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -724.3 units per year.

Mann-Kendall statistic = -20
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

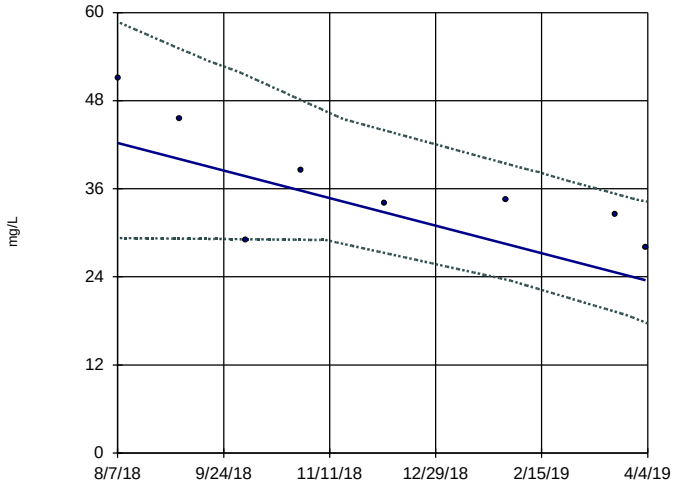
Constituent: Total Dissolved Solids Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = -28.57 units per year.

Mann-Kendall statistic = -18
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

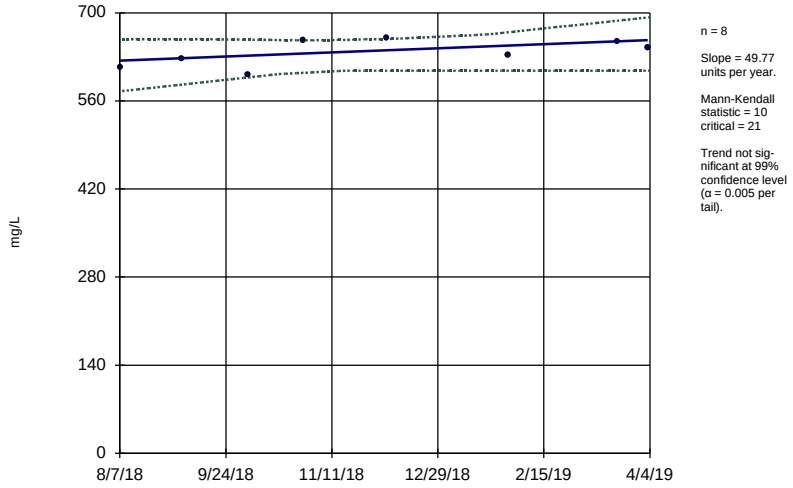
Constituent: Total Dissolved Solids Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 49.77 units per year.

Mann-Kendall statistic = 10
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

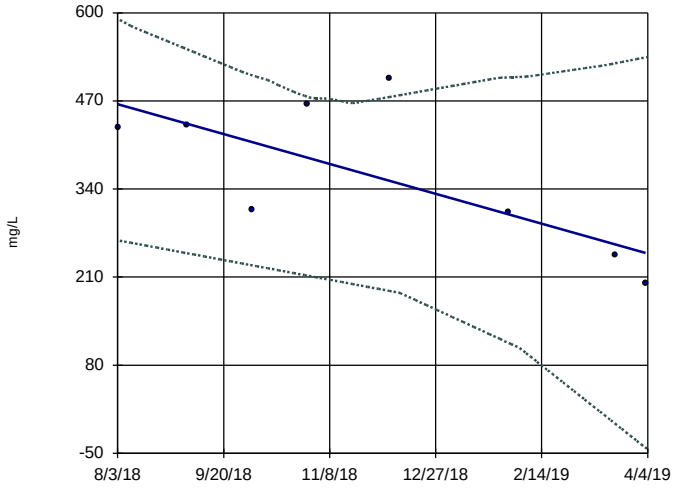
Constituent: Total Dissolved Solids Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = -329.8 units per year.

Mann-Kendall statistic = -12
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids Analysis Run 2/18/2020 1:13 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

APPENDIX G

Appendix IV Constituent Mann-Kendall Trend Test

Trend Test

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 2/19/2020, 2:36 PM

Constituent	Well	Slope	Critical	Sig.	N	%NDs	Alpha
Antimony, dissolved (mg/L)	MW-1	0	21	No	8	100	0.01
Antimony, dissolved (mg/L)	MW-2	0	21	No	8	50	0.01
Antimony, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Antimony, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Antimony, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Antimony, dissolved (mg/L)	MW-6	-0.00...	-21	No	8	62.5	0.01
Arsenic, dissolved (mg/L)	MW-1	0	21	No	8	100	0.01
Arsenic, dissolved (mg/L)	MW-2	0.000...	21	No	8	0	0.01
Arsenic, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	37.5	0.01
Arsenic, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Arsenic, dissolved (mg/L)	MW-5	0	21	No	8	87.5	0.01
Arsenic, dissolved (mg/L)	MW-6	0	-21	No	8	87.5	0.01
Barium, dissolved (mg/L)	MW-1	0.02406	21	No	8	0	0.01
Barium, dissolved (mg/L)	MW-2	-0.05641	-21	No	8	0	0.01
Barium, dissolved (mg/L)	MW-3 (bg)	-0.1623	-21	No	8	0	0.01
Barium, dissolved (mg/L)	MW-4 (bg)	-0.00973	-21	No	8	0	0.01
Barium, dissolved (mg/L)	MW-5	-0.00...	-21	No	8	0	0.01
Barium, dissolved (mg/L)	MW-6	-0.2182	-21	No	8	0	0.01
Beryllium, dissolved (mg/L)	MW-1	0	21	No	8	100	0.01
Beryllium, dissolved (mg/L)	MW-2	0	21	No	8	100	0.01
Beryllium, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Beryllium, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	87.5	0.01
Beryllium, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Beryllium, dissolved (mg/L)	MW-6	0	21	No	8	100	0.01
Cadmium, dissolved (mg/L)	MW-1	0	-21	No	8	75	0.01
Cadmium, dissolved (mg/L)	MW-2	0	21	No	8	75	0.01
Cadmium, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Cadmium, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Cadmium, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Cadmium, dissolved (mg/L)	MW-6	0	21	No	8	100	0.01
Chromium, dissolved (mg/L)	MW-1	0	21	No	8	100	0.01
Chromium, dissolved (mg/L)	MW-2	0	21	No	8	100	0.01
Chromium, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Chromium, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Chromium, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Chromium, dissolved (mg/L)	MW-6	0	21	No	8	100	0.01
Cobalt, dissolved (mg/L)	MW-1	0	-21	No	8	75	0.01
Cobalt, dissolved (mg/L)	MW-2	0	-21	No	8	75	0.01
Cobalt, dissolved (mg/L)	MW-3 (bg)	0	-21	No	8	62.5	0.01
Cobalt, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	50	0.01
Cobalt, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Cobalt, dissolved (mg/L)	MW-6	-0.00...	-21	No	8	50	0.01
Fluoride (mg/L)	MW-1	0	-21	No	8	87.5	0.01
Fluoride (mg/L)	MW-2	0	21	No	8	75	0.01
Fluoride (mg/L)	MW-3 (bg)	0	21	No	8	75	0.01
Fluoride (mg/L)	MW-4 (bg)	0	21	No	8	87.5	0.01
Fluoride (mg/L)	MW-5	0.1422	21	No	8	50	0.01
Fluoride (mg/L)	MW-6	0	21	No	8	87.5	0.01

Trend Test

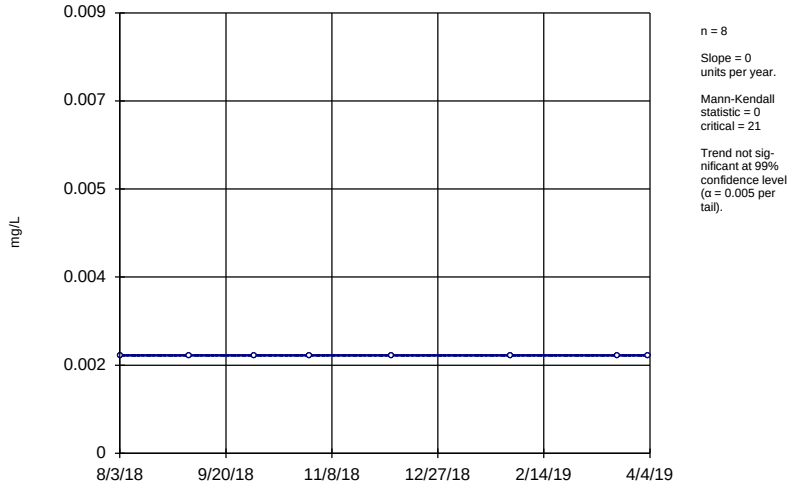
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database Printed 2/19/2020, 2:36 PM

Constituent	Well	Slope	Critical	Sig.	N	%NDs	Alpha
Lead, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Lead, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Lead, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Lead, dissolved (mg/L)	MW-6	0	21	No	8	100	0.01
Lithium, dissolved (mg/L)	MW-1	0	-21	No	8	62.5	0.01
Lithium, dissolved (mg/L)	MW-2	0	21	No	8	50	0.01
Lithium, dissolved (mg/L)	MW-3 (bg)	0.03979	21	No	8	37.5	0.01
Lithium, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Lithium, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Lithium, dissolved (mg/L)	MW-6	0	-21	No	8	87.5	0.01
Mercury, dissolved (mg/L)	MW-1	0	21	No	8	100	0.01
Mercury, dissolved (mg/L)	MW-2	0	21	No	8	100	0.01
Mercury, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Mercury, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Mercury, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Mercury, dissolved (mg/L)	MW-6	0	21	No	8	100	0.01
Molybdenum, dissolved (mg/L)	MW-1	0.01927	21	No	8	0	0.01
Molybdenum, dissolved (mg/L)	MW-2	-0.00...	-21	No	8	0	0.01
Molybdenum, dissolved (mg/L)	MW-3 (bg)	-0.01049	-21	No	8	0	0.01
Molybdenum, dissolved (mg/L)	MW-4 (bg)	-0.00...	-21	No	8	0	0.01
Molybdenum, dissolved (mg/L)	MW-5	-0.00...	-21	No	8	0	0.01
Molybdenum, dissolved (mg/L)	MW-6	0.01904	21	No	8	0	0.01
Radium-226 (pCi/L)	MW-1	-1.286	-18	No	7	57.14	0.01
Radium-226 (pCi/L)	MW-2	-1.308	-18	No	7	57.14	0.01
Radium-226 (pCi/L)	MW-3 (bg)	-1.187	-18	No	7	28.57	0.01
Radium-226 (pCi/L)	MW-4 (bg)	0	18	No	7	85.71	0.01
Radium-226 (pCi/L)	MW-5	-0.7934	-18	No	7	28.57	0.01
Radium-226 (pCi/L)	MW-6	-0.6908	-18	No	7	42.86	0.01
Radium-228 (pCi/L)	MW-1	-0.5885	-18	No	7	71.43	0.01
Radium-228 (pCi/L)	MW-2	0	18	No	7	100	0.01
Radium-228 (pCi/L)	MW-3 (bg)	0	18	No	7	85.71	0.01
Radium-228 (pCi/L)	MW-4 (bg)	0	18	No	7	100	0.01
Radium-228 (pCi/L)	MW-5	-2.361	-18	No	7	42.86	0.01
Radium-228 (pCi/L)	MW-6	0	18	No	7	100	0.01
Selenium, dissolved (mg/L)	MW-1	0	21	No	8	100	0.01
Selenium, dissolved (mg/L)	MW-2	0	21	No	8	100	0.01
Selenium, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Selenium, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Selenium, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Selenium, dissolved (mg/L)	MW-6	0	21	No	8	100	0.01
Thallium, dissolved (mg/L)	MW-1	0	21	No	8	100	0.01
Thallium, dissolved (mg/L)	MW-2	0	21	No	8	100	0.01
Thallium, dissolved (mg/L)	MW-3 (bg)	0	21	No	8	100	0.01
Thallium, dissolved (mg/L)	MW-4 (bg)	0	21	No	8	100	0.01
Thallium, dissolved (mg/L)	MW-5	0	21	No	8	100	0.01
Thallium, dissolved (mg/L)	MW-6	0	21	No	8	100	0.01

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Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



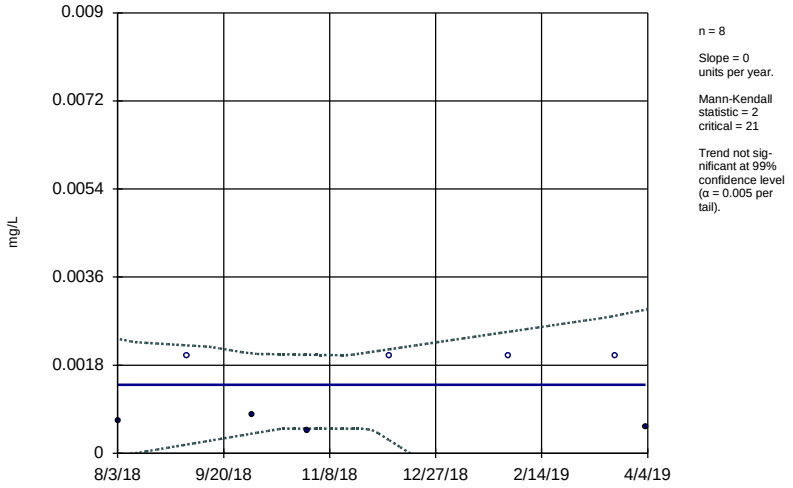
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Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



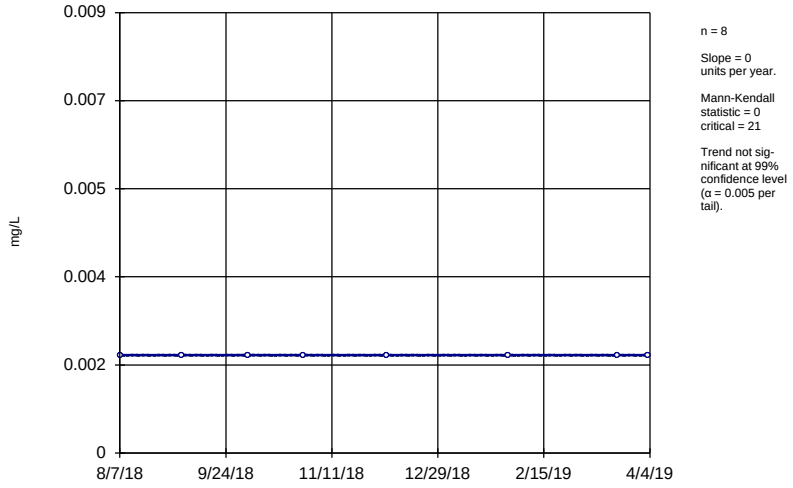
Constituent: Antimony, dissolved Analysis Run 2/19/2020 2:33 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



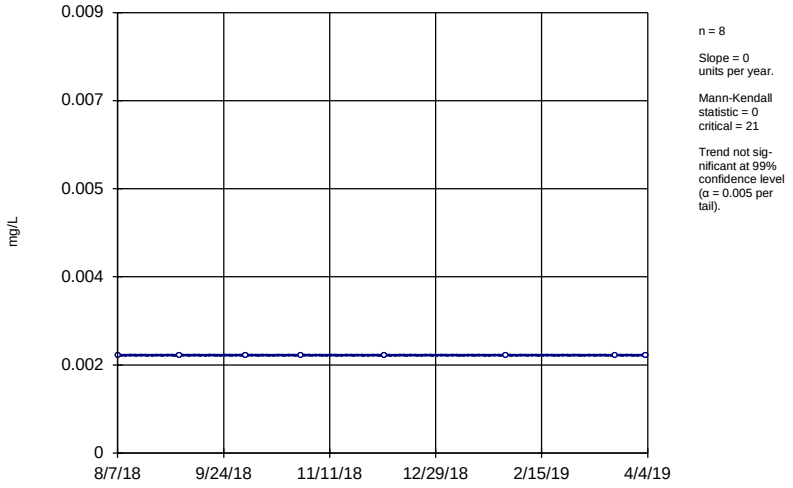
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Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

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Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



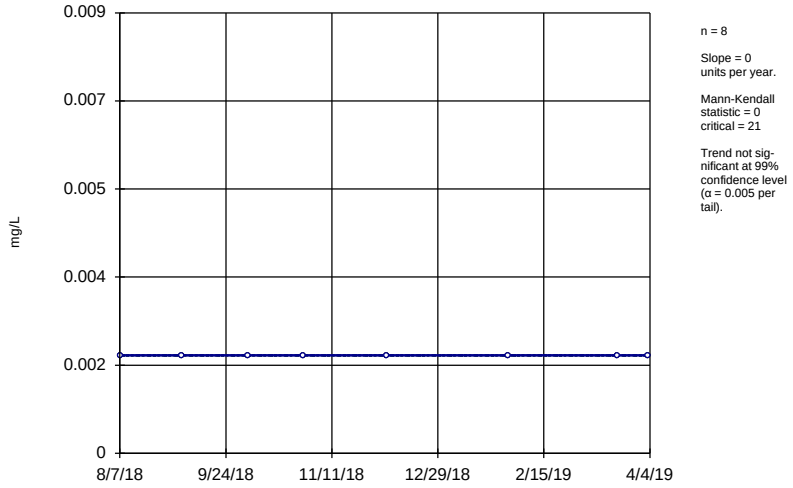
Constituent: Antimony, dissolved Analysis Run 2/19/2020 2:33 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

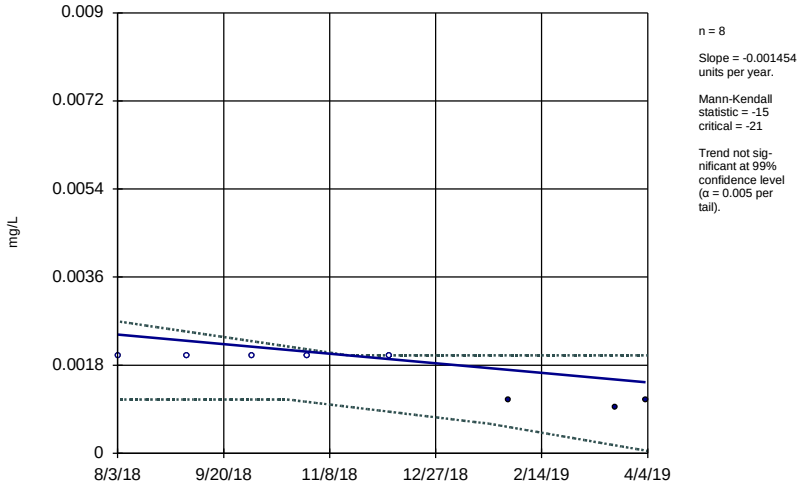
Constituent: Antimony, dissolved Analysis Run 2/19/2020 2:33 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = -0.001454 units per year.

Mann-Kendall statistic = -15 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

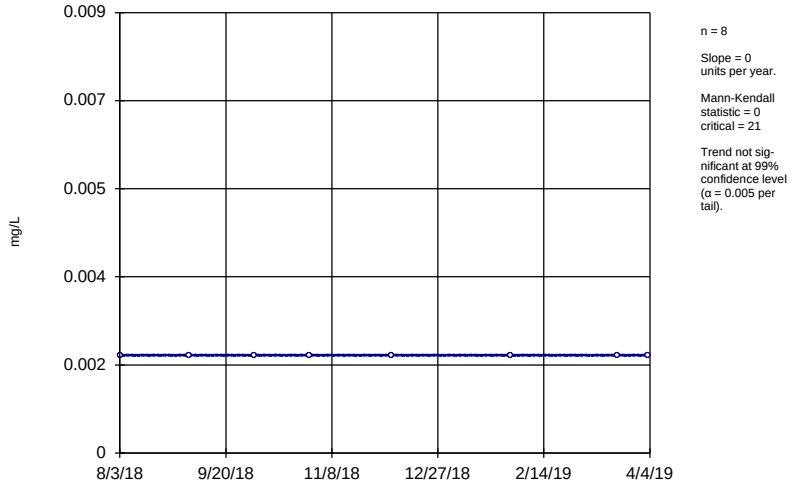
Constituent: Antimony, dissolved Analysis Run 2/19/2020 2:33 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

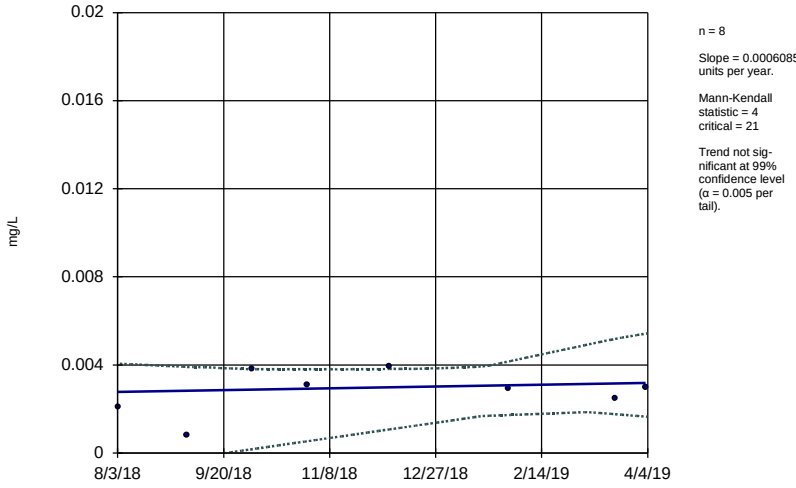
Constituent: Arsenic, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = 0.0006085 units per year.

Mann-Kendall statistic = 4 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

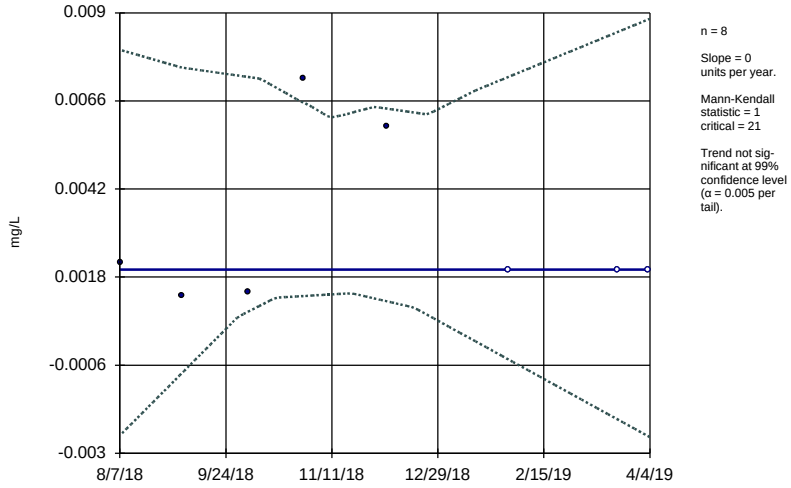
Constituent: Arsenic, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 1 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

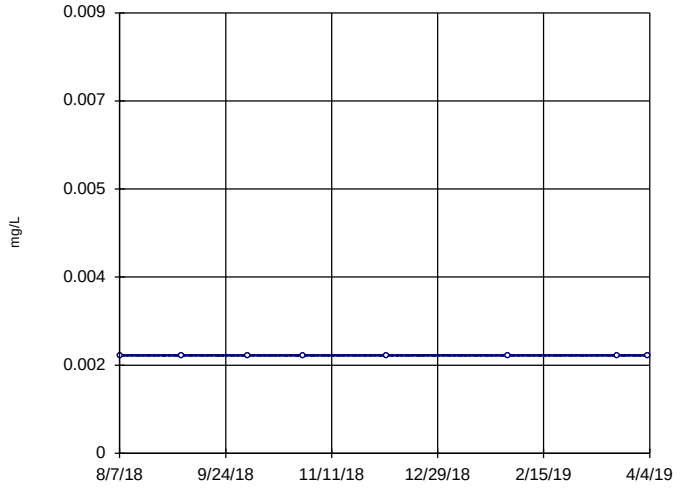
Constituent: Arsenic, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

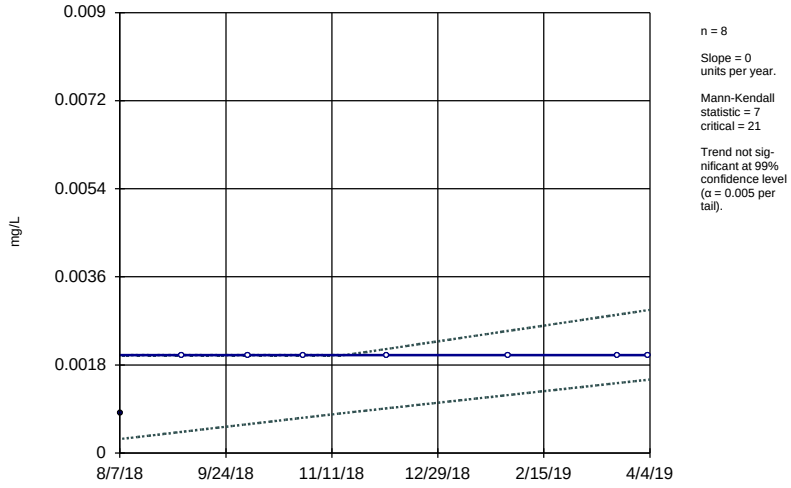
Constituent: Arsenic, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 7 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

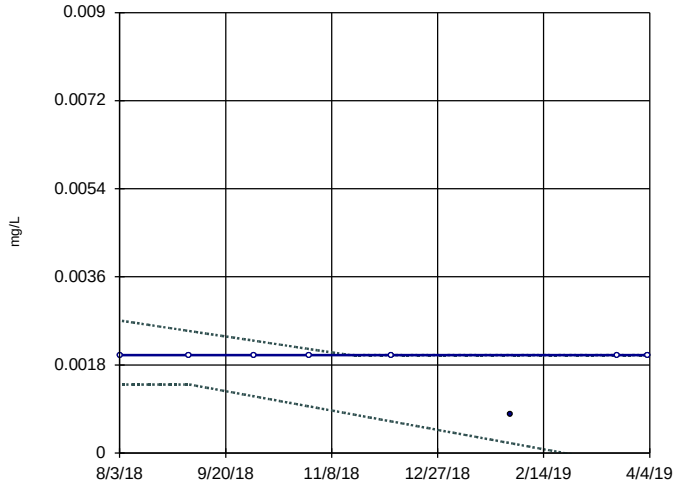
Constituent: Arsenic, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -3 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

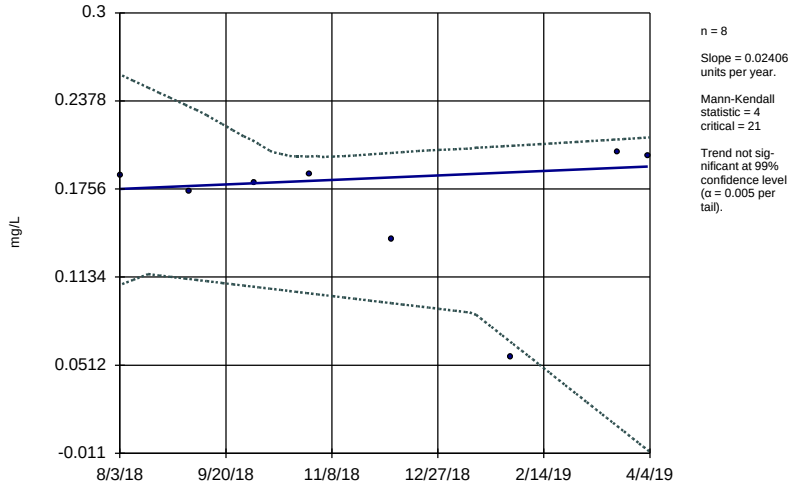
Constituent: Arsenic, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0.02406 units per year.

Mann-Kendall statistic = 4
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

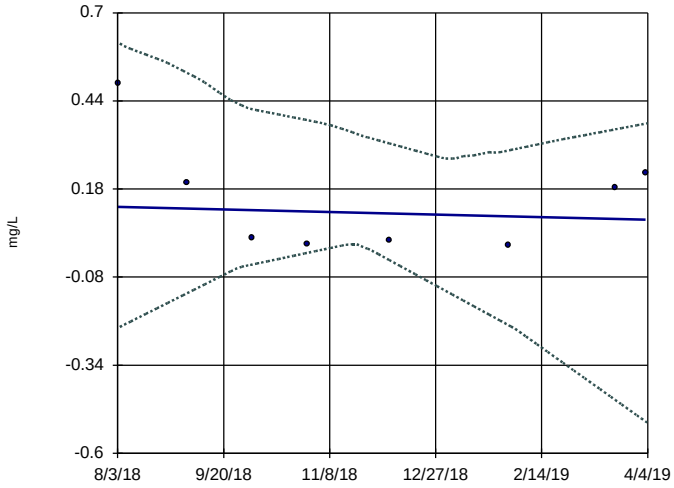
Constituent: Barium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = -0.05641 units per year.

Mann-Kendall statistic = -6
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

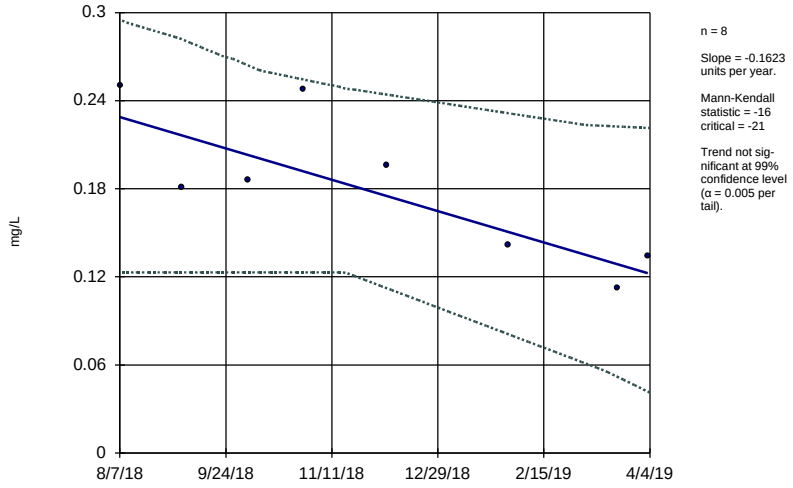
Constituent: Barium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -0.1623 units per year.

Mann-Kendall statistic = -16
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

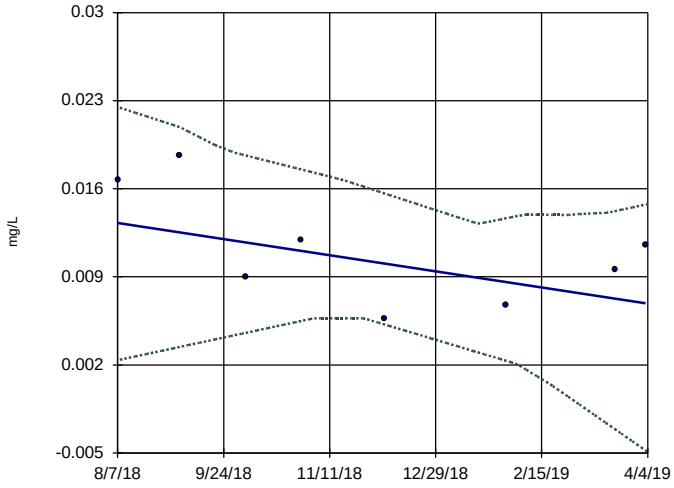
Constituent: Barium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = -0.00973 units per year.

Mann-Kendall statistic = -8
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

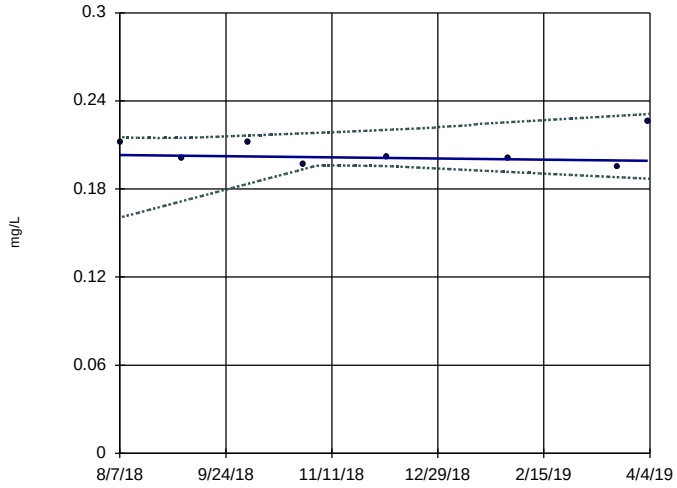
Constituent: Barium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = -0.005889 units per year.

Mann-Kendall statistic = -4 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

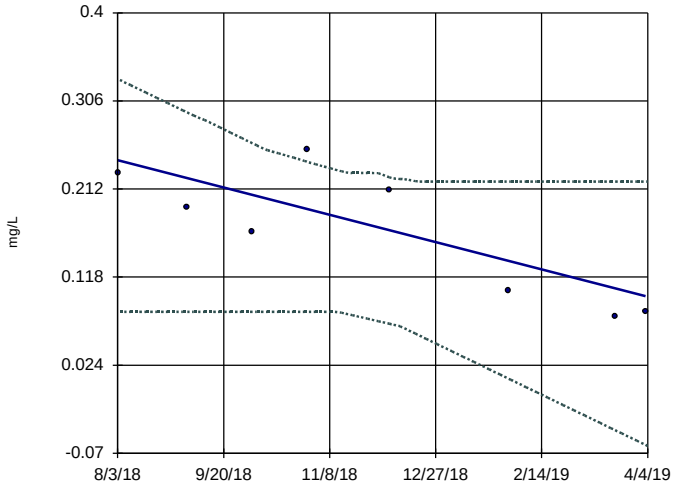
Constituent: Barium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = -0.2182 units per year.

Mann-Kendall statistic = -16 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Barium, dissolved Analysis Run 2/19/2020 2:34 PM

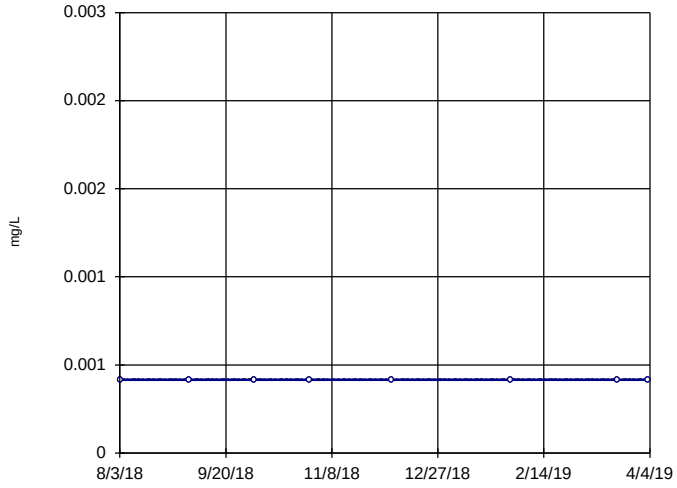
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Beryllium, dissolved Analysis Run 2/19/2020 2:34 PM

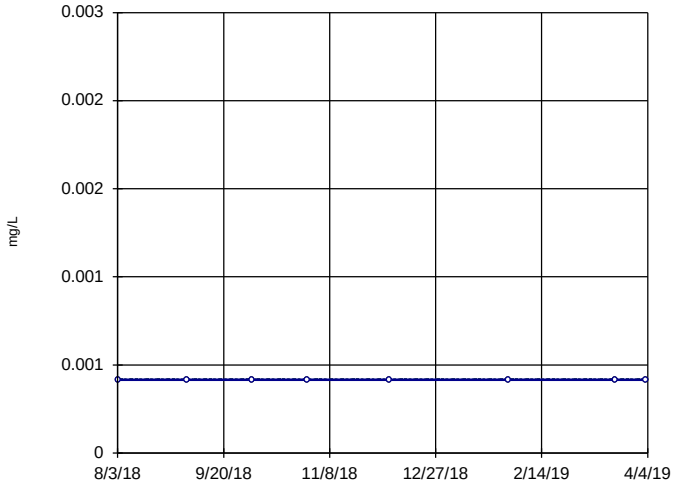
Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

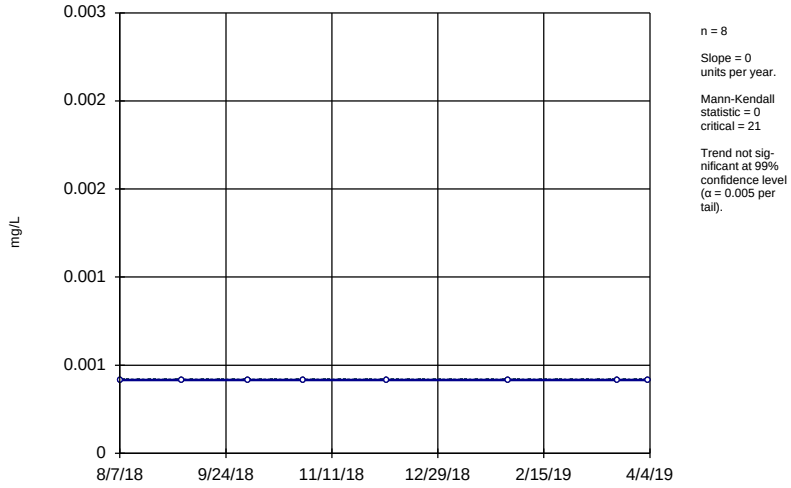
Constituent: Beryllium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



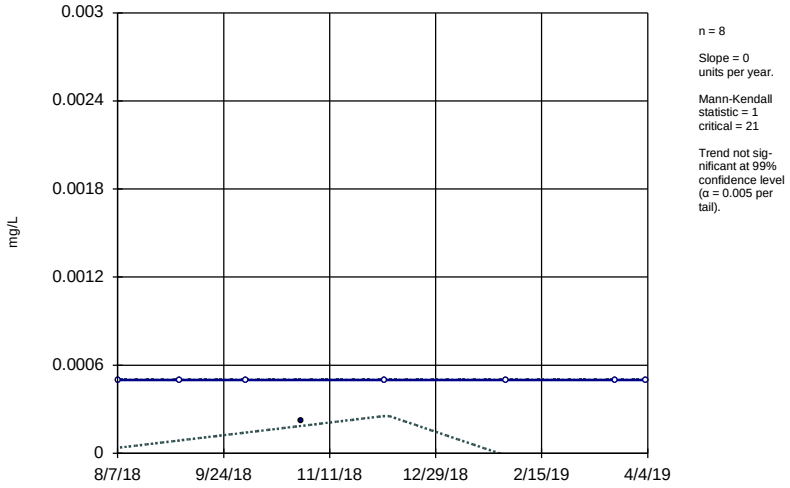
Constituent: Beryllium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



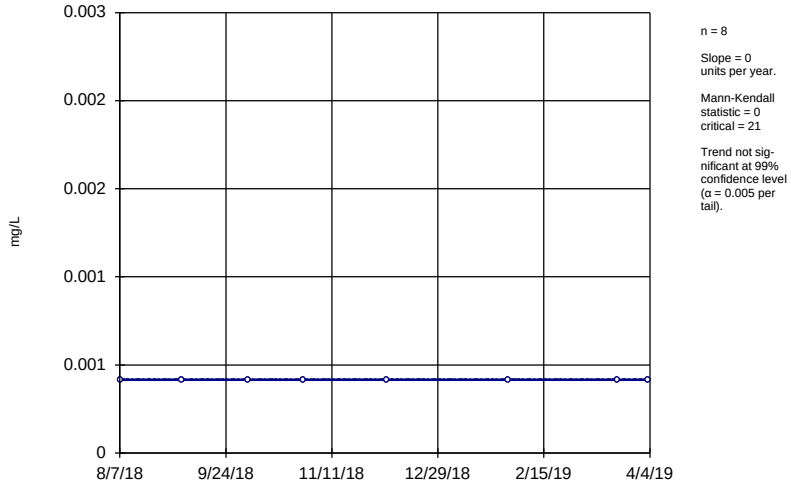
Constituent: Beryllium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



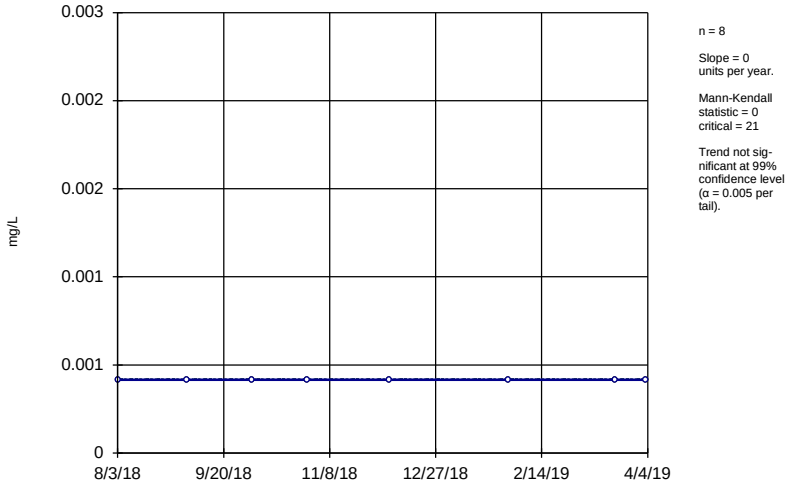
Constituent: Beryllium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



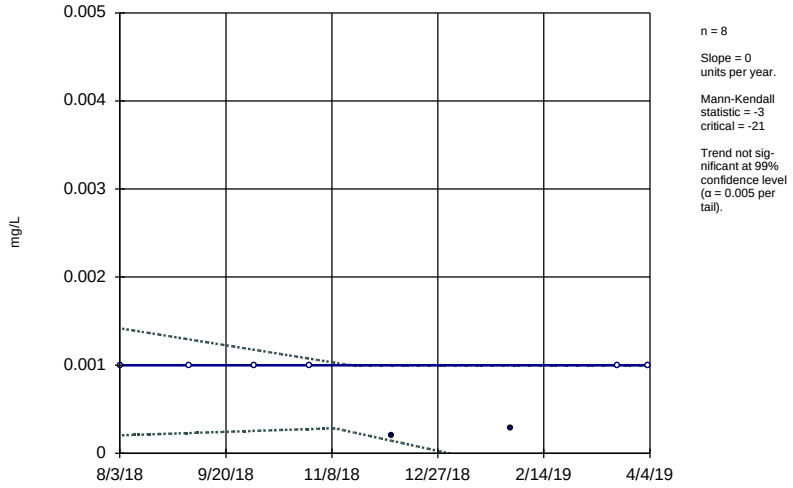
Constituent: Beryllium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -3 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

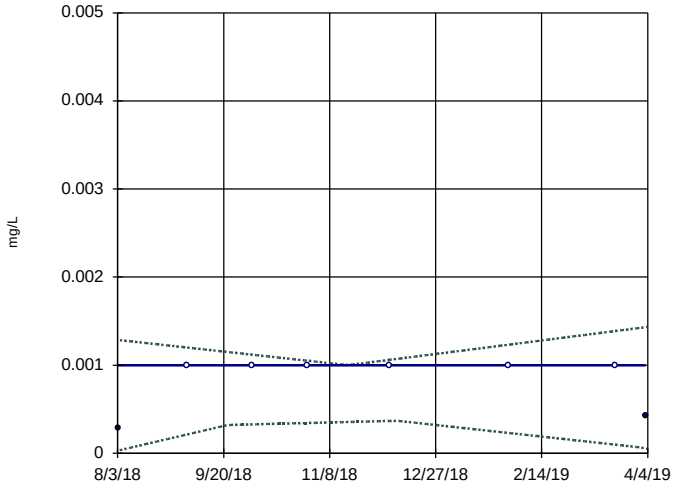
Constituent: Cadmium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 1 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

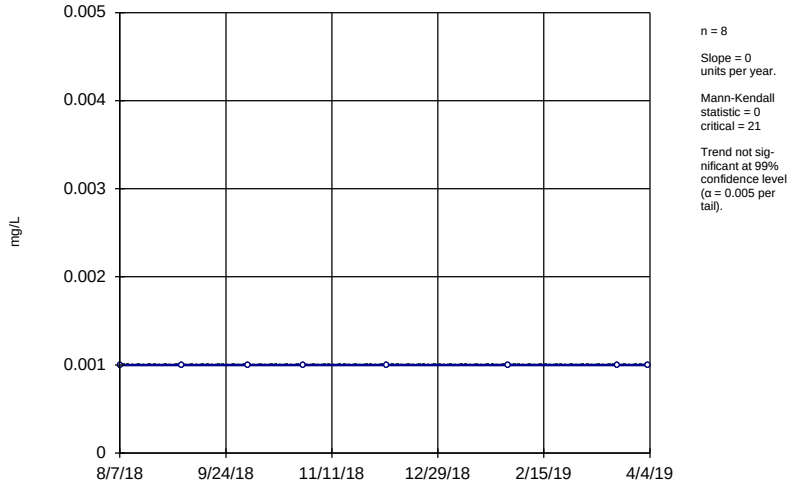
Constituent: Cadmium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

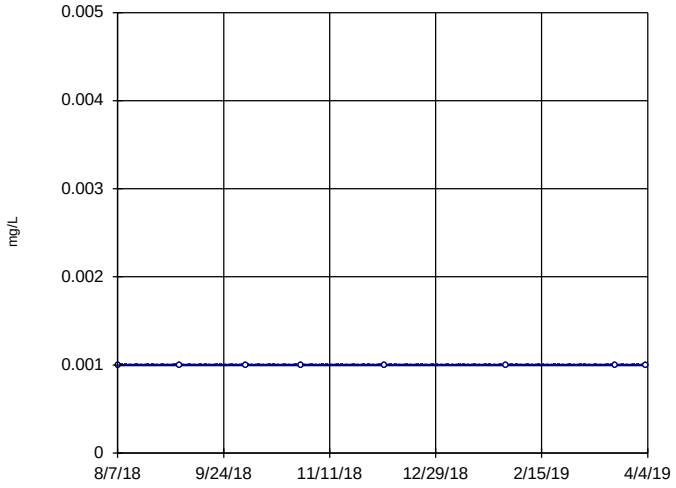
Constituent: Cadmium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

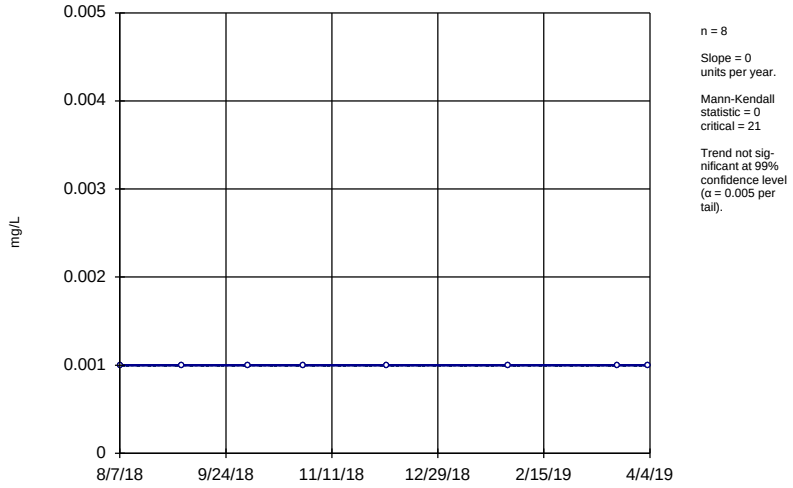
Constituent: Cadmium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



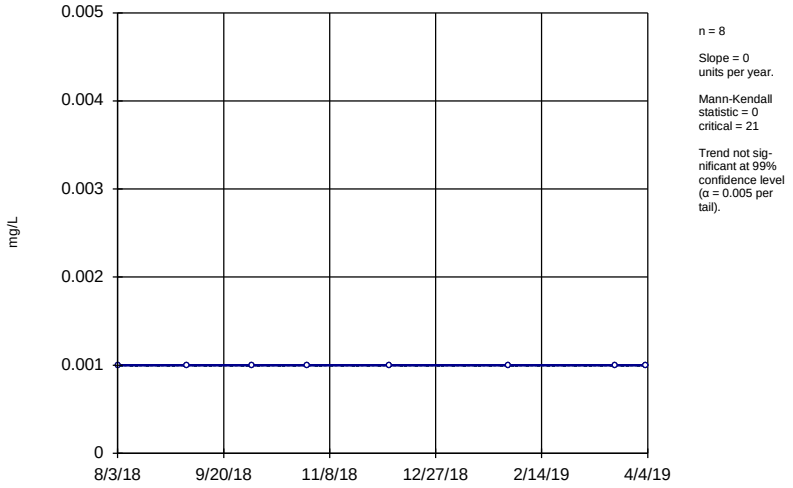
Constituent: Cadmium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



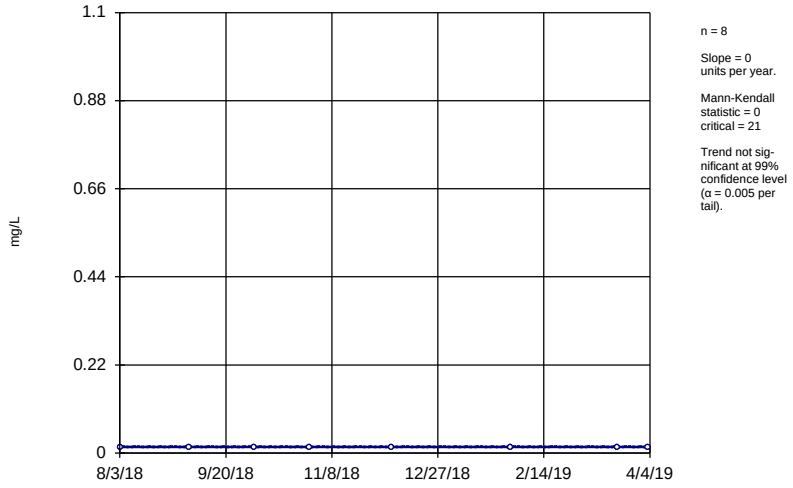
Constituent: Cadmium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



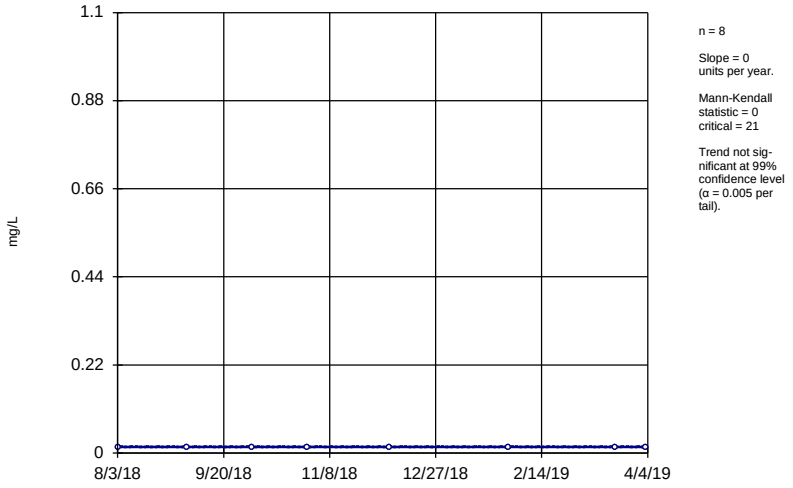
Constituent: Chromium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



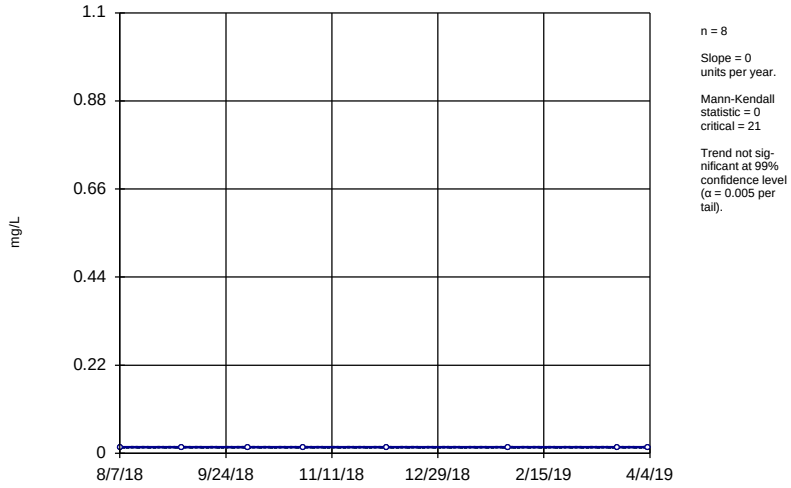
Constituent: Chromium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

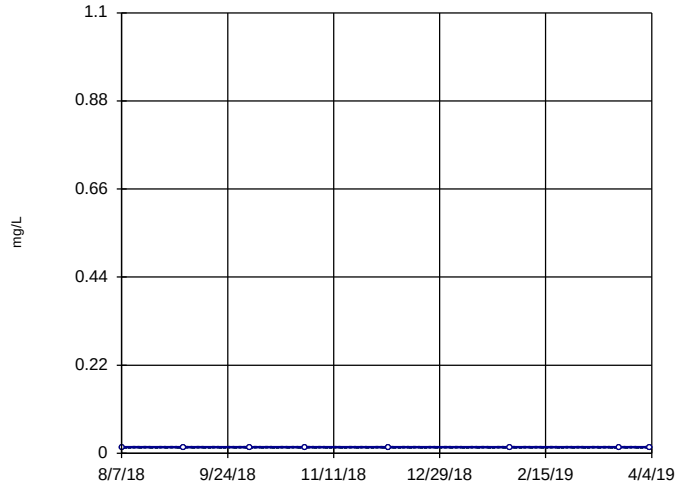
Constituent: Chromium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

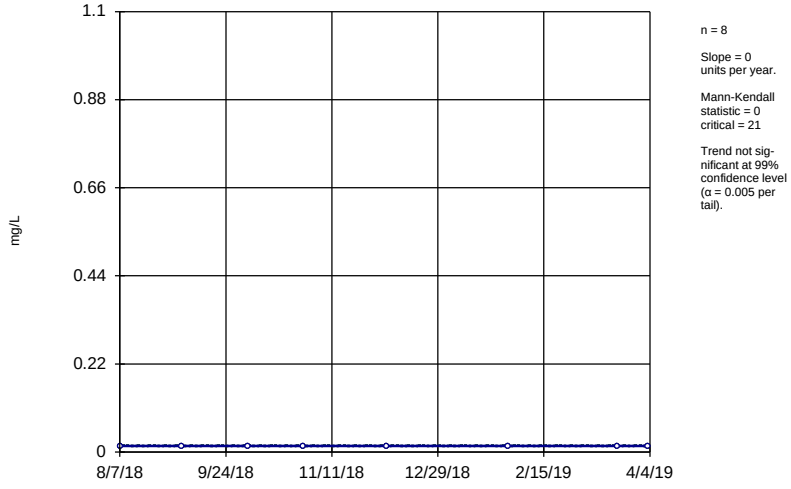
Constituent: Chromium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

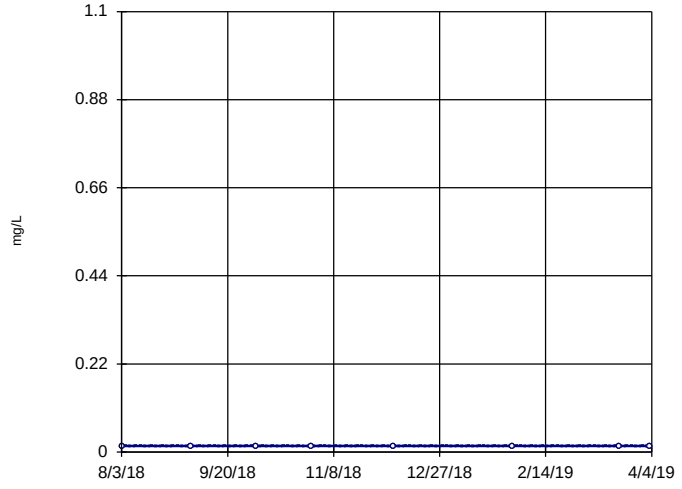
Constituent: Chromium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

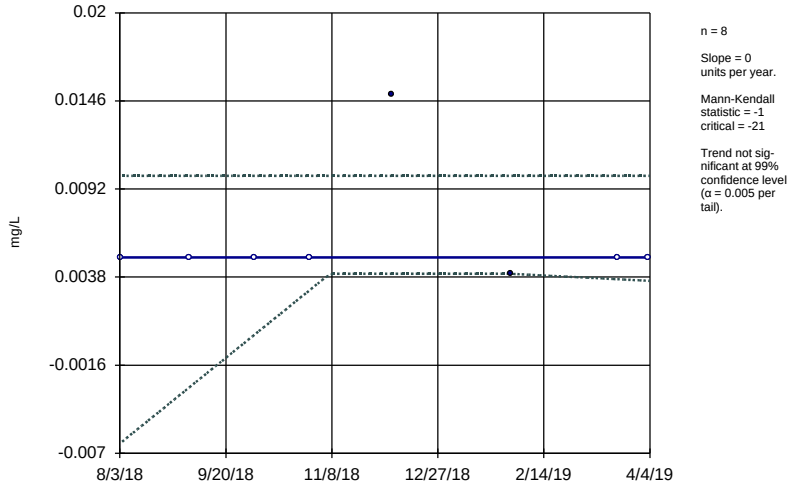
Constituent: Chromium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -1 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

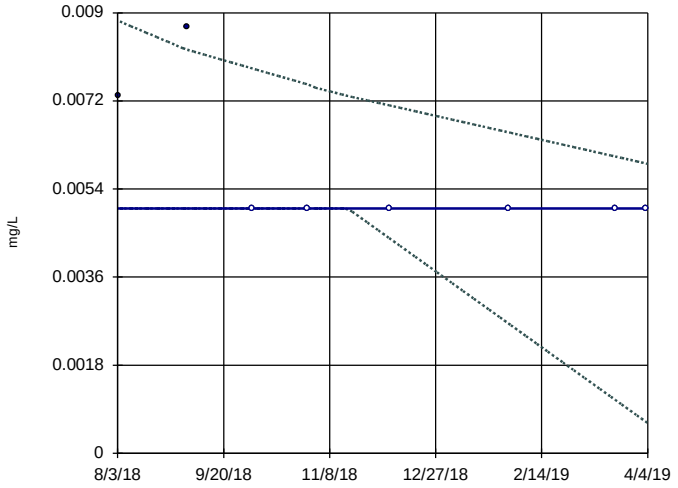
Constituent: Cobalt, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -11 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

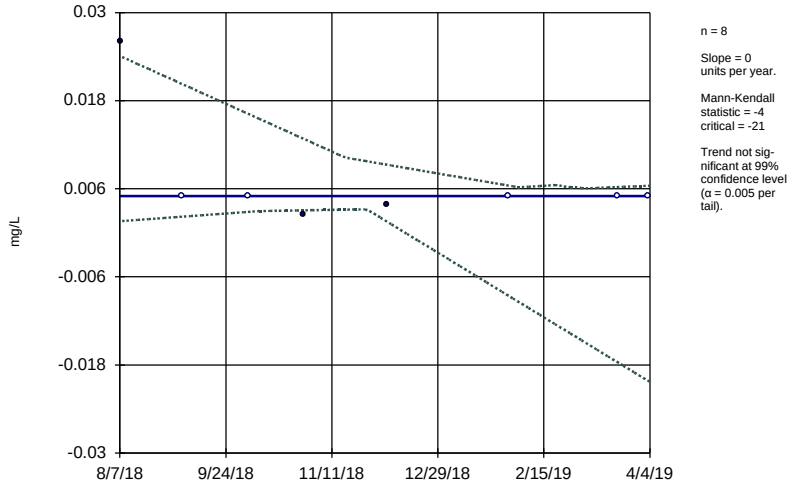
Constituent: Cobalt, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -4 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

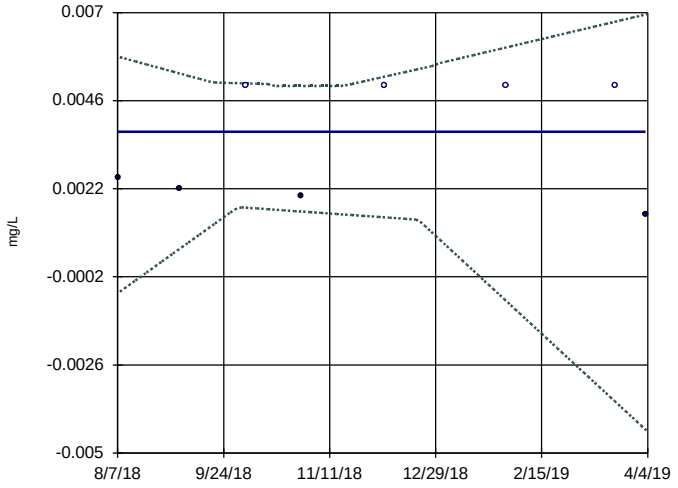
Constituent: Cobalt, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

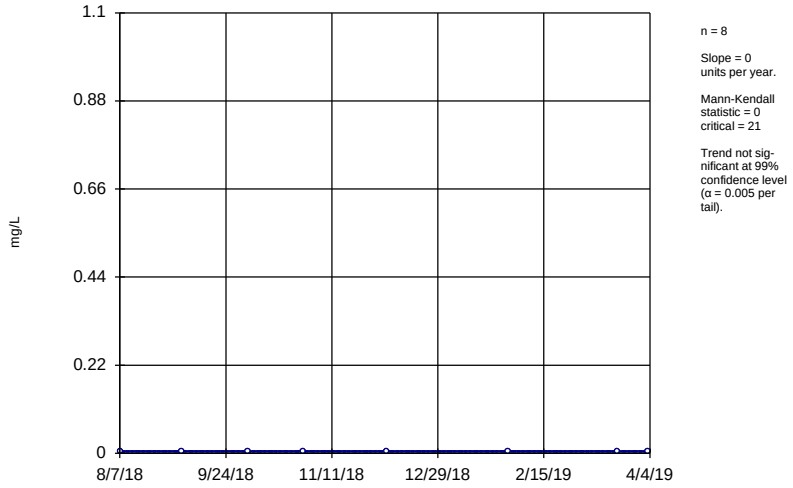
Constituent: Cobalt, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

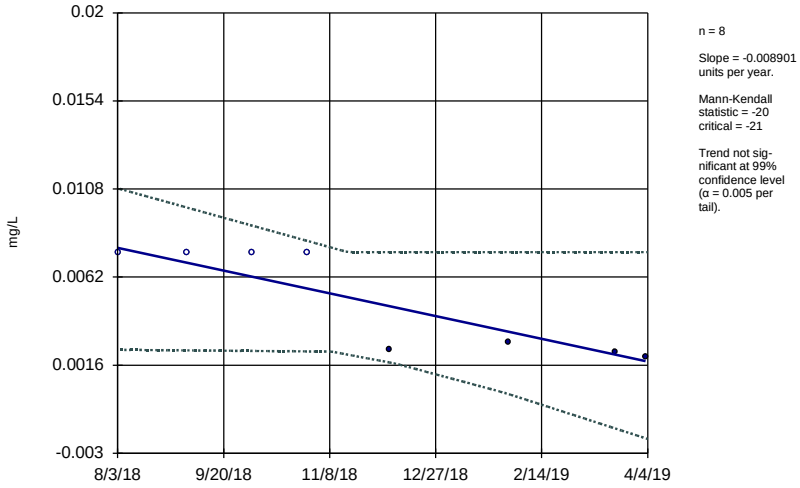
Constituent: Cobalt, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = -0.008901 units per year.

Mann-Kendall statistic = -20 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

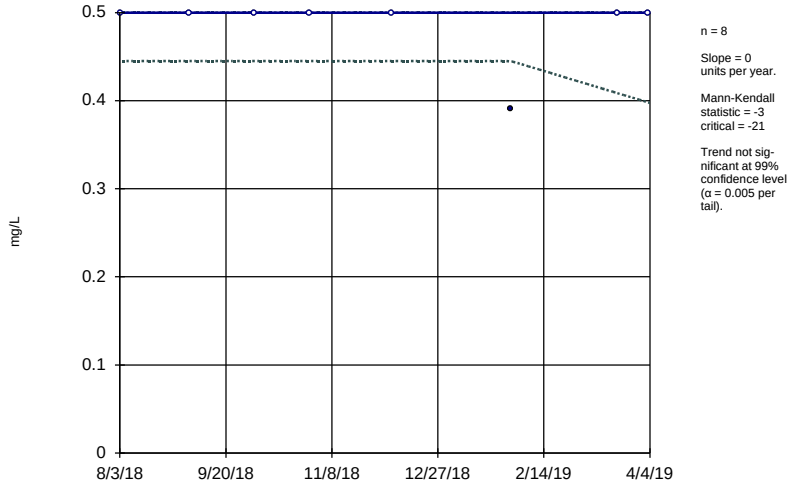
Constituent: Cobalt, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -3 critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

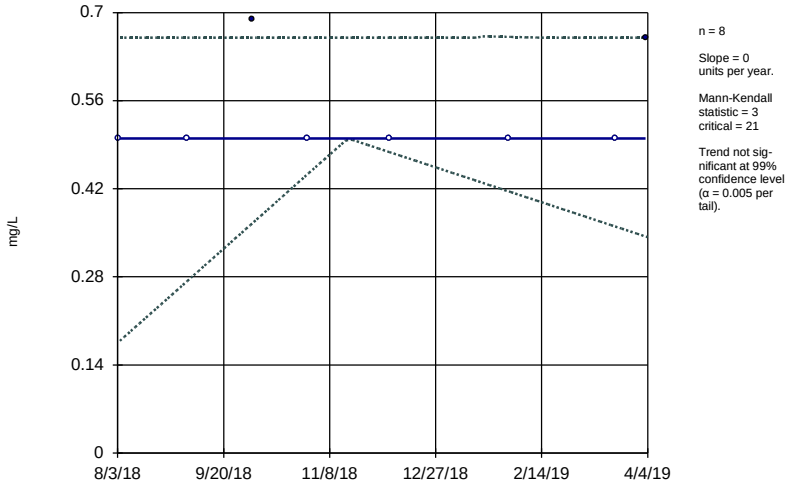
Constituent: Fluoride Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 3 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

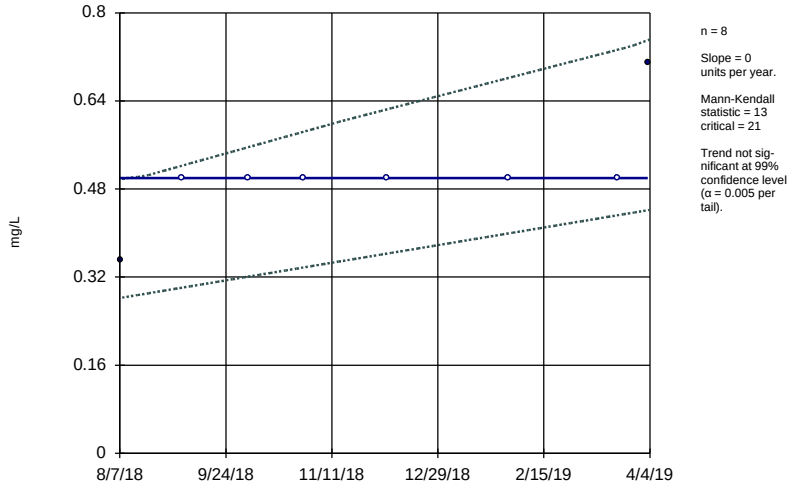
Constituent: Fluoride Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 13 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

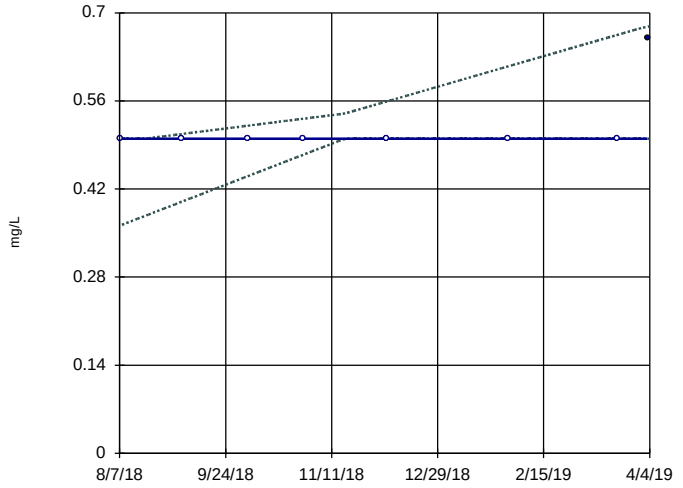
Constituent: Fluoride Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 7 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

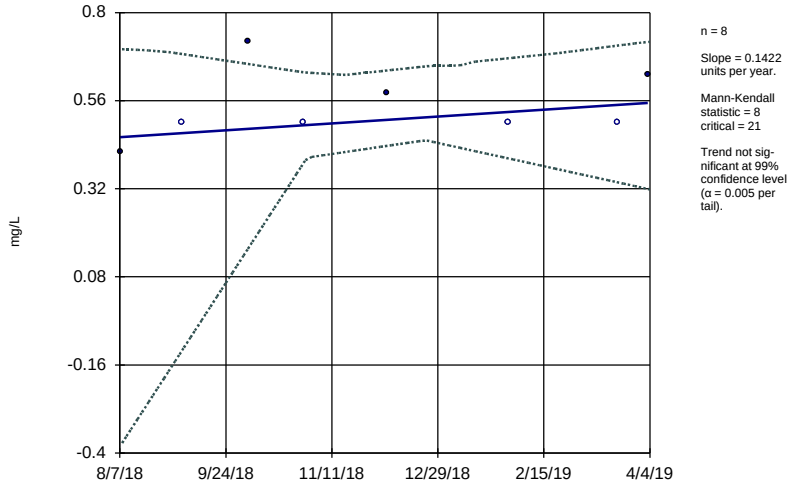
Constituent: Fluoride Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0.1422 units per year.

Mann-Kendall statistic = 8 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

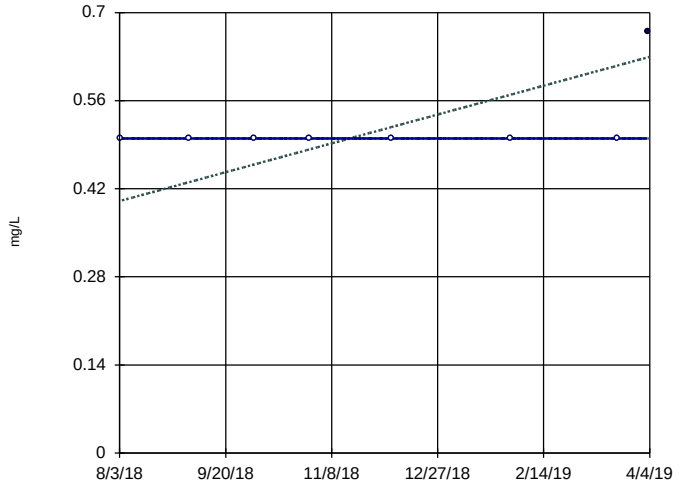
Constituent: Fluoride Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 7 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

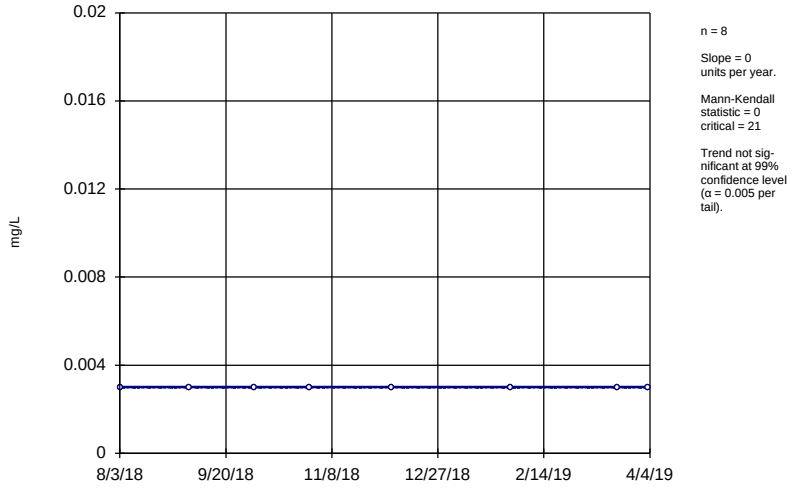
Constituent: Fluoride Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



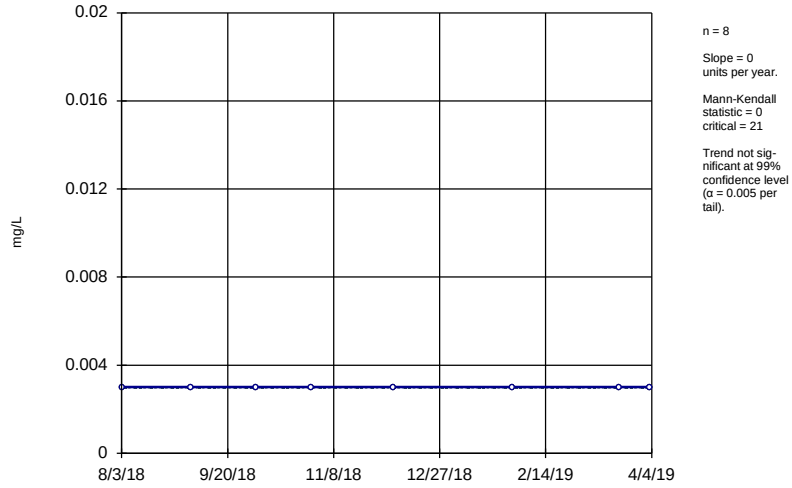
Constituent: Lead, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



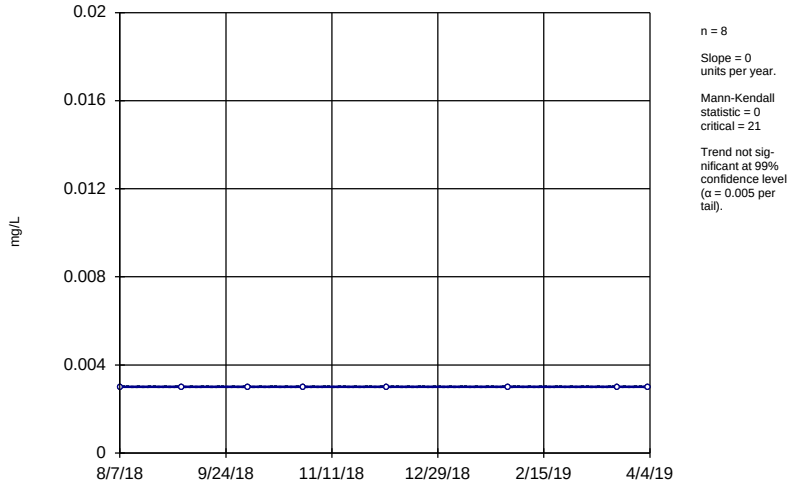
Constituent: Lead, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



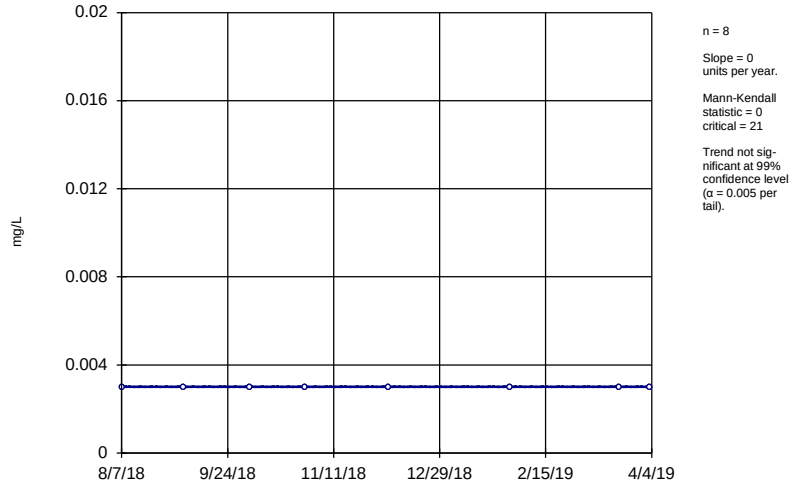
Constituent: Lead, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



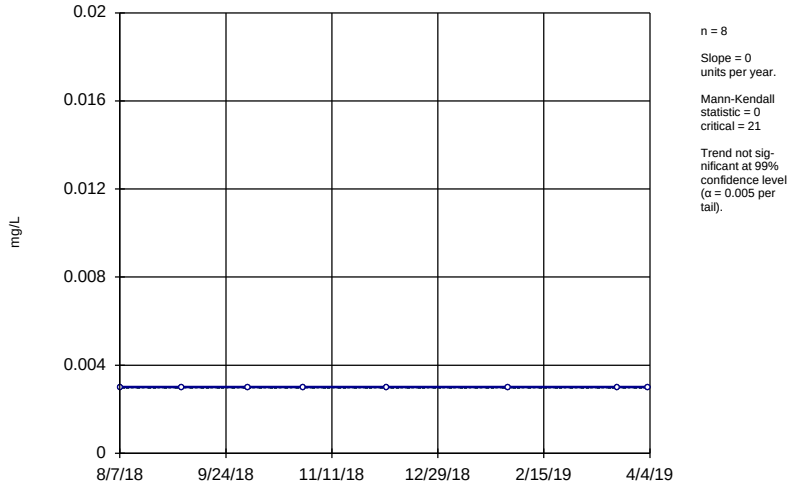
Constituent: Lead, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



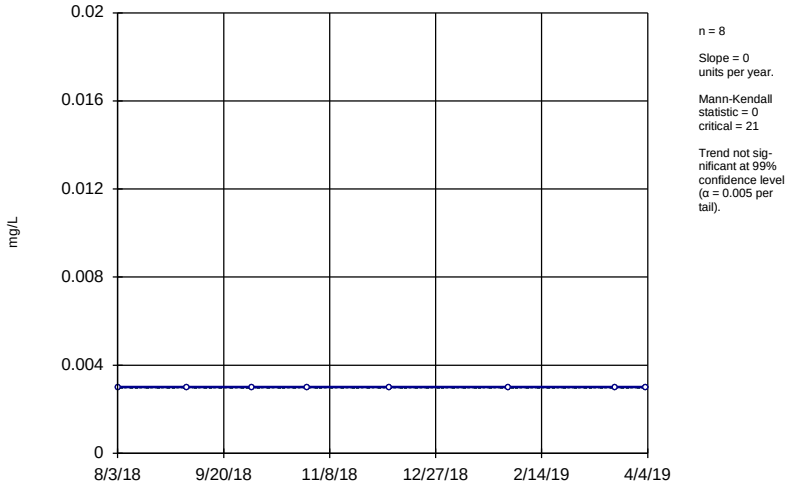
Constituent: Lead, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



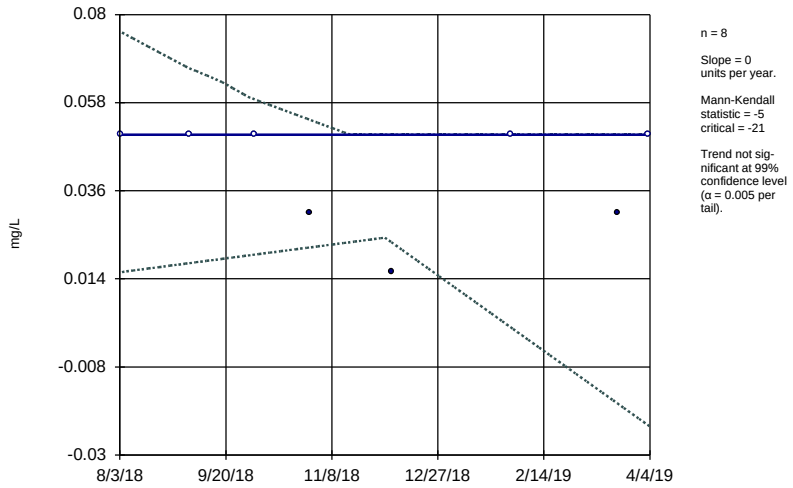
Constituent: Lead, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



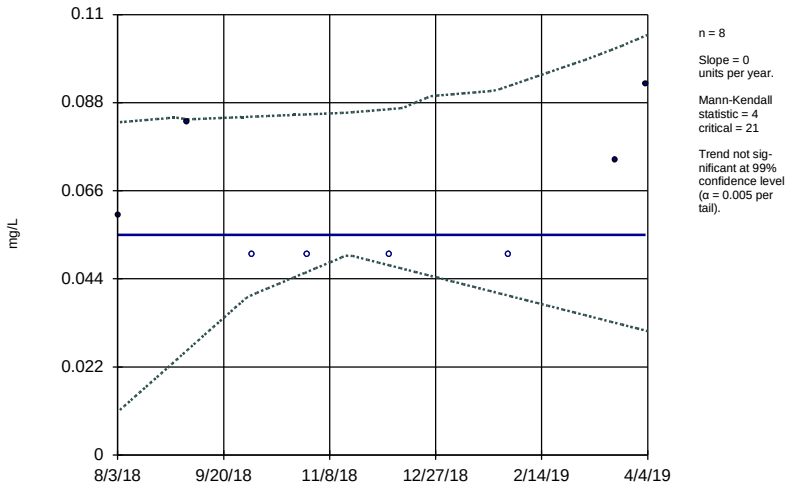
Constituent: Lithium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



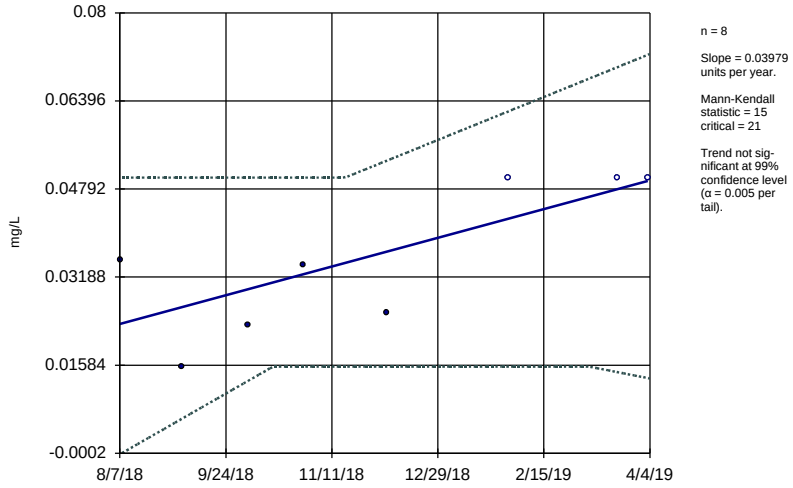
Constituent: Lithium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0.03979 units per year.

Mann-Kendall statistic = 15
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

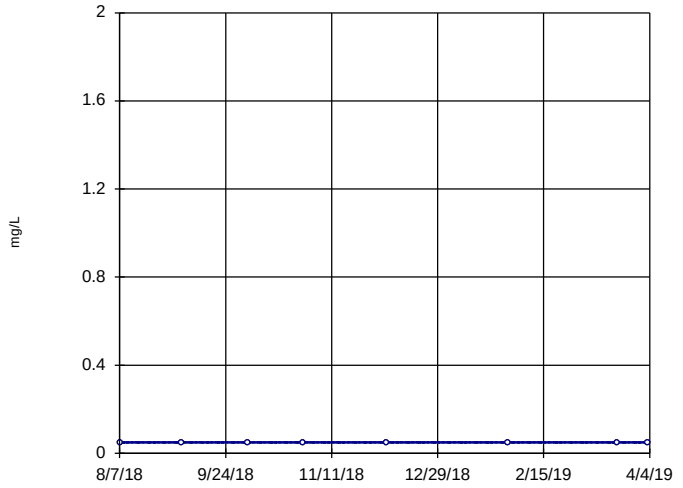
Constituent: Lithium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

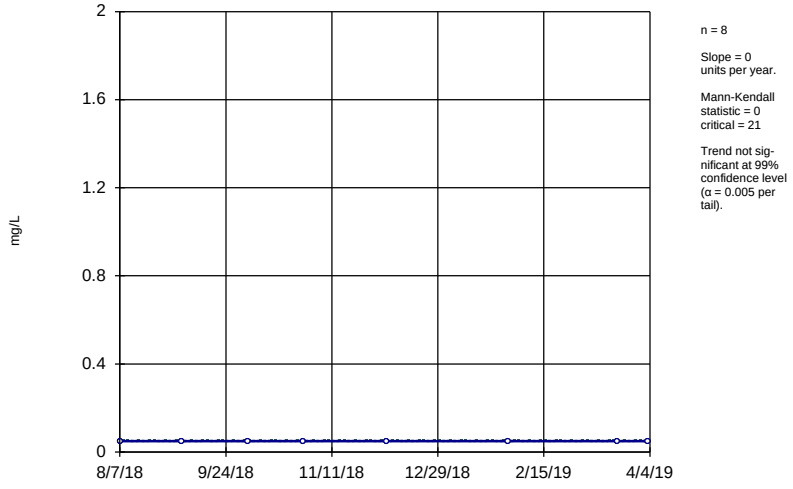
Constituent: Lithium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

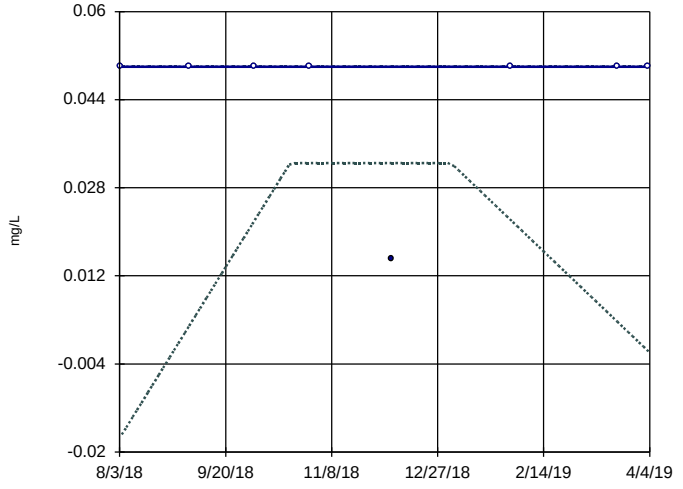
Constituent: Lithium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -1
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

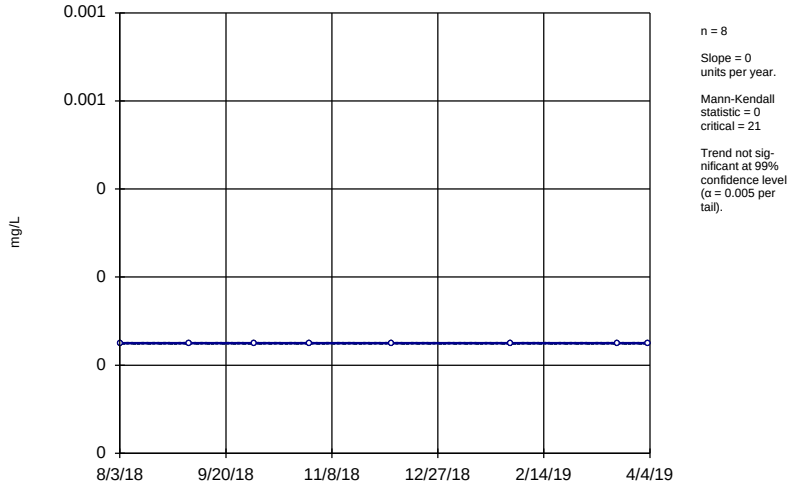
Constituent: Lithium, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



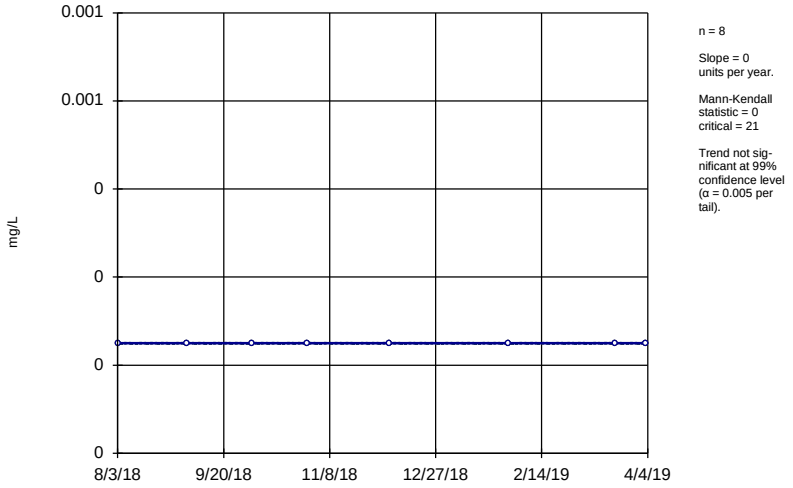
Constituent: Mercury, dissolved Analysis Run 2/19/2020 2:34 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



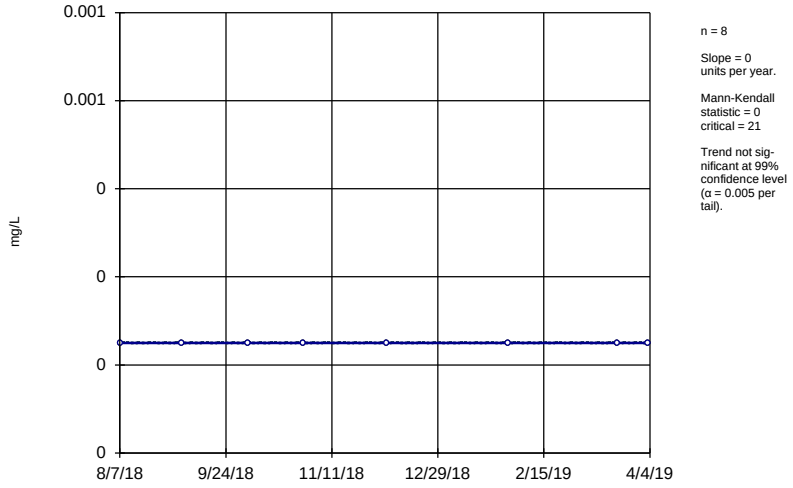
Constituent: Mercury, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



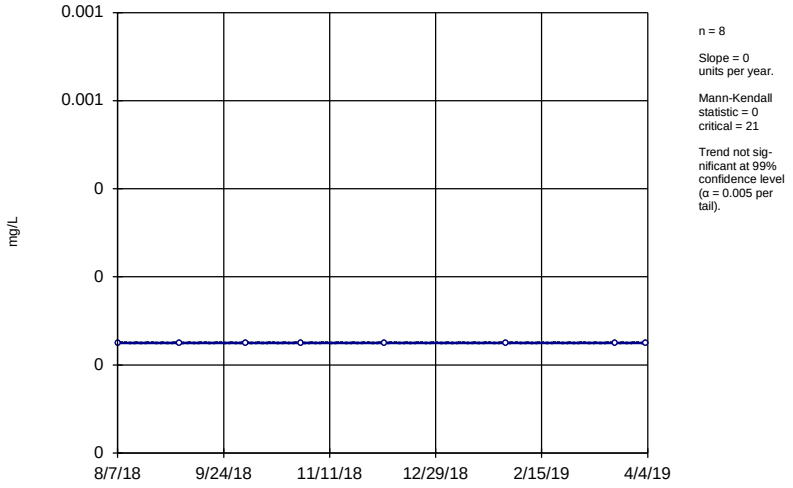
Constituent: Mercury, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



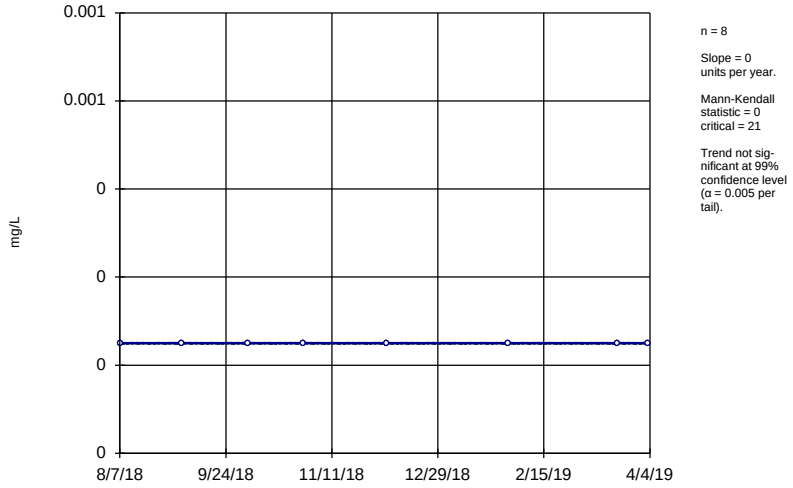
Constituent: Mercury, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not sig-nificant at 99% confidence level (α = 0.005 per tail).

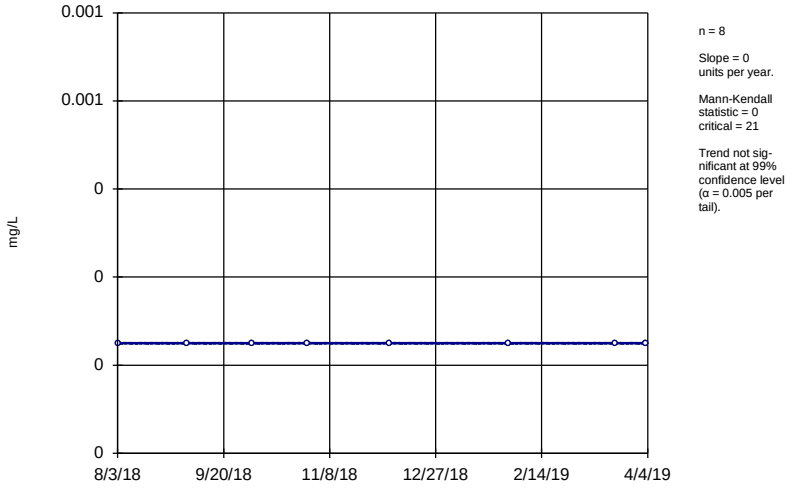
Constituent: Mercury, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not sig-nificant at 99% confidence level (α = 0.005 per tail).

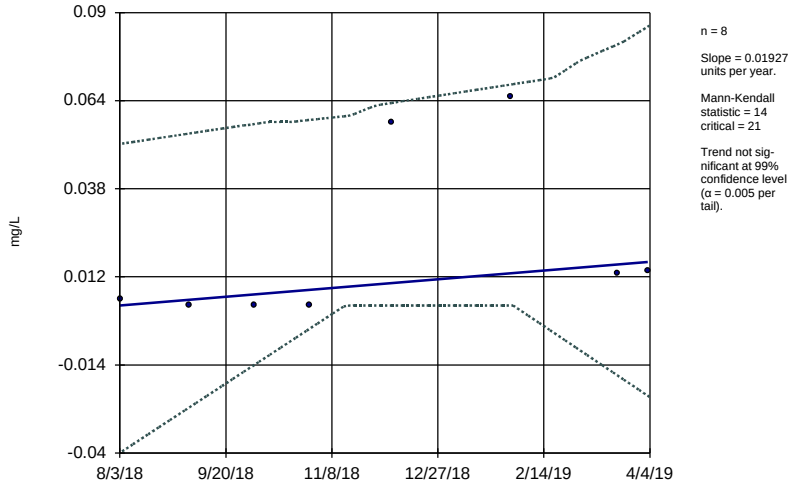
Constituent: Mercury, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0.01927 units per year.

Mann-Kendall statistic = 14 critical = 21

Trend not sig-nificant at 99% confidence level (α = 0.005 per tail).

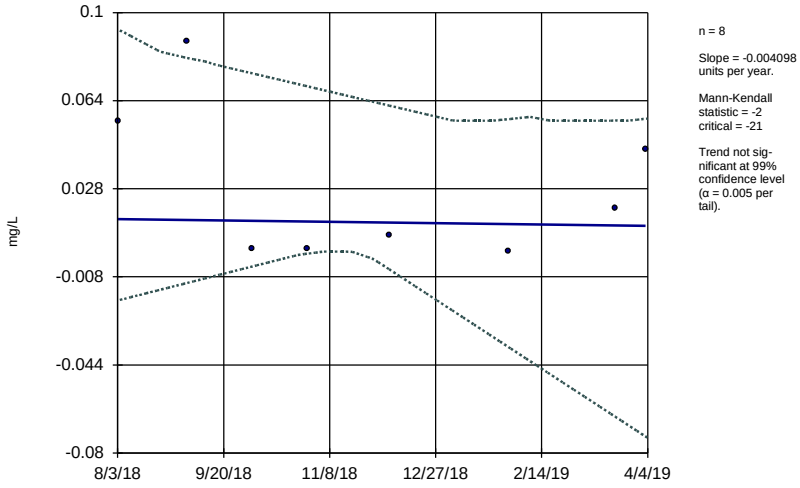
Constituent: Molybdenum, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = -0.004098 units per year.

Mann-Kendall statistic = -2 critical = -21

Trend not sig-nificant at 99% confidence level (α = 0.005 per tail).

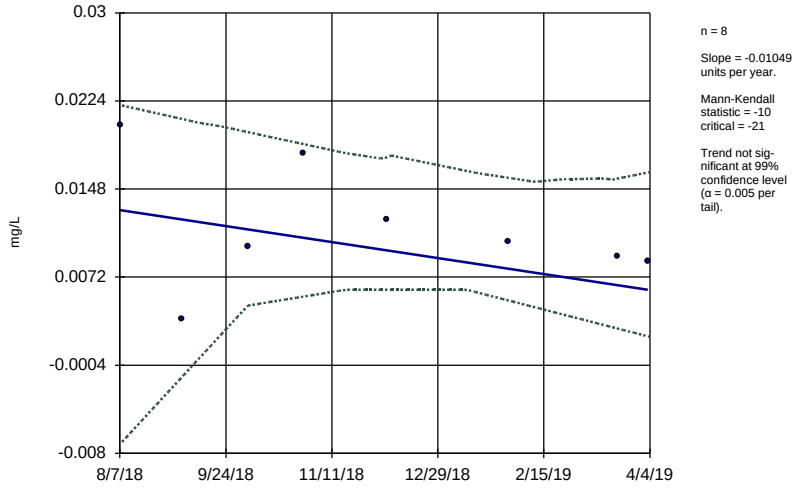
Constituent: Molybdenum, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = -0.01049 units per year.

Mann-Kendall statistic = -10
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

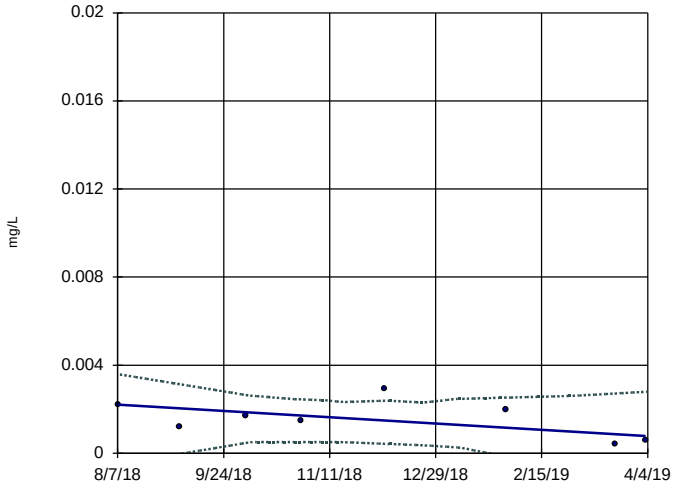
Constituent: Molybdenum, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = -0.002184 units per year.

Mann-Kendall statistic = -8
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

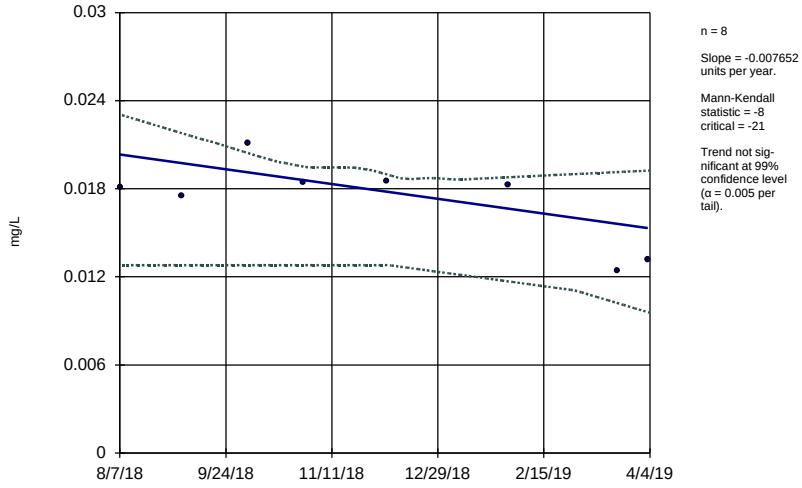
Constituent: Molybdenum, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = -0.007652 units per year.

Mann-Kendall statistic = -8
critical = -21

Trend not significant at 99% confidence level (α = 0.005 per tail).

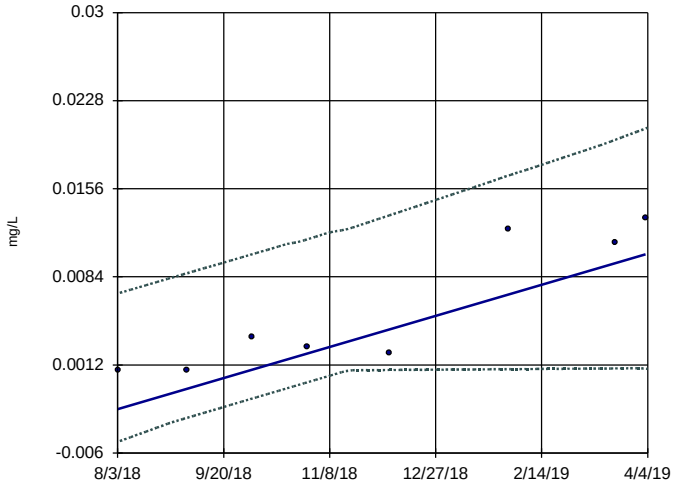
Constituent: Molybdenum, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0.01904 units per year.

Mann-Kendall statistic = 20
critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

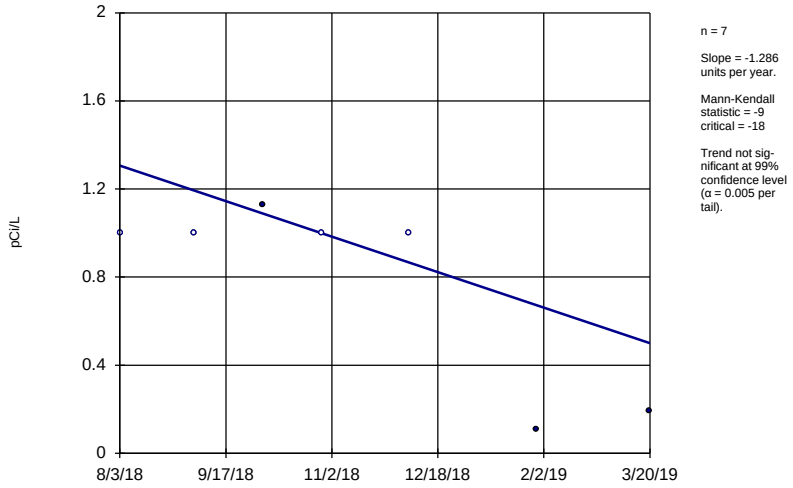
Constituent: Molybdenum, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1



n = 7

Slope = -1.286 units per year.

Mann-Kendall statistic = -9
critical = -18

Trend not significant at 99% confidence level (α = 0.005 per tail).

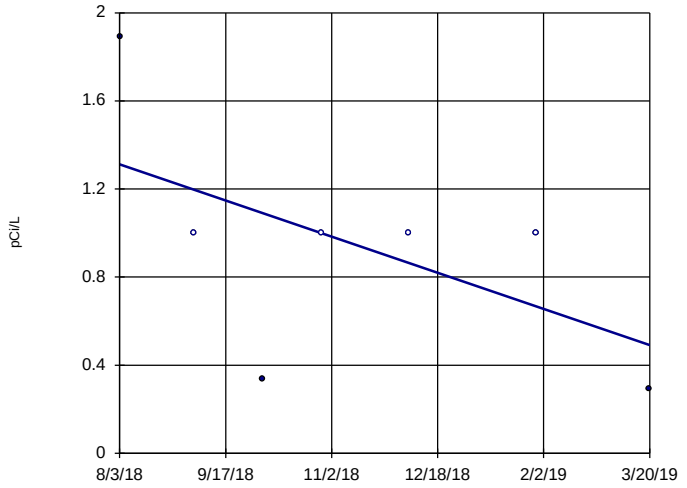
Constituent: Radium-226 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-2



n = 7

Slope = -1.308 units per year.

Mann-Kendall statistic = -9
critical = -18

Trend not significant at 99% confidence level (α = 0.005 per tail).

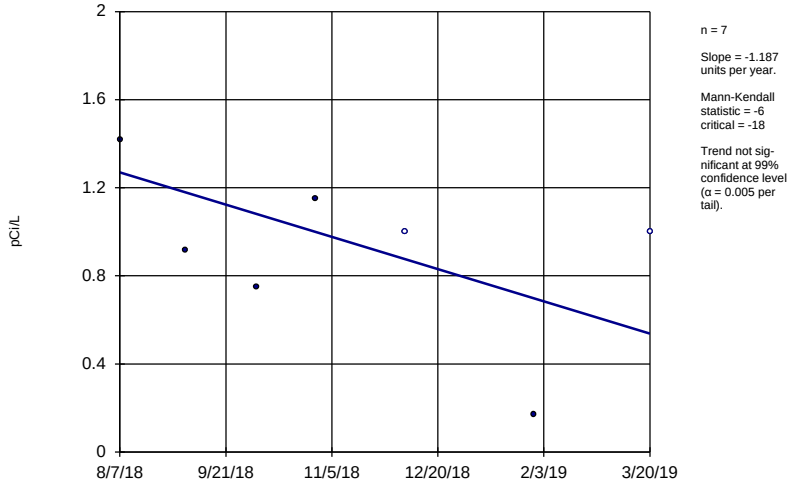
Constituent: Radium-226 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-3 (bg)



n = 7

Slope = -1.187 units per year.

Mann-Kendall statistic = -6
critical = -18

Trend not significant at 99% confidence level (α = 0.005 per tail).

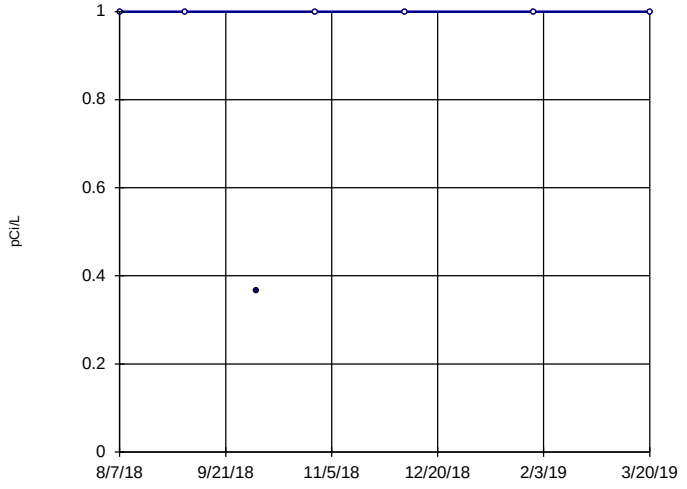
Constituent: Radium-226 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-4 (bg)



n = 7

Slope = 0 units per year.

Mann-Kendall statistic = 2
critical = 18

Trend not significant at 99% confidence level (α = 0.005 per tail).

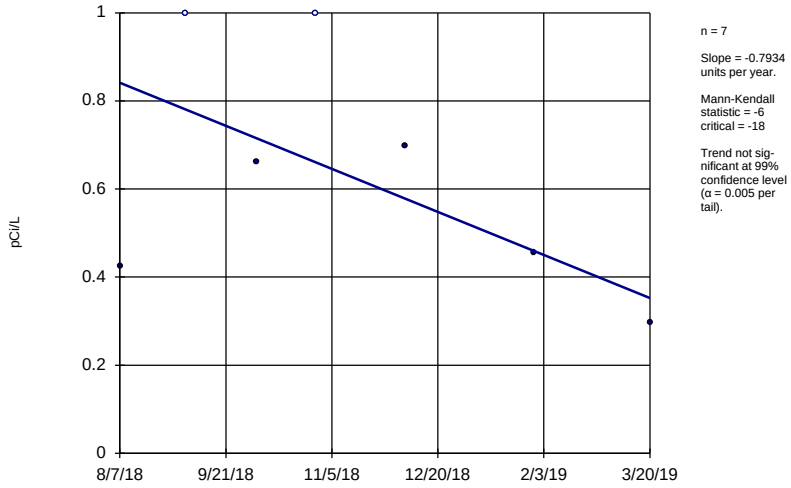
Constituent: Radium-226 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-5



n = 7

Slope = -0.7934 units per year.

Mann-Kendall statistic = -6
critical = -18

Trend not significant at 99% confidence level (α = 0.005 per tail).

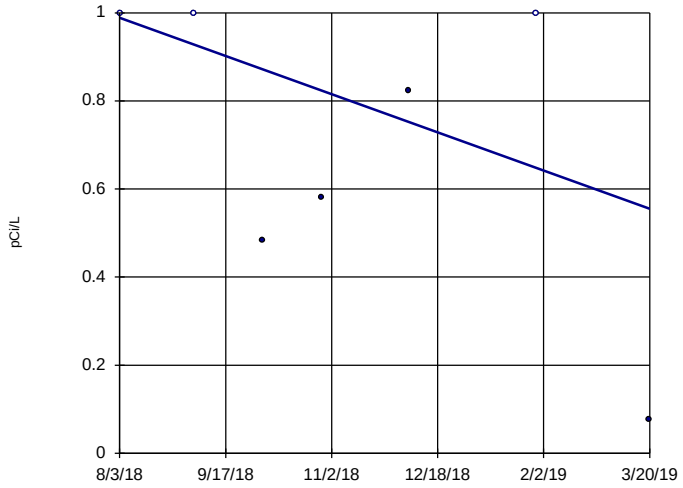
Constituent: Radium-226 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-6



n = 7

Slope = -0.6908 units per year.

Mann-Kendall statistic = -6
critical = -18

Trend not significant at 99% confidence level (α = 0.005 per tail).

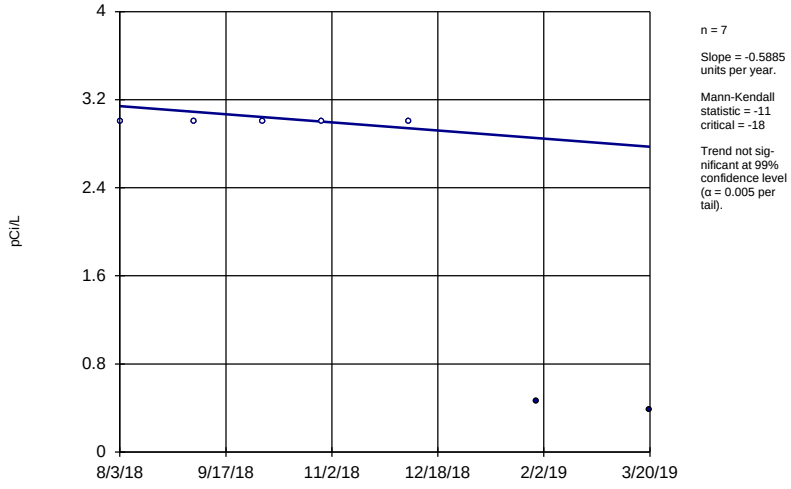
Constituent: Radium-226 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1



n = 7

Slope = -0.5885 units per year.

Mann-Kendall statistic = -11
critical = -18

Trend not significant at 99% confidence level (α = 0.005 per tail).

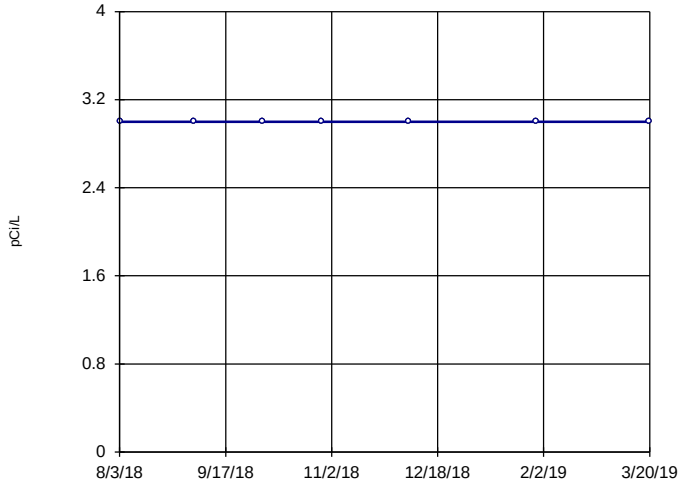
Constituent: Radium-228 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-2



n = 7

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 18

Trend not significant at 99% confidence level (α = 0.005 per tail).

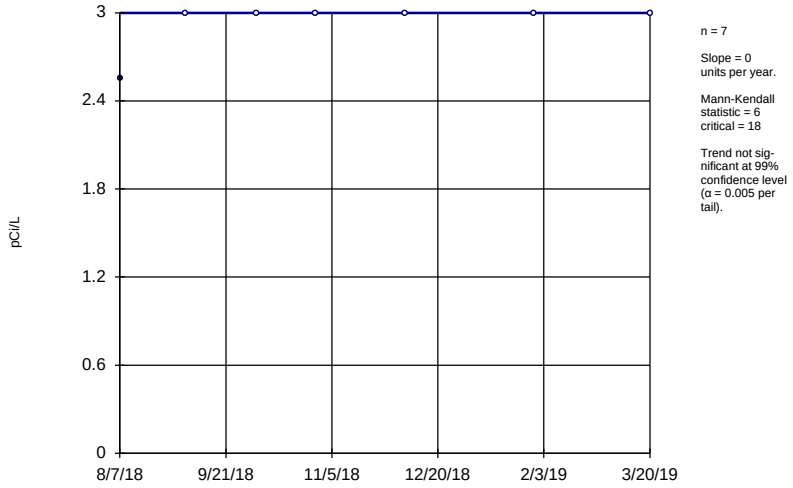
Constituent: Radium-228 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-3 (bg)



n = 7

Slope = 0 units per year.

Mann-Kendall statistic = 6 critical = 18

Trend not significant at 99% confidence level (α = 0.005 per tail).

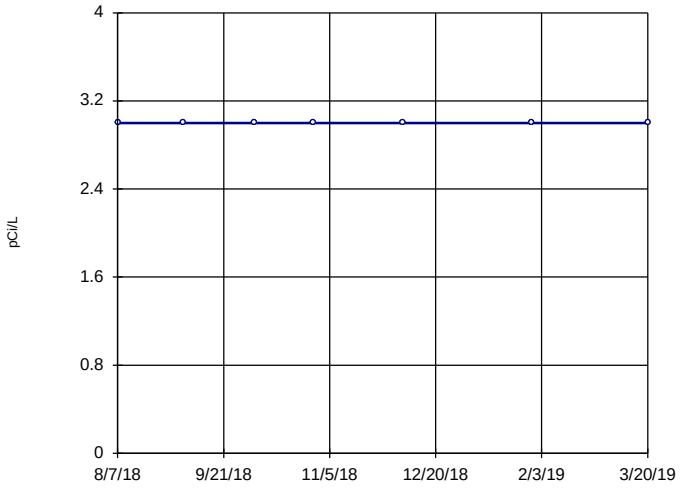
Constituent: Radium-228 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-4 (bg)



n = 7

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 18

Trend not significant at 99% confidence level (α = 0.005 per tail).

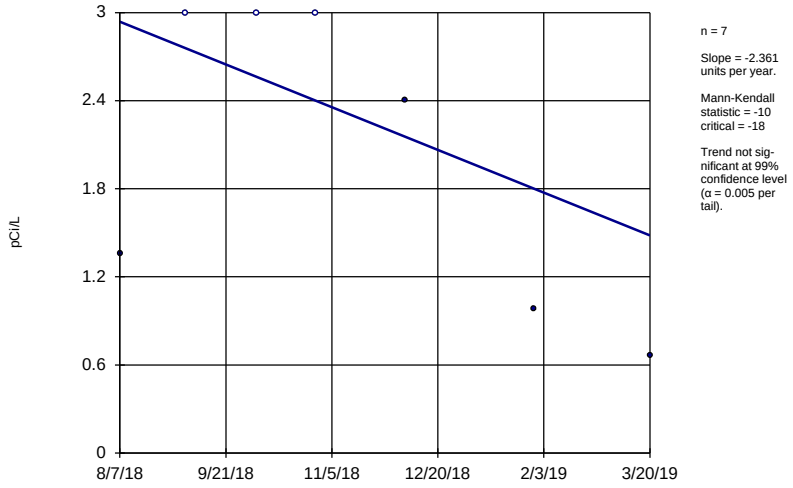
Constituent: Radium-228 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-5



n = 7

Slope = -2.361 units per year.

Mann-Kendall statistic = -10 critical = -18

Trend not significant at 99% confidence level (α = 0.005 per tail).

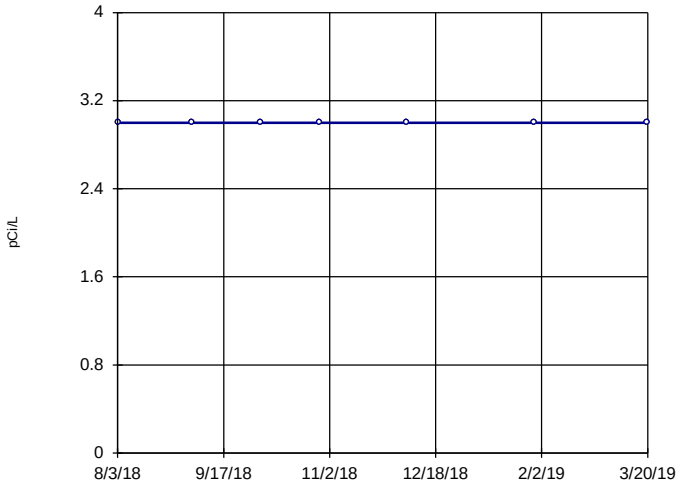
Constituent: Radium-228 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-6



n = 7

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 18

Trend not significant at 99% confidence level (α = 0.005 per tail).

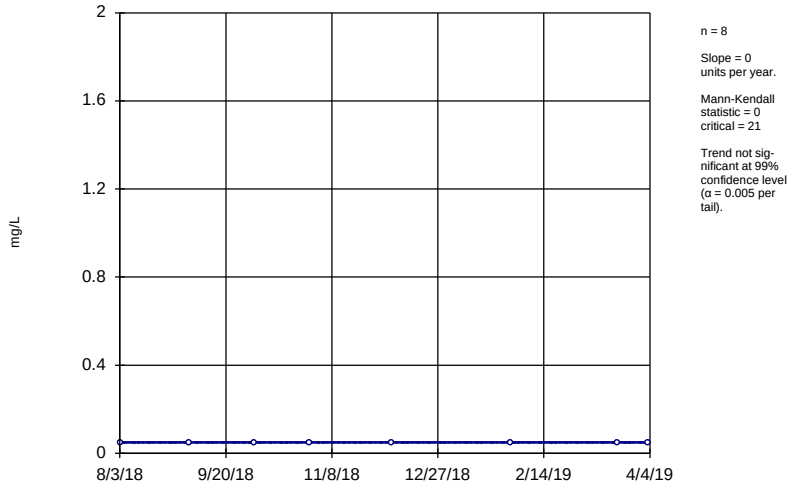
Constituent: Radium-228 Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

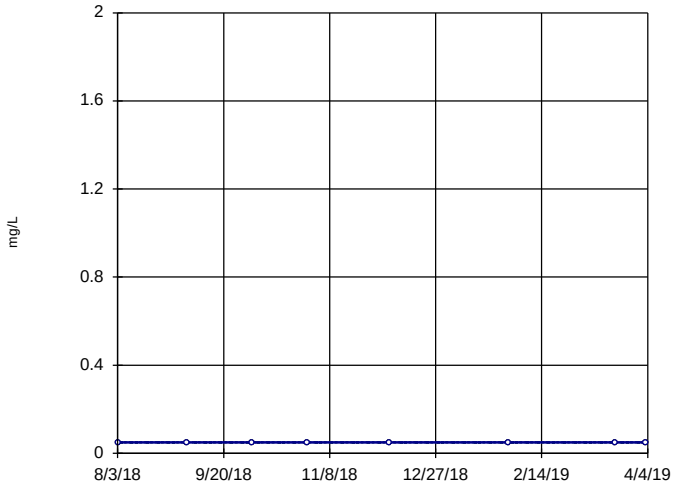
Constituent: Selenium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

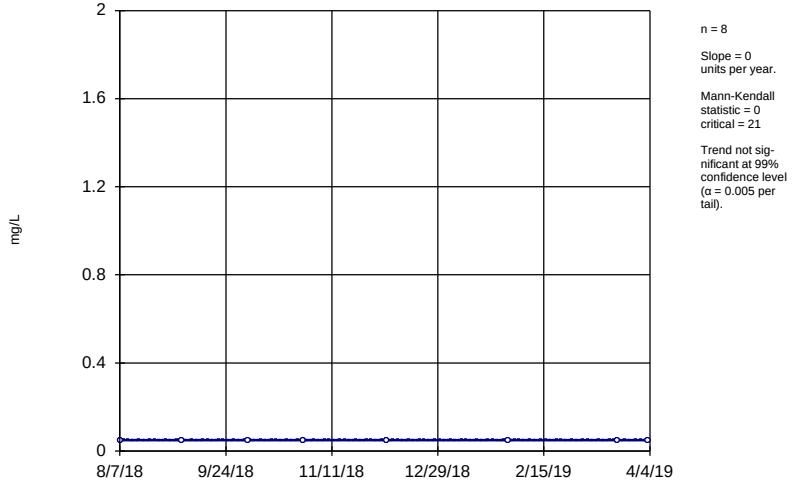
Constituent: Selenium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

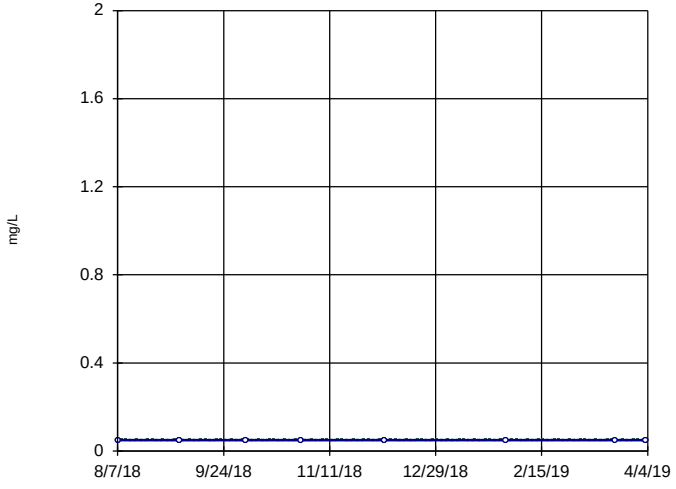
Constituent: Selenium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

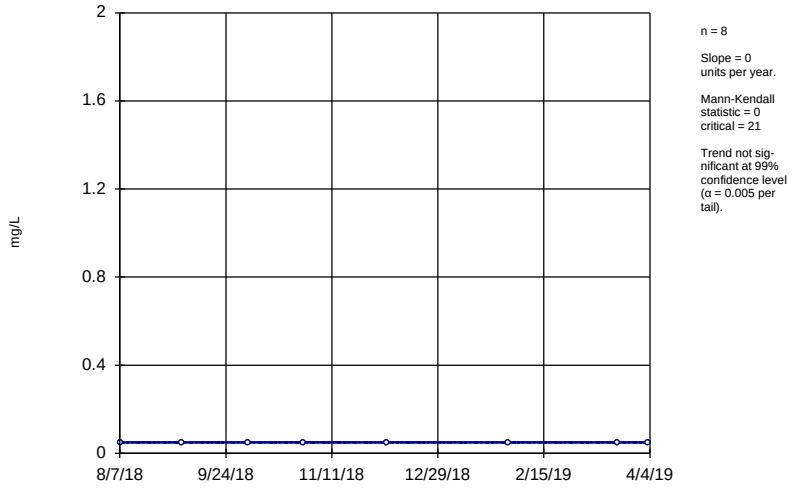
Constituent: Selenium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



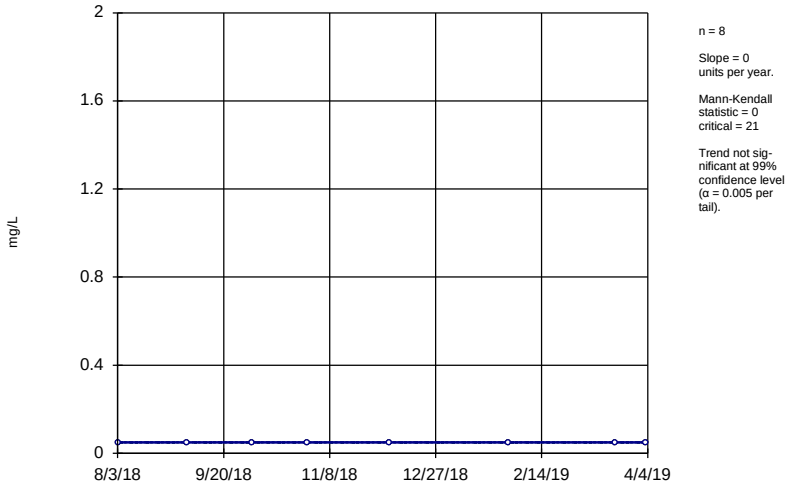
Constituent: Selenium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



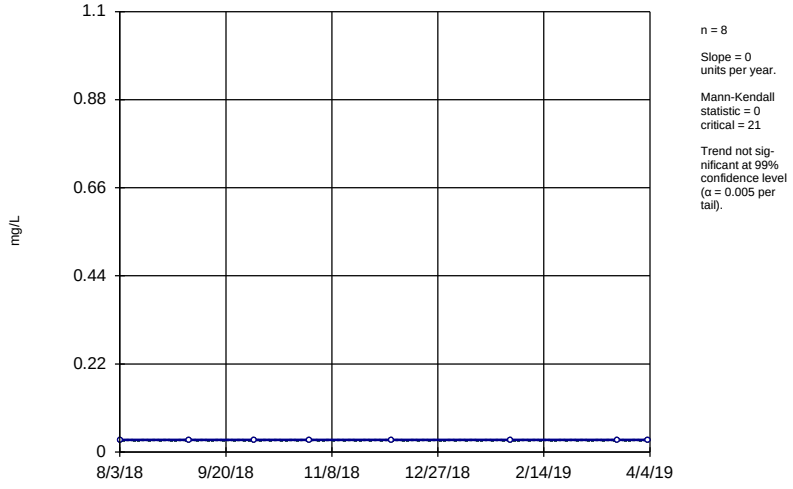
Constituent: Selenium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-1



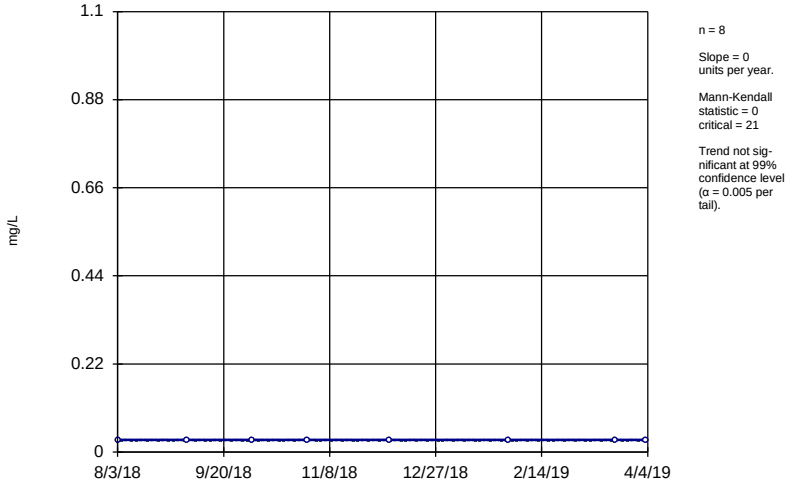
Constituent: Thallium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-2



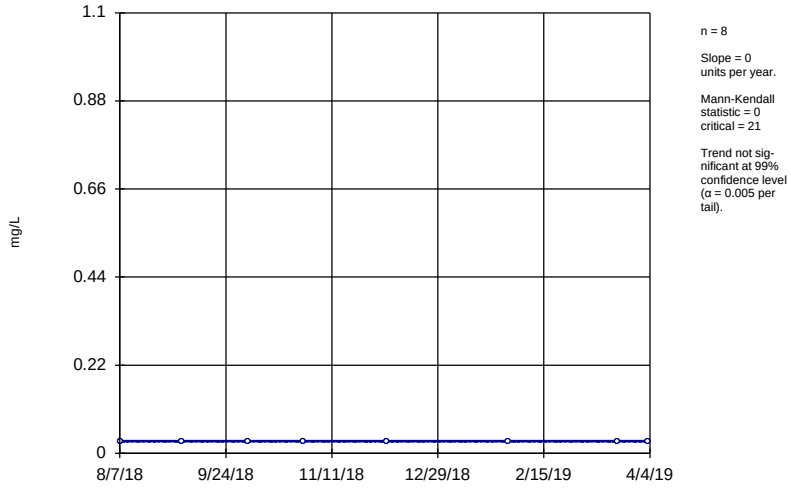
Constituent: Thallium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-3 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

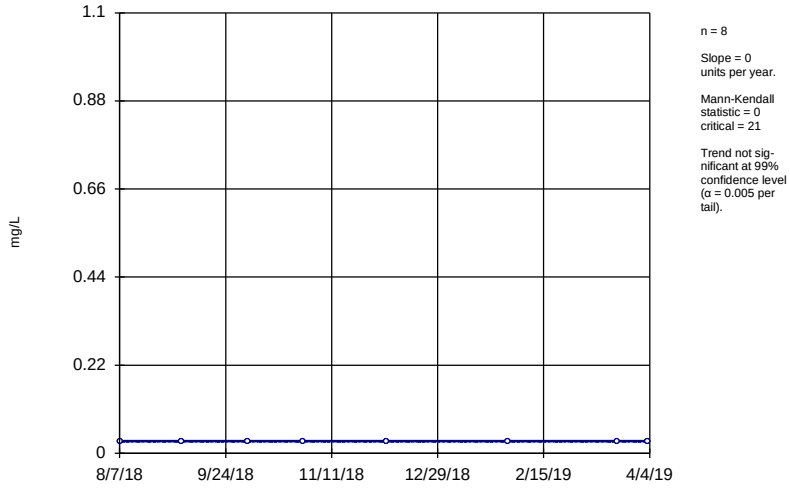
Constituent: Thallium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-4 (bg)



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

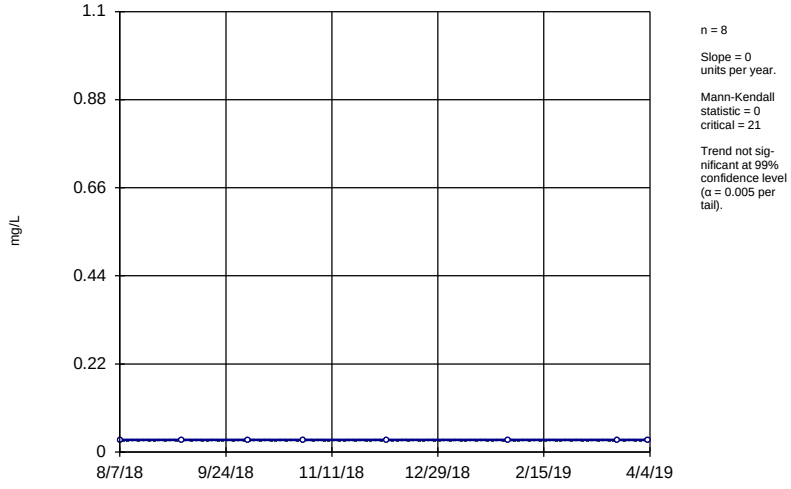
Constituent: Thallium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-5



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

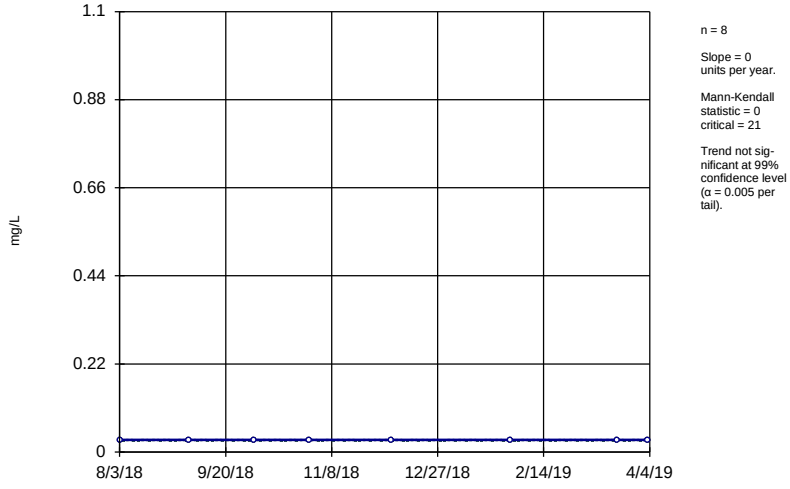
Constituent: Thallium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database

Sanitas™ v.9.6.25 Software licensed to Weaver Consultants Group. UG
Hollow symbols indicate censored values.

Sen's Slope and 99% Confidence Band

MW-6



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 21

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Thallium, dissolved Analysis Run 2/19/2020 2:35 PM

Former Mercer Generating Station Client: Weaver Consultants Group Data: Mercer CCR Database