



# 2019 Annual Groundwater Monitoring and Corrective Action Report for the Nearman Creek Power Station Bottom Ash Pond



**Kansas City, Kansas Board of Public Utilities**  
Nearman Creek Power Station

Project No. 88777  
1/31/2020



# **2019 Annual Groundwater Monitoring and Corrective Action Report for the Nearman Creek Power Station Bottom Ash Pond**

prepared for

**Kansas City, Kansas Board of Public Utilities  
Nearman Creek Power Station**

**Kansas City, Kansas**

**Project No. 88777**

**1/31/2020**

prepared by

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## LIST OF ABBREVIATIONS

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
BA Pond	Bottom Ash Pond
BPU	Kansas City, Kansas Board of Public Utilities
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CCR	Coal Combustion Residuals
CCR Final Rule	<i>Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities; Final Rule</i> , dated April 17, 2015, amended July 30, 2018
CFR	Code of Federal Regulations
Groundwater Monitoring Program	<i>Groundwater Monitoring Plan for the Nearman Creek Power Station Bottom Ash Pond</i>
GWPS	groundwater protection standard
mg/L	milligrams per liter
NCPS	Nearman Creek Power Station
NTU	Nephelometric Turbidity Unit
Pace	Pace Analytical Laboratory
Report	Annual Groundwater Monitoring and Corrective Action Report
SAP	<i>Sampling and Analysis Plan for the Nearman Creek Power Station Bottom Ash Pond</i>
Site	Nearman Creek Power Station
SSI	statistically significant increase
USEPA	United States Environmental Protection Agency

## 1.0 INTRODUCTION

This Annual Groundwater Monitoring and Corrective Action Report (Report) was prepared by Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) on behalf of Kansas City Board of Public Utilities (BPU) to present groundwater monitoring activities performed under the United States Environmental Protection Agency’s (USEPA’s) *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities; Final Rule*, 40 Code of Federal Regulations (CFR) Part 257 and 261, dated April 17, 2015 and amended on July 30, 2018 (USEPA, 2015 and USEPA, 2018) (Final CCR Rule) at the existing utility bottom ash pond (hereinafter referred to as the “BA Pond”) located at BPU’s Nearman Creek Power Station (NCPS or Site). This Report has been prepared to provide an account of groundwater monitoring activities performed in 2019 in support of BPU’s compliance with the Final Rule. These activities were performed in general accordance with the *Groundwater Monitoring Plan for the Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2016a) (Groundwater Monitoring Program) and the *Sampling and Analysis Plan for the Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2016b) (SAP) and included the following:

- Statistical evaluation of groundwater data for samples collected from 2015 through 2019.
- Continued assessment monitoring program per 40 CFR 257.95.
- Establishing groundwater protection standards (GWPSs) for those Appendix IV parameters detected during the assessment monitoring program being implemented at the BA Pond.

### 1.1 Purpose and Scope

This Report has been prepared per 40 CFR 257.90(e) to document the status of the groundwater monitoring and corrective action program at the BA Pond, summarize key actions completed, describe any problems encountered, discuss any actions to resolve the problems, and provide key activities for the upcoming year. This document is the third annual Report for the BA Pond.

### 1.2 Overview

This Report is organized in sections as summarized below:

- **Section 1.0 Introduction**
- **Section 2.0 Groundwater Monitoring Activities and Results**– Section 2.0 presents a narrative of the background, detection, and assessment monitoring activities that have been

performed during the reporting period. Groundwater monitoring results are also included in this section.

- **Section 3.0 Statistical Analysis** – Section 3.0 discusses statistical analyses of data generated during the reporting period.
- **Section 4.0 Certifications and Notifications to the Operating Record** – Section 4.0 lists certifications and notifications that were prepared during the reporting period.
- **Section 5.0 Key Activities for the Upcoming Year** – Section 5.0 presents an account of anticipated activities for 2020.
- **Section 6.0 References** - Section 6.0 includes a full bibliography for references made within this report.

Figure 1-1 presents the location of the BA Pond relative to the NCPS. A description of the site setting is presented in Section 2.0 of the Groundwater Monitoring Program.

## 2.0 GROUNDWATER MONITORING ACTIVITIES AND RESULTS

### 2.1 Description of the Groundwater Monitoring Program

On January 1, 2019, the BA Pond was in assessment monitoring. Prior to 2019, a total of 9 detection monitoring events and 2 assessment monitoring events had been performed at the BA Pond. These events were reported on in the *2017 Annual Groundwater Monitoring and Corrective Action Study Report* (Burns & McDonnell, 2018a) and the *2018 Annual Groundwater Monitoring and Corrective Action Study Report* (Burns & McDonnell, 2019a)

In 2019, two groundwater monitoring events were conducted at the BA Pond as a part of assessment monitoring activities. The following bullets present a summary of the timing of each of the groundwater sampling events, presents the analytes that were sampled, and gives rationale for each sampling event. Sampling was performed in accordance with the Groundwater Monitoring Program.

- July 2019 – Groundwater samples were collected from all wells presented in Figure 2-1, including: Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, MW-10, MW-13, MW-14, MW-15, and MW-16 for the complete list of Appendix III and Appendix IV parameters per the requirements of 40 CFR 257.95(b). The results of this sampling event were statistically evaluated and compared to background concentrations that were developed using the statistical methods included in the September 13, 2018 *Update to Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2018b). The results of this evaluation, which is summarized in the September 27, 2019 *Notification Regarding Groundwater Protection Standards* (Burns & McDonnell, 2019b), indicated that none of the parameters listed in Appendix IV of 40 CFR 257.95 were detected at concentrations above their respective GWPSs.
- November 2019 – Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, MW-10, MW-13, MW-14, MW-15, and MW-16 were sampled for the complete list of Appendix III parameters and those Appendix IV parameters that were detected during the July 2019 sampling event (herein after referred to as the “2019 reduced list of Appendix IV parameters”, which includes: arsenic, barium, fluoride, lithium, molybdenum, selenium, radium). The results of this sampling event were statistically evaluated and compared to background concentrations that were developed using the statistical methods included in the September 13, 2018 *Update to Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2018b). The results of this statistical evaluation, which

is summarized in Appendix B, indicated that none of the parameters listed in Appendix IV of 40 CFR 257.95 were detected at concentrations above their respective GWPSs.

## 2.2 Monitoring Well Redevelopment

In 2019, the Missouri River crested at major and near major flood stage on two separate occasions prior to the July groundwater sampling activities. While the Missouri River is at and near major flood stage, river water exceeds the elevation of each monitoring well used for CCR activities. Due to the flooding, it was likely that river water and/or river sediment entered BA Pond monitoring wells with the potential to bias and compromise groundwater analytical results. Succeeding each flooding event, Burns & McDonnell and BPU personnel developed each monitoring well to stabilization criteria outlined in the *Sampling and Analysis Plan for the Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2016b).

This was done to ensure that groundwater collected during sampling activities was representative of the targeted aquifer in attempt to limit bias that might have been caused from the river's flooding.

Monitoring well development field paperwork is provided in Appendix C.

## 2.3 Groundwater Sampling Activities

During the 2019 sampling events identified in Section 2.1, the depth to groundwater was gauged prior to sampling using a decontaminated water level meter. The measured depth to groundwater and calculated water level elevations for each event are presented on Tables 2-1 and 2-2. Once gauged, the wells were purged using low-flow sampling pumps until stabilization criteria had been met and the turbidity was below 5 Nephelometric Turbidity Units (NTUs). Note, turbidity stabilized above 5 NTUs at Monitoring Wells MW-10 (7.97) and MW-13 (11.12) during the July sampling event and stabilized above 5 NTUs at Monitoring Well MW-8A (10.84) during the November sampling event. Once groundwater stabilized, the BA Pond monitoring wells were sampled for the parameters presented in Section 2.1 using the analytical methods presented on Table 2-3. Samples were maintained in accordance with the SAP included in the Groundwater Monitoring Program and were provided to Pace Analytical Laboratory (Pace) for analysis. No issues were encountered during the sampling events performed at the BA Pond in 2019. Monitoring well sampling forms for each of the groundwater monitoring events are presented in Appendix D. While analytical data are summarized in Table 2-3, copies of laboratory analytical data packages are included in Appendix E. All laboratory data was validated by Burns & McDonnell chemists in accordance with the SAP. Copies of data validation reports are provided in Appendix E, and all data are considered suitable for reporting as qualified. None of the detected parameters from the July nor the November sampling events exceeded their respective GWPS as presented in Table 2-3.

As presented on Figures 2-2 and 2-3, the primary groundwater gradients observed during the reporting period were predominantly to the northwest, generally toward Monitoring Well MW-14.

### 3.0 STATISTICAL ANALYSIS

In accordance with 40 CFR 257.93(h)(2), statistical analysis of the groundwater water quality data collected from October 2015 through November 20, 2019 was completed on August 26, 2020 and January 07, 2020, within 90 days following analysis of the samples collected during the July 2019 and November 2019 sampling events, respectively. The results of these assessments were used to update GWPSs. As presented in Appendix B, the following parameters were observed at concentrations above calculated background values in downgradient monitoring wells, but below their respective GWPSs.

<b>July 2019 Sampling Event</b>	<b>November 2019 Sampling Event</b>
Boron (MW-8A)	Boron (MW-8A and MW-10)
Molybdenum (MW-8A)	Chloride (MW-8A)
Sulfate (MW-8A)	Molybdenum (MW-8A)
--	Sulfate (MW-8A)

#### **4.0 CERTIFICATIONS AND NOTIFICATIONS TO THE OPERATING RECORD**

The following certifications and notifications were made to the operating record and/or were posted to the BPU's publicly accessible CCR website during the reporting period:

- *2018 Annual Groundwater Monitoring and Corrective Action Report for the Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2019a)
- Documentation of the development of monitoring wells and other measurements, as required by 257.91(e)(1).
- Copies of analytical data reports as required by the CCR groundwater monitoring program.
- *Updated Groundwater Monitoring System Certification for the KCBPU – Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2019c), included in Appendix A
- GWPSs
- *Statistical Evaluation of July 2019 Assessment Monitoring Data Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2019d)
- *Notification Regarding Groundwater Protection Standards* (Burns & McDonnell, 2019b)

## **5.0 KEY ACTIVITIES FOR THE UPCOMING YEAR**

Groundwater monitoring and statistical assessments are expected to be performed in 2020 as required by the BA Pond assessment monitoring program. BPU plans to evaluate the existing BA Pond groundwater monitoring network in 2020, based on activities conducted in 2019. Additionally, BPU plans to initiate closure of the BA Pond by removal of CCR in 2020.

## 6.0 REFERENCES

- Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell), 2016a, *Groundwater Monitoring Plan for the Nearman Creek Power Station Bottom Ash Pond*, March 14.
- Burns & McDonnell, 2016b, *Sampling and Analysis Plan for the Nearman Creek Power Station Bottom Ash Pond*, March 14.
- Burns & McDonnell, 2018a. *2017 Annual Groundwater Monitoring and Corrective Action Report for the Nearman Creek Power Station Bottom Ash Pond*. January 31.
- Burns & McDonnell, 2018b. *Update to Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond*. September 13.
- Burns & McDonnell, 2019a. *2018 Annual Groundwater Monitoring and Corrective Action Report for the Nearman Creek Power Station Bottom Ash Pond*. January 31.
- Burns & McDonnell, 2019b. *Notification Regarding Groundwater Protection Standards*. September 27.
- Burns & McDonnell, 2019c. *Updated Groundwater Monitoring System Certification for the KCBPU – Nearman Creek Power Station Bottom Ash Pond*. April 29.
- Burns & McDonnell, 2019d. *Statistical Evaluation of July 2019 Assessment Monitoring Data Nearman Creek Power Station Bottom Ash Pond*. September 27.
- United States Environmental Protection Agency (USEPA), 2015, *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, 40 CFR Parts 257 and 261, Federal Register, Vol. 80, No. 74, April 17, <http://www.gpo.gov/fdsys/pkg/FR-2015-04-17/pdf/2015-00257.pdf>.
- USEPA, 2018. *Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Amendments to the National Minimum Criteria (Phase One, Part One)*. 40 CFR Part 257, Federal Registrar, Vol. 83, No. 146, July 30. <https://www.federalregister.gov/documents/2018/07/30/2018-16262/hazardous-and-solid-waste-management-system-disposal-of-coal-combustion-residuals-from-electric-utilities>

## **TABLES**

**Table 2-1**  
**Monitoring Well Gauging Data - July 2, 2019**  
**Kansas City Board of Public Utilities**  
**Nearman Creek Power Station Bottom Ash Pond**

<b>Well</b>	<b>Date Measured</b>	<b>Top of Casing Elevation (ft MSL)<sup>1</sup></b>	<b>Total Depth Constructed (ft bTOC)</b>	<b>Measured Total Depth (ft bTOC)</b>	<b>Measured Water Level (ft bTOC)</b>	<b>Elevation of Water Level (ft MSL)</b>
MW-2A	7/2/2019	747.86	31.68	NM	6.33	741.53
MW-3	7/2/2019	750.44	34.7	NM	8.27	742.17
MW-4	7/2/2019	746.90	31.75	NM	4.62	742.28
MW-8A	7/2/2019	750.10	35.17	NM	9.99	740.11
MW-10	7/2/2019	745.25	29.5	NM	4.40	740.85
MW-13	7/2/2019	747.81	33.48	NM	4.50	743.31
MW-14	7/2/2019	749.18	33.27	NM	14.10	735.08
MW-15	7/2/2019	752.88	32.7	NM	10.10	742.78
MW-16	7/2/2019	748.43	32.59	NM	5.02	743.41

**Notes:**

<sup>1</sup> - Elevations as presented by Atlas Surveyors on *Survey of Monitoring Wells* dated December 4, 2018.

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level

NM- Not measured

**Table 2-2**  
**Monitoring Well Gauging Data - November 25, 2019**  
**Kansas City Board of Public Utilities**  
**Nearman Creek Power Station Bottom Ash Pond**

<b>Well</b>	<b>Date Measured</b>	<b>Top of Casing Elevation (ft MSL)<sup>1</sup></b>	<b>Total Depth Constructed (ft bTOC)</b>	<b>Measured Total Depth (ft bTOC)</b>	<b>Measured Water Level (ft bTOC)</b>	<b>Elevation of Water Level (ft MSL)</b>
MW-2A	11/25/2019	747.86	31.68	31.70	12.63	735.23
MW-3	11/25/2019	750.44	34.7	34.51	14.95	735.49
MW-4	11/25/2019	746.90	31.75	31.98	11.52	735.38
MW-8A	11/25/2019	750.10	35.17	35.27	15.94	734.16
MW-10	11/25/2019	745.25	29.5	26.60	10.61	734.64
MW-13	11/25/2019	747.81	33.48	33.47	10.74	737.07
MW-14	11/25/2019	749.18	33.27	33.27	17.43	731.75
MW-15	11/25/2019	752.88	32.7	31.75	15.62	737.26
MW-16	11/25/2019	748.43	32.59	32.64	12.19	736.24

**Notes:**

<sup>1</sup> - Elevations as presented by Atlas Surveyors on *Survey of Monitoring Wells* dated December 4, 2018.

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level

**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Sample Location						MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3
Sample Date						10/29/2015	1/27/2016	4/27/2016	7/25/2016	10/25/2016	1/24/2017	4/24/2017	7/25/2017	9/14/2017	3/8/2018
Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>										
<b>Appendix III - Detection Monitoring</b>															
6010B	Boron	mg/l	0.272	--	--	0.218	0.219	0.244	0.272	0.24	0.208	0.2 U	0.218	0.226	NS
6010B	Calcium	mg/l	252.1	--	--	194	199	201	235	218	212	191	218	195	NS
9056MOD	Chloride	mg/l	24.82	--	--	4.45	4.65	4.64	4.37	5.23	5.88	7.83	6.69	5.63	NS
9056MOD	Fluoride	mg/l	0.486	--	--	0.158	0.125	0.139	0.1 U	0.138	0.176	0.136	0.141	0.157	NS
9040C	pH	su	6.56 - 8.29	--	--	6.83 J	6.93 J	6.82 J	6.75 J	8.29 J	6.56 J	6.85 J	6.78 J	6.79 J	NS
In Situ	pH	su	6.34 - 8.60	--	--	6.93	6.7	6.33	6.87	6.74	6.75	6.68	6.63	6.6	6.45
9056MOD	Sulfate	mg/l	198.7	--	--	109	114	121	117	121	130	115	143	106	NS
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	717	749	771	845	697	831	715	827	733	NS
<b>Appendix IV - Assessment Monitoring</b>															
6010B/6020	Antimony	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035	0.0021	0.00269	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00219
6010B	Barium	mg/l	0.274	2	--	0.151	0.152	0.154	0.197	0.173	0.165	0.145	0.159	0.177	0.164
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.486	4	--	0.158	0.125	0.139	0.1 U	0.138	0.176	0.136	0.141	0.157	0.134
6010B/6020	Lead	mg/l	--	--	--	0.005 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.0708	0.0708	--	0.0441	0.0525	0.0528	0.0536	0.0551	0.0542	0.0548	0.0461	0.0486	0.0608
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	0.01 U	0.00576	0.00406	0.0196	0.00685	0.002 U	0.002 U	0.00411	0.00568	0.01 U
6010B/6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	0.637	1.63	2.09	0.630 J	1.06	4.26	1.27 J	NA	1.27 J	1.06

**Notes:**

Samples were collected when the BA Pond was in a Detection Monitoring Program

Samples were collected when the BA Pond was in an Assessment Monitoring Program

1 = Calculated background limit as calculated as part of the January 7, 2019 assessment of the November 2019 assessment monitoring event.

2 = Groundwater Protection Standards established for the BA Pond by comparing calculated background limits, MCLs, and §257.95(h)(2) criteria, Appendix B

3 = Calculated background limit for arsenic as calculated as part of the Alternate Source Demonstration dated December 12, 2018.

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated with potential high bias

J- = Result qualified as estimated with potential low bias

MCL = Maximum Contaminant Level

mg/l = milligram per liter

NA = Not Available

NS = Not Sampled or Not Measured

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

pCi/L = picocurie per liter

su = Standard Units

U = Non Detect at the identified concentration

U\* = Qualified as non detect during data validation process

V = The sample concentration is too high to evaluate accurate spike recoveries (Lab Qualifier)

**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Sample Location						MW-3	MW-3	MW-3	MW-3	MW-3	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4
Sample Date						6/4/2018	10/2/2018	11/20/2018	7/1/2019	11/26/2019	10/30/2015	1/27/2016	4/27/2016	7/25/2016	10/25/2016	1/24/2017
Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>											
<b>Appendix III - Detection Monitoring</b>																
6010B	Boron	mg/l	0.272	--	--	0.212	0.2 U	NS	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2
6010B	Calcium	mg/l	252.1	--	--	215	207	NS	136	181	200	191	206	181 V	186	207
9056MOD	Chloride	mg/l	24.82	--	--	5.74	7.13	NS	7.37	7.35	9.72	8.98	13.4	3.9	6.27	11.2
9056MOD	Fluoride	mg/l	0.486	--	--	0.173 J+	0.186	NS	0.218	0.180	0.112	0.12	0.108	0.104	0.131	0.172
9040C	pH	su	6.56 - 8.29	--	--	6.94 J	6.83 J	NS	7.23 J	6.84 J	6.92 J	7.02 J	6.84 J	6.87 J	7.30 J	6.87 J
In Situ	pH	su	6.34 - 8.60	--	--	7.18	6.66	6.6	6.74	6.74	6.8	6.7	6.11	6.81	6.86	6.81
9056MOD	Sulfate	mg/l	198.7	--	--	137	136	NS	66.9	93.4	116	109	128	74.5	96.2	148
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	788	747	NS	506	638	780	736	755	683	837	774
<b>Appendix IV - Assessment Monitoring</b>																
6010B/6020	Antimony	mg/l	--	--	--	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035	0.002 U	0.0021	0.002 U	0.00216	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Barium	mg/l	0.274	2	--	0.159	0.163	NS	0.162	0.183	0.16	0.148	0.152	0.141	0.149	0.173
6010B	Beryllium	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	NS	NS	NS	0.01 U	NS	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	NS	NS	NS	0.01 U	NS	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.486	4	--	0.173 J+	0.186	NS	0.218	0.18	0.112	0.12	0.108	0.104	0.131	0.172
6010B/6020	Lead	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	0.005 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.0708	0.0708	--	0.0606	0.0481	NS	0.0239	0.0462	0.0372	0.0439	0.0418	0.0425	0.0464	0.0411
7470A	Mercury	mg/l	--	--	--	NS	NS	NS	0.0002 U	NS	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	NS	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	NS	NS	NS	0.002 U	0.01 U	0.0423	0.0562	0.00642	0.0315	0.0383	0.0155
6010B/6020	Thallium	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	1.62	0.555 J	NS	2.07	1.01	0.266	1.16	0.46	0.700 J	0.756	0.18 U*

**Notes:**

**Samples were collected when the BA Pond was in a Detection Monitoring Program**

**Samples were collected when the BA Pond was in an Assessment Monitoring Program**

1 = Calculated background limit as calculated as part of the January 7, 2019 assessment of the November 2019 assessment monitoring event.

2 = Groundwater Protection Standards established for the BA Pond by comparing calculated background limits, MCLs, and §257.95(h)(2) criteria, Appendix B

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B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated with potential high bias

J- = Result qualified as estimated with potential low bias

MCL = Maximum Contaminant Level

mg/l = milligram per liter

NA = Not Available

NS = Not Sampled or Not Measured

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

pCi/L = picocurie per liter

su = Standard Units

U = Non Detect at the identified concentration

U\* = Qualified as non detect during data validation process

V = The sample concentration is too high to evaluate accurate spike recoveries (Lab Qualifier)

**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Sample Location						MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-2A
Sample Date						4/24/2017	7/26/2017	9/14/2017	3/8/2018	6/4/2018	10/2/2018	11/20/2018	7/2/2019	11/26/2019	10/29/2015
Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>										
<b>Appendix III - Detection Monitoring</b>															
6010B	Boron	mg/l	0.272	--	--	0.2 U	0.2 U	0.2 U	NS	0.2 U	0.2 U	NS	0.2 U	0.2 U	0.2 U
6010B	Calcium	mg/l	252.1	--	--	224	193	186	NS	214 O1 V	176	NS	89.9	128	223
9056MOD	Chloride	mg/l	24.82	--	--	12.4	6.6	4.92	NS	3.59	1.95	NS	8.22	6.94	7.54
9056MOD	Fluoride	mg/l	0.486	--	--	0.119	0.135	0.148 J-	NS	0.156 J+	0.177	NS	0.314	0.235	0.129
9040C	pH	su	6.56 - 8.29	--	--	6.86 J	6.71 J	6.88 J	NS	6.93 J	6.91 J	NS	7.56 J	7.10 J	6.86 J
In Situ	pH	su	6.34 - 8.60	--	--	6.69	6.79	6.7	6.68	6.94	6.80	6.7	7.29	6.9	6.96
9056MOD	Sulfate	mg/l	198.7	--	--	148	117	100	NS	116	87	NS	64.1	59.7	227
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	840	736	732	NS	741	619	NS	358	481	852
<b>Appendix IV - Assessment Monitoring</b>															
6010B/6020	Antimony	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00361
6010B	Barium	mg/l	0.274	2	--	0.151	0.14	0.146	0.135	0.134	0.121	NS	0.112	0.134	0.127
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	NS	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	NS	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	NS	NS	NS	0.01 U	NS	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	NS	NS	NS	0.01 U	NS	0.0112
9056MOD	Fluoride	mg/l	0.486	4	--	0.119	0.135	0.148 J-	0.132	0.156 J+	0.177	NS	0.314	0.235	0.129
6010B/6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	NS	0.005 U
6010B	Lithium	mg/l	0.0708	0.0708	--	0.0442	0.0353	0.0428	0.0458	0.051	0.0304	NS	0.0177	0.0265	0.0357
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	NS	NS	NS	0.0002 U	NS	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NS	0.005 U	0.005 U	0.005 U
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	0.002 U	0.022	0.0186	0.01 U	NS	NS	NS	0.002 U	0.01 U	0.01 U
6010B/6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	NS	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	0.191	NA	0.191 J	0.168	0.876	0.186 J	NS	1.66 J	0.115	0.763

**Notes:**

**Samples were collected when the BA Pond was in a Detection Monitoring Program**

**Samples were collected when the BA Pond was in an Assessment Monitoring Program**

- 1 = Calculated background limit as calculated as part of the January 7, 2019 assessment of the November 2019 assessment monitoring event.
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- BA = Bottom Ash
- J = Result qualified as estimated
- J+ = Result qualified as estimated with potential high bias
- J- = Result qualified as estimated with potential low bias
- MCL = Maximum Contaminant Level
- mg/l = milligram per liter
- NA = Not Available
- NS = Not Sampled or Not Measured
- O1 = The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference. (Lab Qualifier)
- pCi/L = picocurie per liter
- su = Standard Units
- U = Non Detect at the identified concentration
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**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Sample Location						MW-2A	DUP-1	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	DUP-2	MW-2A	DUP-1
Sample Date						1/27/2016	1/27/2016	4/27/2016	7/25/2016	10/25/2016	1/23/2017	4/24/2017	4/24/2017	7/25/2017	7/25/2017	7/25/2017
Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>	Duplicate Pair			Duplicate Pair			Duplicate Pair				
<b>Appendix III - Detection Monitoring</b>																
6010B	Boron	mg/l	0.272	--	--	0.2 U	0.221	0.353	0.261	0.2 U	0.495	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
6010B	Calcium	mg/l	252.1	--	--	208	206	200 V	231	163	193	128	130	138	140	
9056MOD	Chloride	mg/l	24.82	--	--	5.81	5.92	6.47	6.64	9.7	14.9	9.83	9.88	9.67	9.67	
9056MOD	Fluoride	mg/l	0.486	--	--	0.159	0.154	0.158	0.114	0.13	0.187	0.181	0.191	0.189	0.192	
9040C	pH	su	6.56 - 8.29	--	--	6.91 J	6.93 J	6.85 J	6.69 J	7.00 J	6.84 J	7.0 J	7.02 J	6.94 J	7.01 J	
In Situ	pH	su	6.34 - 8.60	--	--	6.8	6.8	6.26	6.63	6.86	6.75	6.85	6.85	6.84	6.84	
9056MOD	Sulfate	mg/l	198.7	--	--	180	182	153	196	127	153	81.6	82.5	74.6	74.7	
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	811	783	848	865	616	734	508	478	512	506	
<b>Appendix IV - Assessment Monitoring</b>																
6010B/6020	Antimony	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035	0.00468	0.00465	0.00416	0.00492	0.00499	0.00541	0.00381	0.00326	0.00578	0.00553	
6010B	Barium	mg/l	0.274	2	--	0.125	0.126	0.12	0.135	0.102	0.129	0.0796	0.0796	0.111	0.111	
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
9056MOD	Fluoride	mg/l	0.486	4	--	0.159	0.154	0.158	0.114	0.13	0.187	0.181	0.191	0.189	0.192	
6010B/6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B	Lithium	mg/l	0.0708	0.0708	--	0.0395	0.04	0.0442	0.0457	0.0351	0.0334	0.0305	0.0305	0.0206	0.0221	
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B/6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	2.45	1.21	1.33	1.68	0.72	1.7	0.214 J	0.597 J	NA	NA	

**Notes:**

**Samples were collected when the BA Pond was in a Detection Monitoring Program**

**Samples were collected when the BA Pond was in an Assessment Monitoring Program**

- 1 = Calculated background limit as calculated as part of the January 7, 2019 assessment of the November 2019 assessment monitoring event.
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**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>	Sample Location	MW-2A	DUP-1	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	DUP-1	MW-2A	DUP-1
						Sample Date	9/14/2017	9/14/2017	3/8/2018	6/4/2018	10/1 & 10/3/2018	11/20/2018	7/1/2019	7/1/2019	11/26/2019	11/26/2019
						Duplicate Pair						Duplicate Pair		Duplicate Pair		
<b>Appendix III - Detection Monitoring</b>																
6010B	Boron	mg/l	0.272	--	--		0.2 U	0.2 U	NS	0.2 U	0.2 U	NS	0.2 U	0.2 U	0.2 U	0.2 U
6010B	Calcium	mg/l	252.1	--	--		155	155	NS	156	163	NS	127 V	127	122	123
9056MOD	Chloride	mg/l	24.82	--	--		6.26	6.33	NS	4.34	5.12	NS	8.82	8.96	14.0	13.9
9056MOD	Fluoride	mg/l	0.486	--	--		0.186	0.181	NS	0.274 J+	0.208	NS	0.23	0.229	0.274	0.271
9040C	pH	su	6.56 - 8.29	--	--		6.91 J	6.99 J	NS	7.05 J	6.96 J	NS	8.23 J	7.47 J	7.23 J	7.23 J
In Situ	pH	su	6.34 - 8.60	--	--		6.8	6.8	6.39	6.81	6.80	6.7	6.85	6.85	7.01	7.01
9056MOD	Sulfate	mg/l	198.7	--	--		89	89.6	NS	53.8	68.5	NS	86.3	87.2	108	109
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--		571	568	NS	537	580	NS	462	462	471	436
<b>Appendix IV - Assessment Monitoring</b>																
6010B/6020	Antimony	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035		0.00487	0.00487	0.00428	0.002 U	0.00359	0.00324	0.002 U	0.002 U	0.00248	0.00246
6010B	Barium	mg/l	0.274	2	--		0.116	0.115	0.184	0.147	0.157	NS	0.11	0.107	0.116	0.115
6010B	Beryllium	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	NS	NS
6010B	Cadmium	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	NS	NS
6010B	Chromium	mg/l	--	--	--		0.01 U	0.01 U	0.01 U	NS	NS	NS	0.01 U	0.01 U	NS	NS
6010B	Cobalt	mg/l	--	--	--		0.01 U	0.01 U	0.01 U	NS	NS	NS	0.01 U	0.01 U	NS	NS
9056MOD	Fluoride	mg/l	0.486	4	--		0.186	0.181	0.166	0.274 J+	0.208	NS	0.23	0.229	0.274	0.271
6010B/6020	Lead	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	NS	NS
6010B	Lithium	mg/l	0.0708	0.0708	--		0.0294	0.0298	0.0372	0.0352	0.027	NS	0.0204	0.0202	0.0205	0.0223
7470A	Mercury	mg/l	--	--	--		0.0002 U	0.0002 U	0.0002 U	NS	NS	NS	0.0002 U	0.0002 U	NS	NS
6010B	Molybdenum	mg/l	0.005	0.100	--		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NS	0.005 U	0.005 U	0.005 U	0.005 U
6010B/6020	Selenium	mg/l	0.0562	0.0562	--		0.002 U	0.002 U	0.01 U	NS	NS	NS	0.002 U	0.002 U	0.01 U	0.01 U
6010B/6020	Thallium	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	NS	NS
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--		1.31 J	1.10 J	0.864	1.64	1.25 J	NS	0.318 J	0.396 J	0.696	0.519

**Notes:**

**Samples were collected when the BA Pond was in a Detection Monitoring Program**

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1 = Calculated background limit as calculated as part of the January 7, 2019 assessment of the November 2019 assessment monitoring event.

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October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>	Sample Location	MW-8A	DUP-1A	MW-8A	MW-8A	DUP-2	MW-8A	MW-8A	MW-8A	MW-8A	MW-8A	
						Sample Date	10/29/2015	10/29/2015	1/27/2016	4/28/2016	4/28/2016	7/25/2016	10/25/2016	1/23/2017	4/24/2017	7/25/2017	9/14/2017
<b>Appendix III - Detection Monitoring</b>						Duplicate Pair		Duplicate Pair									
6010B	Boron	mg/l	0.272	--	--		2.37	2.38	2.48	2.61	2.67	2.66	2.29	2.38	2.26	2.4	2.27
6010B	Calcium	mg/l	252.1	--	--		186	185	168	186	182	204	156	146	126	161	153
9056MOD	Chloride	mg/l	24.82	--	--		26.5	30.3	30.4	30.2	30.1	29.3	30.3	26.9	29.6	28.9	28.4
9056MOD	Fluoride	mg/l	0.486	--	--		0.54	0.318	0.267	0.339	0.339	0.292	0.355	0.413	0.37	0.325	0.268
9040C	pH	su	6.56 - 8.29	--	--		6.94 J	6.97 J	7.04 J	6.93 J	6.88 J	6.78 J	7.97 J	6.72 J	6.91 J	6.88 J	6.89 J
In Situ	pH	su	6.34 - 8.60	--	--		6.94	6.94	6.9	6.75	6.75	6.56	6.92	6.88	6.86	6.73	6.74
9056MOD	Sulfate	mg/l	198.7	--	--		491	598	471	520	522	453	412	386	383	477	380
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--		1180	1130	1060	1170	1170	1190	1040	935	880	1020	1000
<b>Appendix IV - Assessment Monitoring</b>																	
6010B/6020	Antimony	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035		0.012	0.0132	0.0127	0.0308	0.0299	0.0122	0.0134	0.0156	0.0232	0.0145	0.0144
6010B	Barium	mg/l	0.274	2	--		0.073	0.0738	0.0635	0.0937	0.0924	0.0624	0.0473	0.0524	0.0565	0.0539	0.0541
6010B	Beryllium	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.486	4	--		0.54	0.318	0.267	0.339	0.339	0.292	0.355	0.413	0.37	0.325	0.268
6010B/6020	Lead	mg/l	--	--	--		0.005 U	0.005 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.0708	0.0708	--		0.0243	0.0242	0.0309	0.0298	0.0298	0.0368	0.0316	0.0268	0.0275	0.0201	0.0269
7470A	Mercury	mg/l	--	--	--		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--		0.005 U	0.005 U	0.005 U	0.00584	0.00591	0.005 U	0.005 U	0.00623	0.00685	0.00569	0.005 U
6010B/6020	Selenium	mg/l	0.0562	0.0562	--		0.01 U	0.01 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B/6020	Thallium	mg/l	--	--	--		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--		0.36	0.298	1.44	0.673	0.127	1.45	1.11	0.536	1.07 J	NA	0.980 J

**Notes:**

**Samples were collected when the BA Pond was in a Detection Monitoring Program**

**Samples were collected when the BA Pond was in an Assessment Monitoring Program**

- 1 = Calculated background limit as calculated as part of the January 7, 2019 assessment of the November 2019 assessment monitoring event.
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- 3 = Calculated background limit for arsenic as calculated as part of the Alternate Source Demonstration dated December 12, 2018.
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- BA = Bottom Ash
- J = Result qualified as estimated
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- J- = Result qualified as estimated with potential low bias
- MCL = Maximum Contaminant Level
- mg/l = milligram per liter
- NA = Not Available
- NS = Not Sampled or Not Measured
- O1 = The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference. (Lab Qualifier)
- pCi/L = picocurie per liter
- su = Standard Units
- U = Non Detect at the identified concentration
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**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>	Sample Location	MW-8A	DUP-1	MW-8A	DUP-1	MW-8A	MW-8A	MW-8A	MW-8A	MW-10	MW-10
						Sample Date	3/8/2018	3/8/2018	6/4/2018	6/4/2018	10/1 & 10/3/2018	11/20/2018	7/1/2019	11/26/2019	10/29/2015	1/27/2016
						Duplicate Pair		Duplicate Pair								
<b>Appendix III - Detection Monitoring</b>																
6010B	Boron	mg/l	0.272	--	--	NS	NS	2.44	2.47	2.31	NS	1.06	2.09 O1	1.08	0.907	
6010B	Calcium	mg/l	252.1	--	--	NS	NS	129	129	122	NS	105	115 O1	217	213	
9056MOD	Chloride	mg/l	24.82	--	--	NS	NS	25.7	25.5	26.2	NS	21.0	27.0	30.2	17	
9056MOD	Fluoride	mg/l	0.486	--	--	NS	NS	0.453 J+	0.441 J+	0.394	NS	0.251	0.329	0.327	0.104	
9040C	pH	su	6.56 - 8.29	--	--	NS	NS	6.97 J	6.98 J	6.95 J	NS	7.25 J	7.11 J	6.82 J	6.89 J	
In Situ	pH	su	6.34 - 8.60	--	--	6.91	6.91	6.86	6.86	6.86	6.6	7.14	7.07	7.03	7.1	
9056MOD	Sulfate	mg/l	198.7	--	--	NS	NS	353	360	419	NS	223	324	623	227	
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	NS	NS	853	881	920	NS	636	787	1130	916	
<b>Appendix IV - Assessment Monitoring</b>																
6010B/6020	Antimony	mg/l	--	--	--	0.002 U	0.002 U	NS	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	
6020	Arsenic	mg/l	0.035	0.035	0.035	0.0206	0.021	0.0204	0.0195	0.0278	0.0183	0.0128	0.0266	0.00743	0.00489	
6010B	Barium	mg/l	0.274	2	--	0.0657	0.065	0.0559	0.0548	0.0602	NS	0.201	0.176 O1	0.183	0.106	
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	NS	NS	NS	NS	0.002 U	NS	0.002 U	0.002 U	
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	NS	NS	NS	NS	0.002 U	NS	0.002 U	0.002 U	
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	NS	NS	NS	NS	0.01 U	NS	0.01 U	0.01 U	
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	NS	NS	NS	NS	0.01 U	NS	0.01 U	0.01 U	
9056MOD	Fluoride	mg/l	0.486	4	--	0.348	0.347	0.453 J+	0.441 J+	0.394	NS	0.251	0.329	0.327	0.104	
6010B/6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	NS	NS	NS	NS	0.002 U	NS	0.005 U	0.002 U	
6010B	Lithium	mg/l	0.0708	0.0708	--	0.029	0.0281	0.0262	0.031	0.0174	NS	0.0277	0.0188	0.0501	0.0571	
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	NS	NS	NS	NS	0.0002 U	NS	0.0002 U	0.0002 U	
6010B	Molybdenum	mg/l	0.005	0.100	--	0.00833	0.00816	0.00865	0.00876	0.00967	NS	0.00524	0.00953	0.005 U	0.005 U	
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	0.01 U	0.01 U	NS	NS	NS	NS	0.002 U	0.01 U	0.01 U	0.002 U	
6010B/6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	NS	NS	NS	NS	0.002 U	NS	0.002 U	0.002 U	
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	0.628	0.308	1.61	1.54	0.589 J	NS	0.107 J	0.491	0.442	2.32	

**Notes:**

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- J- = Result qualified as estimated with potential low bias
- MCL = Maximum Contaminant Level
- mg/l = milligram per liter
- NA = Not Available
- NS = Not Sampled or Not Measured
- O1 = The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference. (Lab Qualifier)
- pCi/L = picocurie per liter
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**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Sample Location						MW-10	DUP-1	MW-10	DUP-1	MW-10	DUP-1	MW-10	MW-10	MW-10	MW-10	
Sample Date						4/27/2016	4/27/2016	7/25/2016	7/25/2016	10/26/2016	10/26/2016	1/23/2017	4/24/2017	7/25/2017	9/14/2017	
Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>	Duplicate Pair		Duplicate Pair		Duplicate Pair		Duplicate Pair		Duplicate Pair		
<b>Appendix III - Detection Monitoring</b>																
6010B	Boron	mg/l	0.272	--	--	1.35	1.35	1.05	1.04	1.04	0.2 U	1.29	1.24	1.29	1.19	
6010B	Calcium	mg/l	252.1	--	--	179	178	218	217	217	221	191	157	193	195	
9056MOD	Chloride	mg/l	24.82	--	--	21.9	21.8	20.4	20.4	18	46.3	23.2	21.6	26	22.6	
9056MOD	Fluoride	mg/l	0.486	--	--	0.125	0.105	0.125	0.1 U	0.111	0.101	0.183	0.161	0.143	0.144	
9040C	pH	su	6.56 - 8.29	--	--	6.92 J	6.96 J	6.73 J	6.78 J	7.02 J	7.46 J	6.86 J	7.01 J	6.88 J	6.82 J	
In Situ	pH	su	6.34 - 8.60	--	--	6.5	6.5	6.66	6.66	6.7	6.7	6.78	6.87	6.7	6.64	
9056MOD	Sulfate	mg/l	198.7	--	--	220	226	223	217	228	75	238	193	280	258	
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	797	820	905	903	911	739	845	709	852	880	
<b>Appendix IV - Assessment Monitoring</b>																
6010B/6020	Antimony	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6020	Arsenic	mg/l	0.035	0.035	0.035	0.0135	0.0115	0.00519	0.00536	0.00351	0.00365	0.0107	0.0143	0.00612	0.00635	
6010B	Barium	mg/l	0.274	2	--	0.0871	0.0857	0.0875	0.0875	0.0825	0.082	0.0897	0.088	0.0748	0.0705	
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
9056MOD	Fluoride	mg/l	0.486	4	--	0.125	0.105	0.125	0.1 U	0.111	0.11	0.183	0.161	0.143	0.144	
6010B/6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B	Lithium	mg/l	0.0708	0.0708	--	0.045	0.0446	0.0549	0.0545	0.0578	0.0571	0.0494	0.0399	0.0376	0.0495	
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
6010B/6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	1.77	1.16	0.550 J	0.520 J	0.877 J	0.603 J	0.253	0.848 J	NA	1.10 J	

**Notes:**

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**Table 2-3  
Summary of Analytical Results  
October 2015 through November 2019 Sampling Events  
Kansas City Board of Public Utilities  
Nearman Creak Power Station Bottom Ash Pond**

Sample Location						MW-10	MW-10	MW-10	DUP-1	MW-10	DUP	MW-10	MW-10	MW-13	MW-13	MW-13
Sample Date						3/8/2018	6/4/2018	10/1 & 10/3/2018	10/1 & 10/3/2018	11/20/2018	11/20/2018	7/1/2019	11/26/2019	10/1/2018	11/19/2018	7/2/2019
Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>	Duplicate Pair										
<b>Appendix III - Detection Monitoring</b>																
6010B	Boron	mg/l	0.272	--	--	NS	1.5	1.22	1.23	NS	NS	0.2 U	1.36	0.2 U	NS	0.2 U
6010B	Calcium	mg/l	252.1	--	--	NS	168	179	179	NS	NS	101	198	95	NS	90.9
9056MOD	Chloride	mg/l	24.82	--	--	NS	19.6	18.6	18.7	NS	NS	11.3	16.3	19.5	NS	22.1
9056MOD	Fluoride	mg/l	0.486	--	--	NS	0.235 J+	0.219	0.217	NS	NS	0.26	0.146	0.38	NS	0.317
9040C	pH	su	6.56 - 8.29	--	--	NS	6.94 J	6.98 J	6.96 J	NS	NS	7.47 J	6.91 J	7.1 J	NS	7.08 J
In Situ	pH	su	6.34 - 8.60	--	--	6.41	6.61	6.80	6.80	6.6	6.6	7.2	6.74	8.67	6.979	6.79
9056MOD	Sulfate	mg/l	198.7	--	--	NS	214	234	232	NS	NS	104	180	155	NS	154
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	NS	748	822	808	NS	NS	441	832	542	NS	520
<b>Appendix IV - Assessment Monitoring</b>																
6010B/6020	Antimony	mg/l	--	--	--	0.002 U	NS	NS	NS	NS	NS	0.002 U	0.002 U	NS	NS	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035	0.0158	0.0126	0.0245	0.0241	0.00789	0.00821	0.00228	0.002 U	0.0252	0.024	0.00957
6010B	Barium	mg/l	0.274	2	--	0.0993	0.107	0.129	0.128	NS	NS	0.0725	0.138	0.205	NS	0.235
6010B	Beryllium	mg/l	--	--	--	0.002 U	NS	NS	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	NS	NS	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	NS	NS	NS	NS	NS	0.01 U	NS	NS	NS	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	NS	NS	NS	NS	NS	0.01 U	NS	NS	NS	0.01 U
9056MOD	Fluoride	mg/l	0.486	4	--	0.164	0.235 J+	0.219	0.217	NS	NS	0.26	0.146	0.38	NS	0.317
6010B/6020	Lead	mg/l	--	--	--	0.002 U	NS	NS	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U
6010B	Lithium	mg/l	0.0708	0.0708	--	0.0418	0.0445	0.0281	0.0286	NS	NS	0.0165	0.0483	0.0296	NS	0.0314
7470A	Mercury	mg/l	--	--	--	0.0002 U	NS	NS	NS	NS	NS	0.0002 U	NS	NS	NS	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	NS	NS	0.005 U	0.005 U	0.005 U	NS	0.005 U
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	0.01 U	NS	NS	NS	NS	NS	0.00922	0.01 U	NS	NS	0.002 U
6010B/6020	Thallium	mg/l	--	--	--	0.002 U	NS	NS	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	0.102	1.18	0.35 J	0.35	NS	NS	0.414	2.06	0.765 J	NS	1.18 J

**Notes:**

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J- = Result qualified as estimated with potential low bias

MCL = Maximum Contaminant Level

mg/l = milligram per liter

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

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Nearman Creak Power Station Bottom Ash Pond**

Sample Location						MW-13	MW-14	MW-14	MW-14	MW-14	MW-15	MW-15	MW-15	MW-15	MW-16	MW-16	MW-16
Sample Date						11/26/2019	10/1/2018	11/19/2018	7/2/2019	11/26/2019	10/1/2018	11/19/2018	7/1/2019	11/26/2019	11/19/2018	7/1/2019	11/25/2019
Analytical Method	Analyte	Unit	Calculated Background Limit <sup>1</sup>	GWPS <sup>2</sup>	ASD Background Limit <sup>3</sup>												
<b>Appendix III - Detection Monitoring</b>																	
6010B	Boron	mg/l	0.272	--	--	0.2 U	0.2 U	NS	0.2 U	0.2 U	0.2 U	NS	0.2 U	0.2 U	NS	0.217	0.2 U
6010B	Calcium	mg/l	252.1	--	--	115	200	NS	114	130	78.3	NS	88	71.4	NS	246	224
9056MOD	Chloride	mg/l	24.82	--	--	21.3	21.5	NS	10.5	12.9	16.4	NS	17.4	13.9	NS	2.54	4.01
9056MOD	Fluoride	mg/l	0.486	--	--	0.405	0.208	NS	0.231	0.265	0.462	NS	0.282	0.486	NS	0.155	0.136
9040C	pH	su	6.56 - 8.29	--	--	7.08 J	6.7 J	NS	7.21 J	7.11 J	7.45 J	NS	7.71 J	7.45 J	NS	6.76 J	6.76 J
In Situ	pH	su	6.34 - 8.60	--	--	7.01	6.7	6.804	6.93	6.94	6.9	6.878	7.55	7.34	6.863	6.58	6.8
9056MOD	Sulfate	mg/l	198.7	--	--	165	221	NS	82	121	194	NS	164	162	NS	172	123
2540 C-2011	Total Dissolved Solids	mg/l	959.2	--	--	580	839	NS	490	533	505	NS	496	452	NS	942	784
<b>Appendix IV - Assessment Monitoring</b>																	
6010B/6020	Antimony	mg/l	--	--	--	0.002 U	NS	NS	0.002 U	0.002 U	NS	NS	0.002 U	0.002 U	NS	0.002 U	0.002 U
6020	Arsenic	mg/l	0.035	0.035	0.035	0.0201	0.002 U	0.002 U	0.002 U	0.002 U	0.00482	0.00509	0.00324	0.0104	0.035	0.0341	0.0342
6010B	Barium	mg/l	0.274	2	--	0.251	0.0765	NS	0.074	0.0864	0.107	NS	0.097	0.103	NS	0.259	0.257
6010B	Beryllium	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U	NS	NS	0.002 U	NS
6010B	Cadmium	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U	NS	NS	0.002 U	NS
6010B	Chromium	mg/l	--	--	--	NS	NS	NS	0.01 U	NS	NS	NS	0.01 U	NS	NS	0.01 U	NS
6010B	Cobalt	mg/l	--	--	--	NS	NS	NS	0.01 U	NS	NS	NS	0.01 U	NS	NS	0.01 U	NS
9056MOD	Fluoride	mg/l	0.486	4	--	0.405	0.208	NS	0.231	0.265	0.462	NS	0.282	0.486	NS	0.155	0.136
6010B/6020	Lead	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U	NS	NS	0.002 U	NS
6010B	Lithium	mg/l	0.0708	0.0708	--	0.0358	0.0297	NS	0.015 U	0.0154	0.0428	NS	0.0295	0.0414	NS	0.0635	0.0646
7470A	Mercury	mg/l	--	--	--	NS	NS	NS	0.0002 U	NS	NS	NS	0.0002 U	NS	NS	0.0002 U	NS
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	NS	0.005 U	0.005 U	0.005 U	NS	0.005 U	0.005 U	NS	0.005 U	0.005 U
6010B/6020	Selenium	mg/l	0.0562	0.0562	--	0.01 U	NS	NS	0.002 U	0.01 U	NS	NS	0.002 U	0.01 U	NS	0.002 U	0.01 U
6010B/6020	Thallium	mg/l	--	--	--	NS	NS	NS	0.002 U	NS	NS	NS	0.002 U	NS	NS	0.002 U	NS
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.2	5	--	0.546	0.138 J	NS	0.69 J	0.107	1.35 J	NS	0.219 J	0.398	NS	1.69 J	0.995

**Notes:**

**Samples were collected when the BA Pond was in a Detection Monitoring Program**

**Samples were collected when the BA Pond was in an Assessment Monitoring Program**

1 = Calculated background limit as calculated as part of the January 7, 2019 assessment of the November 2019 assessment monitoring event.

2 = Groundwater Protection Standards established for the BA Pond by comparing calculated background limits, MCLs, and §257.95(h)(2) criteria, Appendix B

3 = Calculated background limit for arsenic as calculated as part of the Alternate Source Demonstration dated December 12, 2018.

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated with potential high bias

J- = Result qualified as estimated with potential low bias

MCL = Maximum Contaminant Level

mg/l = milligram per liter

NA = Not Available

NS = Not Sampled or Not Measured

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

pCi/L = picocurie per liter

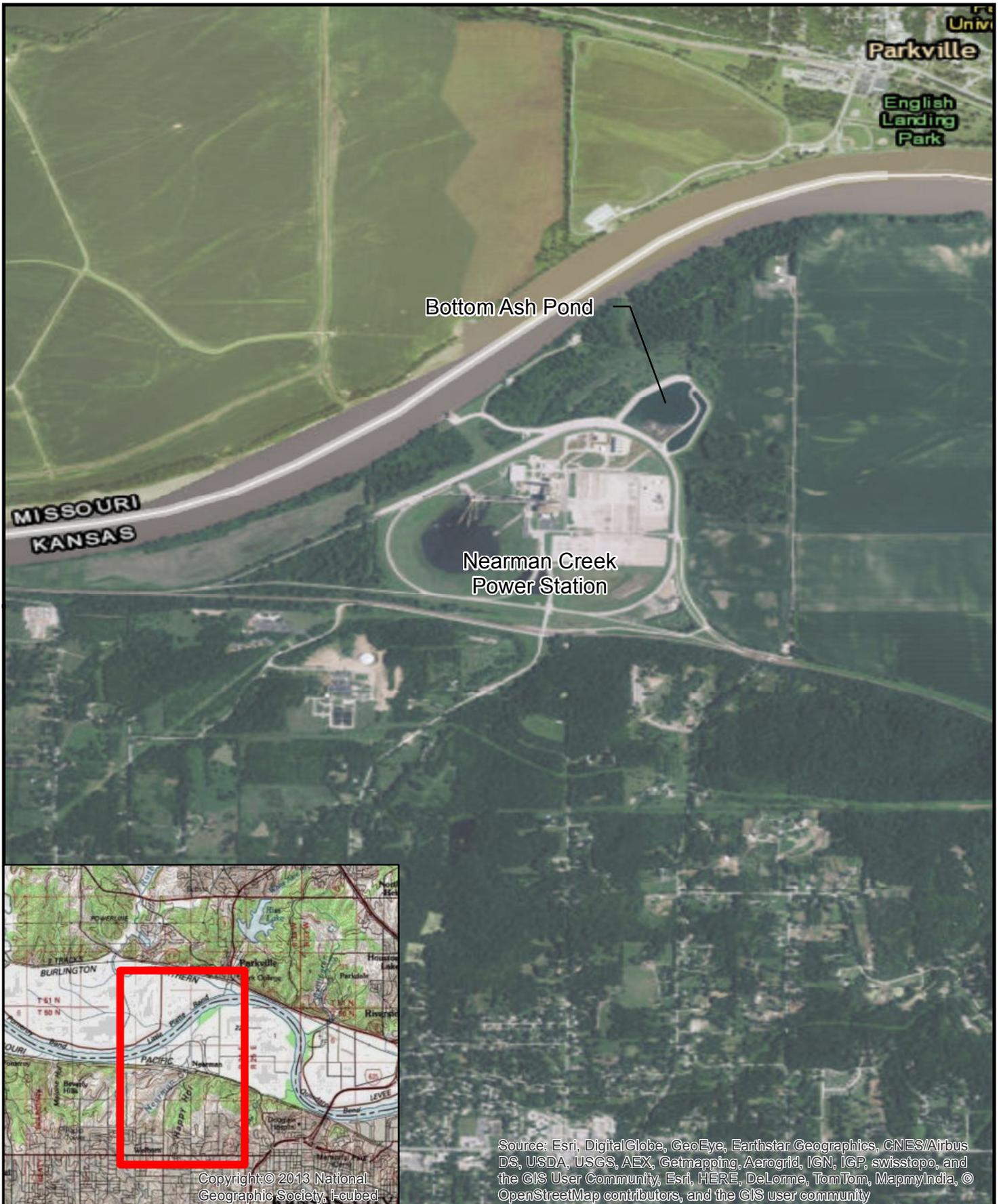
su = Standard Units

U = Non Detect at the identified concentration

U\* = Qualified as non detect during data validation process

V = The sample concentration is too high to evaluate accurate spike recoveries (Lab Qualifier)

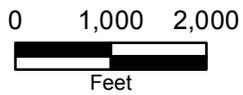
## **FIGURES**



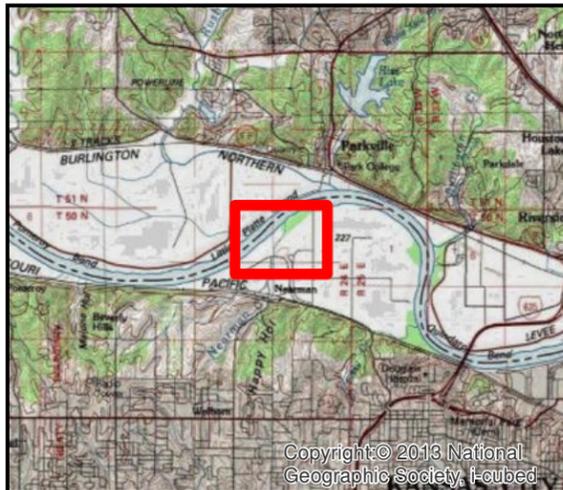
Path: Z:\Clients\ENV\KCBPU\85458\_CCRActivities\Studies\Geospatial\ArcDocs\Figure 1-1\_Site Location Map.mxd  
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Copyright © 2013 National Geographic Society, i-cubed

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS user community



**FIGURE 1-1**  
**SITE LOCATION**  
**NEARMAN CREEK**  
**POWER STATION**  
**KANSAS CITY BPU**



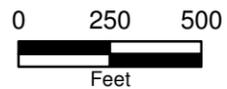
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Legend**

- BA Pond Monitoring Well - Upgradient
 

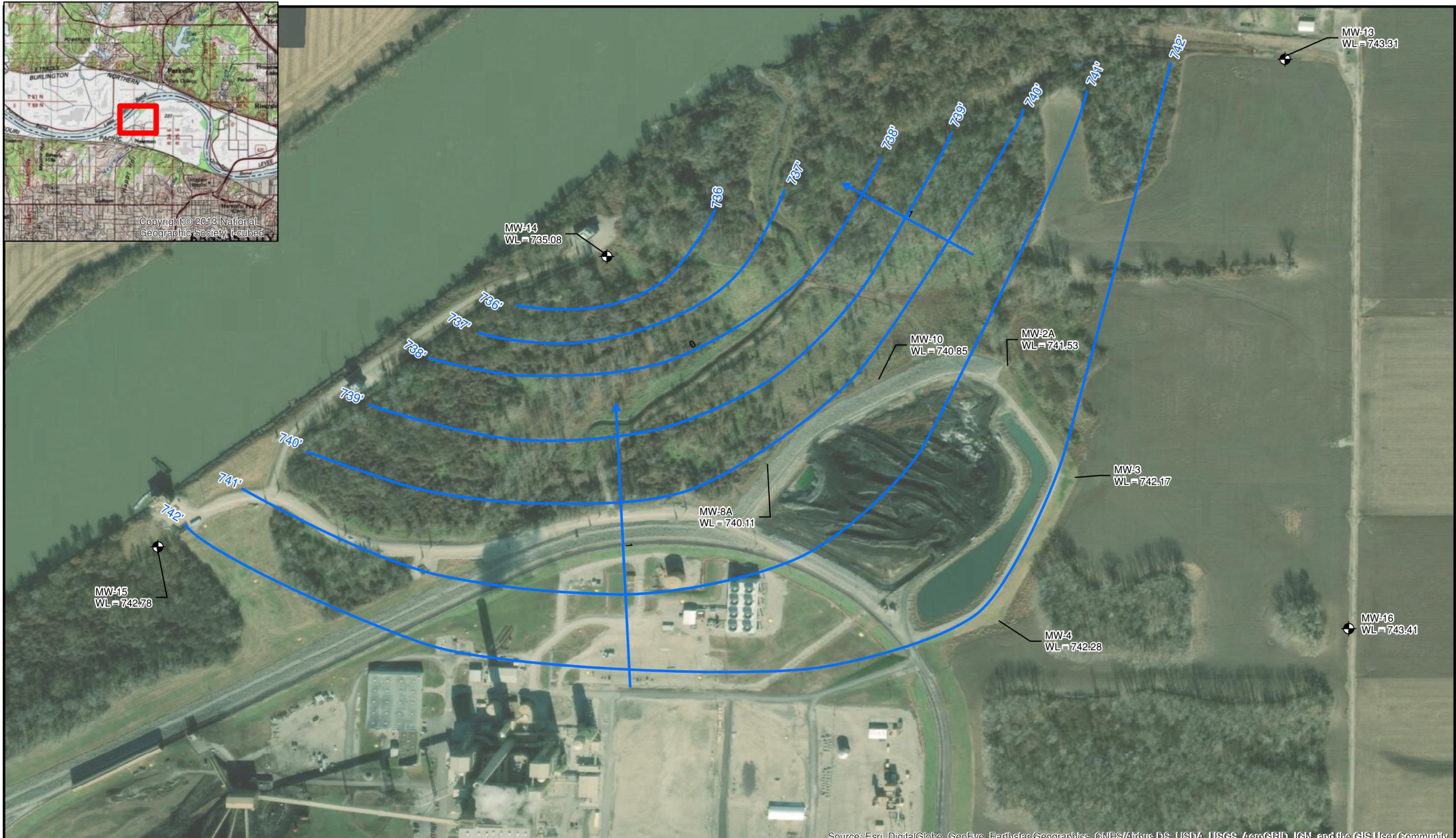
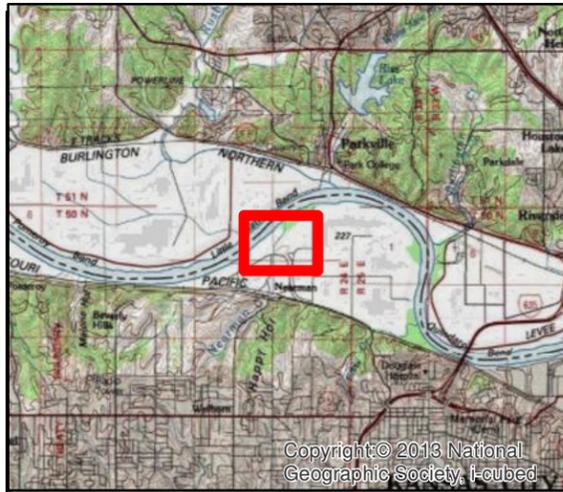
 Assessment Monitoring Well
- ↓
 BA Pond Monitoring Well - Downgradient
 

 ASD Monitoring Well



**FIGURE 2-1**  
**MONITORING WELL LOCATIONS**  
**NEARMAN CREEK POWER STATION**  
**KANSAS CITY BPU**  
**KANSAS CITY, KS**

Source: ESRI and Burns & McDonnell Engineering.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: Z:\Clients\ENSK\BPU\088777\_CCRGW\MON\Studies\Geospatial\ArcDocs\2019 GW Report\Nearman\PiezometricSurface\PondGWReportJuly2019.mxd  
COPYRIGHT © 2020 BURNS & MCDONNELL ENGINEERING COMPANY, INC.

**Legend**

- Monitoring Well
- Approximate Groundwater Flow Direction
- Piezometric Surface Contour

733.54 Water Level Elevation

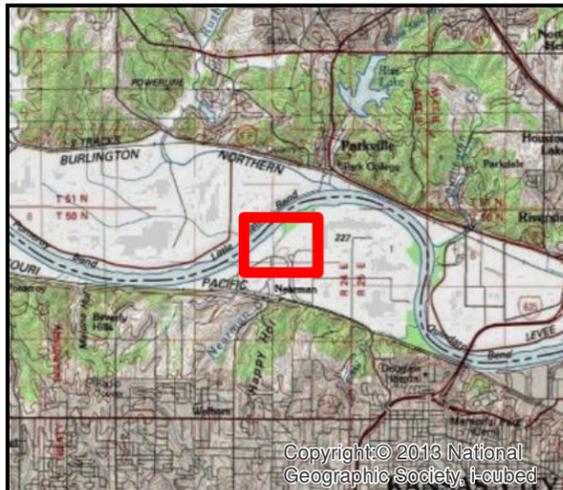
**Notes:**  
1 - Piezometric surface was inferred using groundwater elevation data collected on July 2, 2019 and should be considered approximate.

0 200 400  
Feet

Source: ESRI and Burns & McDonnell Engineering.



**FIGURE 2-2**  
**JULY 2, 2019 POTENTIOMETRIC MAP**  
**NEARMAN CREEK POWER STATION**  
**KANSAS CITY BPU**  
**KANSAS CITY, KS**



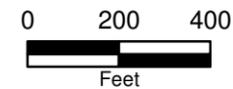
Path: Z:\Clients\ENSKOBPU088777\_CCRG\MON\Studies\Geospatial\ArcDocs\2019 GW Report\20191125\FIGURE X-X 2019\_CCF Piezometric Surface Map.mxd  
 COPYRIGHT © 2020 BURNS & MCDONNELL ENGINEERING COMPANY, INC.

**Legend**

-  Monitoring Well
-  Approximate Groundwater Flow Direction
-  Piezometric Surface Contour
-  733.54 Water Level Elevation

**Notes**

1 - Piezometric surface was inferred using groundwater elevation data collected on November 25, 2019 and should be considered approximate.



**FIGURE 2-3**  
**NOV. 25 2019 POTENTIOMETRIC MAP**  
**NEARMAN CREEK POWER STATION**  
**KANSAS CITY BPU**  
**KANSAS CITY, KS**

Source: ESRI and Burns & McDonnell Engineering.

**APPENDIX A – NOTIFICATIONS RELATED TO GROUNDWATER**



April 29, 2019

Mr. Wally (Walter) Mack  
Hydrogeologic Unit Chief  
Kansas Department of Health and Environment - Bureau of Waste Management  
1000 SW Jackson, Suite 320  
Topeka, KS 66612-1366

Re: Updated Groundwater Monitoring System Certification for the  
Kansas City Board of Public Utilities - Nearman Creek Power Station Bottom Ash Pond

Dear Mr. Selm:

On behalf of the Kansas City Board of Public Utilities (BPU), Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) is hereby submitting an updated certification to the groundwater monitoring system at Nearman Creek Power Station's Bottom Ash Pond. Four additional monitoring wells (MW-13, MW-14, MW-15, and MW-16) were installed by Burns & McDonnell in 2018 on behalf of BPU. Details regarding the additional monitoring well installations are provided in the *Alternate Source Demonstration for the Nearman Creek Power Station Bottom Ash Pond* prepared by Burns & McDonnell (dated December 12, 2018).

This letter supersedes the original *Groundwater Monitoring System Certification* prepared by Burns & McDonnell (dated June 15, 2016) and has been prepared to support compliance with the United States Environmental Protection Agency's (EPA's) *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule* (Final Rule, 40 CFR Parts 257 and 261). The Nearman Creek Power Station Bottom Ash Pond meets the definition of a Surface Impoundment as presented in the Final Rule and is therefore subject to groundwater monitoring requirements identified in 40 CFR §257.91.

The pre-existing groundwater monitoring system and the additional 2018 monitoring well installations are screened and in hydraulic connection within the uppermost alluvial aquifer. Monitoring wells MW-13, MW-14, MW-15, and MW-16 have been added to the pre-existing groundwater monitoring system and will continue to be monitored in accordance with the groundwater monitoring requirements set forth in 40 CFR §257.93 through §257.95. The updated groundwater monitoring system is summarized in the enclosed table and figure. Monitoring well construction diagrams of MW-13, MW-14, MW-15, and MW-16 are provided in Attachment 1.

As set forth herein, and in accordance with 40 CFR §257.91(f), Burns & McDonnell certifies that the groundwater monitoring system for the Nearman Creek Power Station Bottom Ash Pond has been designed and constructed to meet the requirements of section 40 CFR §257.91.

#### Limitations

This letter has been prepared in accordance with generally accepted environmental engineering practices for groundwater quality assessment and reporting. Conclusions contained herein are Burns & McDonnell's interpretation of readily available data and constitute a professional opinion based on said data. No other warranty, expressed or implied, is made as to the information included in this document. If others make conclusions and recommendations based on data contained herein, such conclusions and recommendations are the responsibility of others.



Mr. Wally (Walter) Mack  
Kansas Department of Health and Environment - Bureau of Waste Management  
April 29, 2019  
Page 2

Burns & McDonnell has exercised reasonable skill, care, and diligence in preparation of this letter in accordance with customarily accepted standards of good professional practice in effect at the time this report was prepared.

Special risks are inherently associated with the characterization and description of groundwater, including, but not limited to groundwater occurrence, site geology, and site hydrogeology. Even a comprehensive groundwater assessment and/or monitoring program using appropriate equipment, implemented by experienced personnel under the direction of trained professionals, may fail to detect certain conditions.

Changes in subsurface conditions can be influenced by many factors. These factors include but are not limited to management of surrounding areas, seasonal rainfall fluctuations, changes in drainage conditions in and around the site, and groundwater occurrence. Over time, actual conditions discovered are subject to variation because of natural occurrences and/or man-made intervention on or near the site.

If you have questions regarding the information presented herein please contact me at 816-822-3069 or Mr. Brian R. Hoye, PG at 816-823-6257.

Sincerely,



04/29/19 9:45 AM

Mr. Scott A. Martin, PE  
Professional Engineer

Mr. Brian R. Hoye, PG  
Project Manager

BRH/sam

Attachments

cc: Ingrid Setzler (BPU), Keith Brown (BPU)  
Mike Selm (Kansas Department of Health & Environment)

**TABLE**

**Existing Groundwater Monitoring Well Network**  
Nearman Creek Power Station  
Kansas City, Kansas

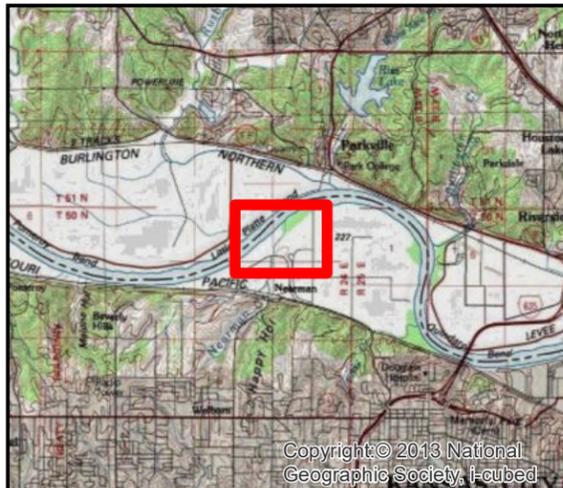
Montirong Well ID	Date of Installation	Up or Down Gradient of Bottom Ash Pond	Northing	Easting	Top of Casing Elevaiton (ft amsl)	Ground Surface Elevation (ft amsl)	Well Screen			Constructed Well Total Depth		
							Thickness (feet)	Top (ft amsl)	Bottom (ft amsl)	(feet amsl)	(ft bgs)	(ft bTOC)
<b>Groundwater Monitoring Wells</b>												
MW-2A	October 2015	Down (Cross)	323923.39	2937911.60	747.86	744.99	5.00	721.18	715.70	716.18	28.81	31.68
MW-3	September 1982	Up	323434.49	2938160.38	750.48	748.48	20.00	728.48	715.78	715.78	32.70	34.70
MW-4	January 1983	Up	322800.43	2937915.96	746.99	745.69	20.00	725.69	715.24	715.24	30.45	31.75
MW-8A	October 2015	Down	323462.96	2937093.00	750.12	747.59	5.00	719.95	714.47	714.95	32.64	35.17
MW-10	October 2015	Down	323844.68	2937474.63	745.30	742.69	5.00	720.80	715.32	715.80	26.89	29.50
MW-13	September 2018	Up (Cross)	325317.62	2938817.53	747.81	745.06	5.00	719.33	713.85	714.33	30.73	33.48
MW-14	September 2018	Down	324361.67	2936503.71	749.18	746.08	5.00	720.91	715.43	715.91	30.17	33.27
MW-15	September 2018	Up (Cross)	323020.60	2935004.36	752.88	750.20	5.00	725.18	719.70	720.18	30.02	32.70
MW-16	November 2018	Up	322808.22	2939131.62	748.43	745.67	5.00	720.92	715.44	715.92	29.75	32.51

Notes:

amsl - above mean sea level  
bgs - below ground surface  
bTOC - below top of casing  
ft - feet

1. Survey data provided by Atlas Surveyors on *Survey of Monitoring Wells* dated Dec. 4, 2018.

**FIGURE**



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

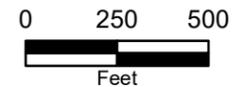
Path: Z:\Clients\ENSK\BPU\8777\_CORGMON\Studies\Geospatial\ArcDocs\MW\_Certification\_2019 Update\FIGURE 2-1\_20190410\_CCR Well Locations.mxd  
COPYRIGHT © 2018 BURNS & MCDONNELL ENGINEERING COMPANY, INC.

**Legend**

- ⊕ BA Pond Monitoring Well - Downgradient
- ⊖ BA Pond Monitoring Well - Upgradient

**Notes**

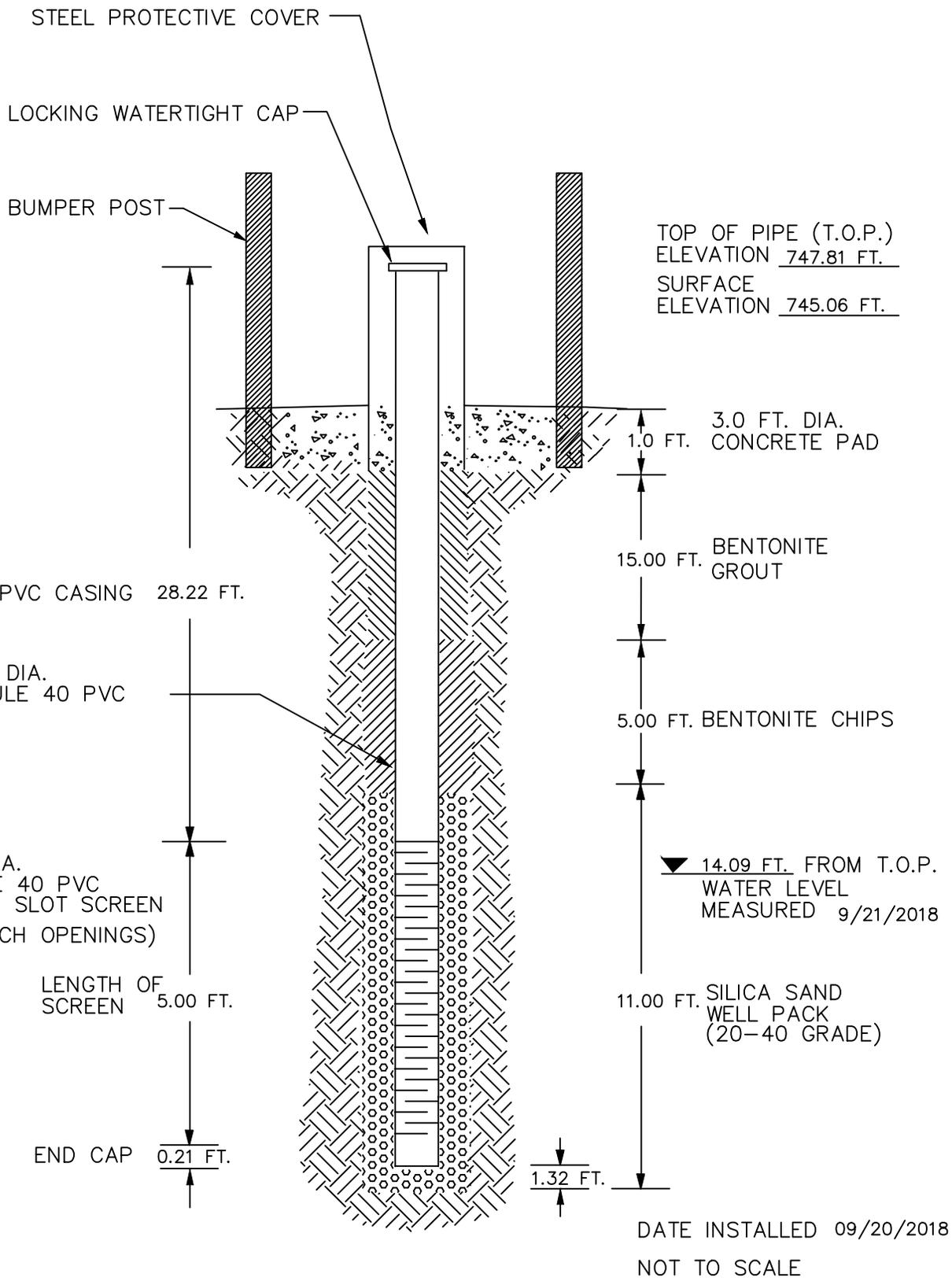
1. Upgradient Monitoring Wells MW-13 and MW-15 are also located hydraulically cross-/side-gradient from the Bottom Ash Pond.



**MONITORING WELL LOCATIONS  
NEARMAN CREEK POWER STATION  
KANSAS CITY BPU  
KANSAS CITY, KS**

Source: ESRI and Burns & McDonnell Engineering.

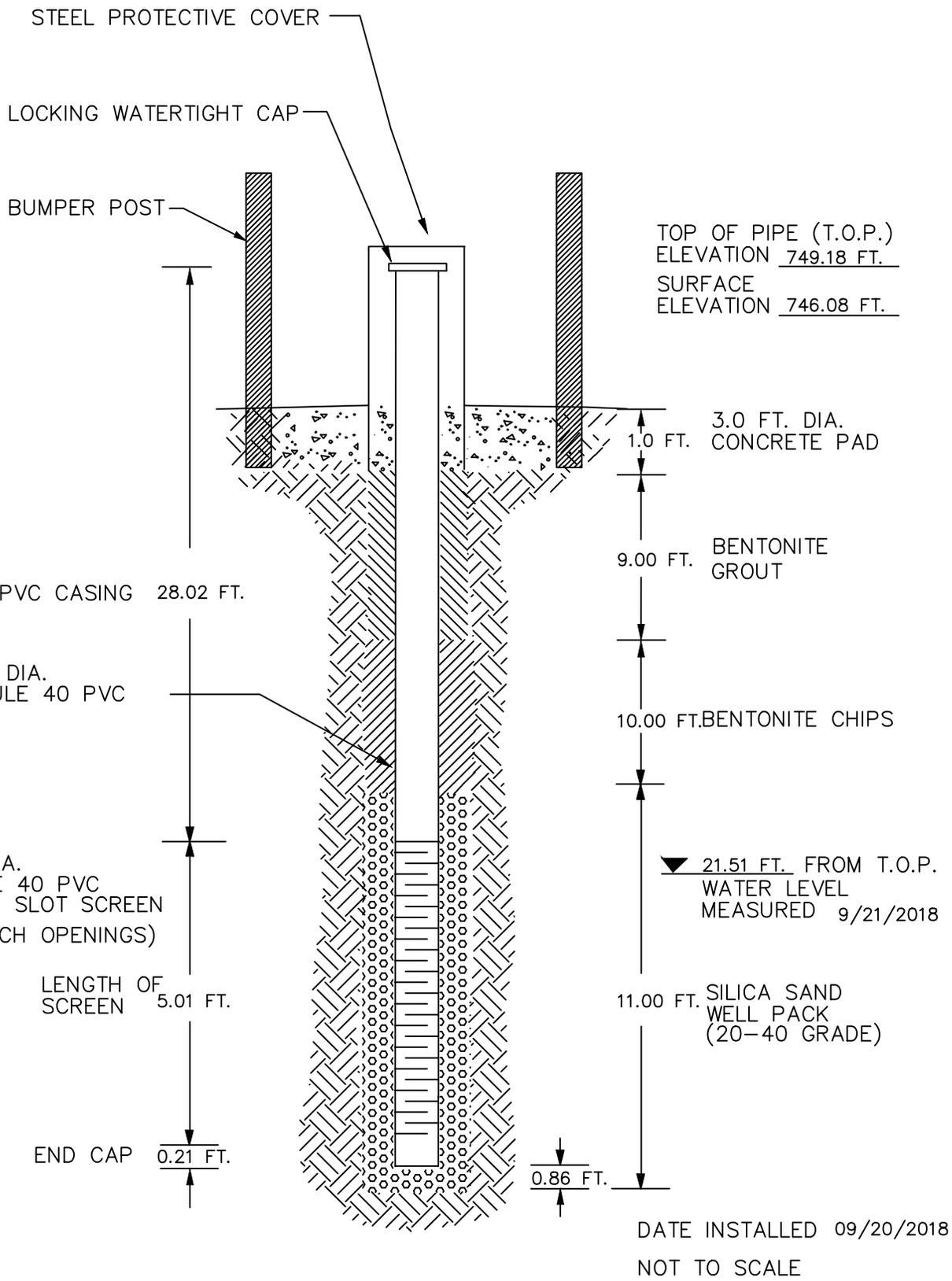
**ATTACHMENT 1 – MONITORING WELL DIAGRAMS**



BOTTOM OF WELL 33.43 FT. BELOW TOC

BOTTOM OF WELL 30.68 BELOW GRADE

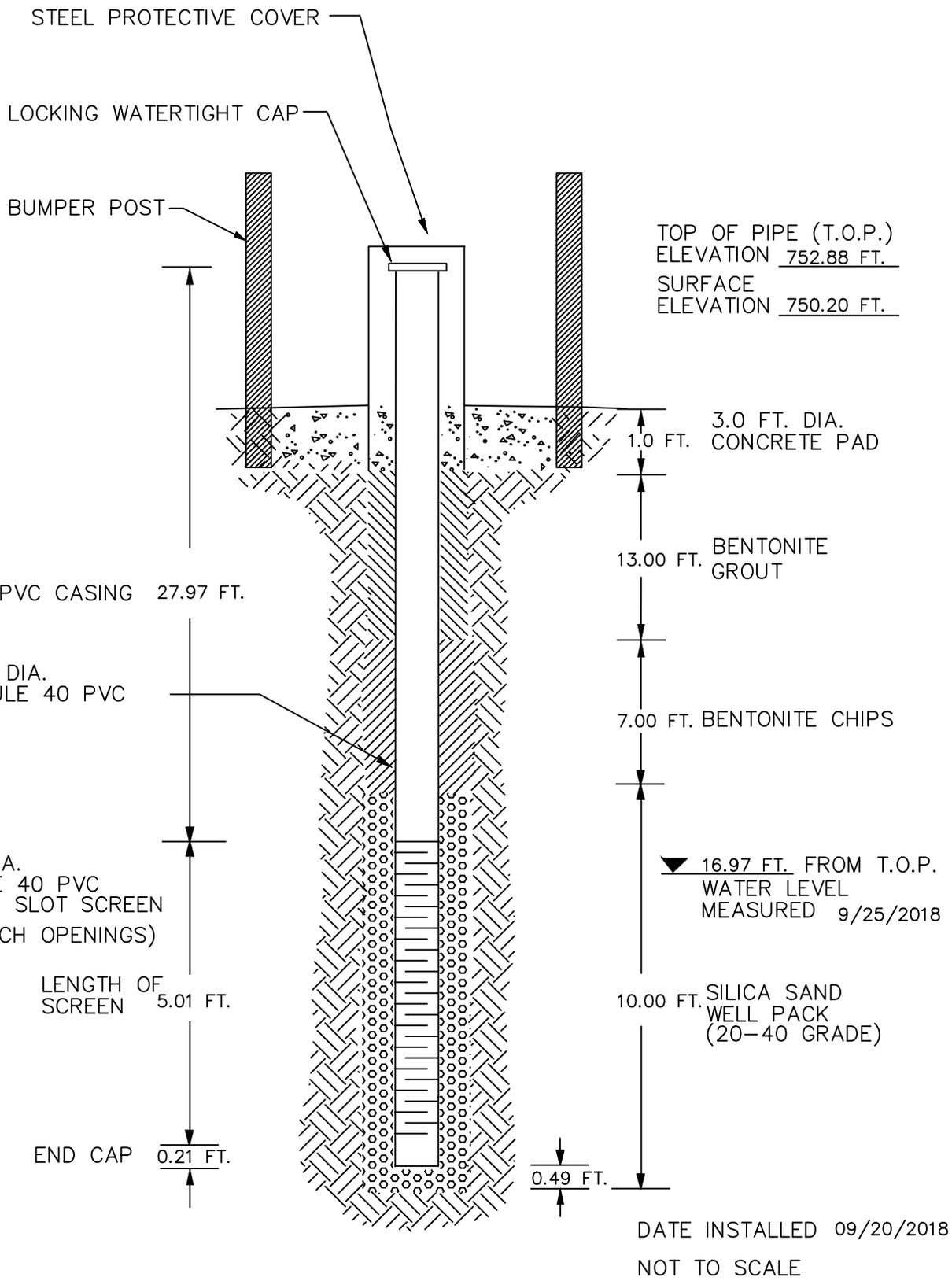
	<p>MONITORING WELL MW-13 CONSTRUCTION RECORD</p>
--	--



BOTTOM OF WELL 33.24 FT. BELOW TOC

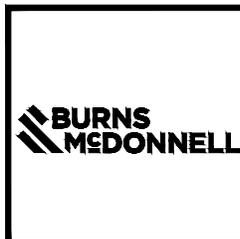
BOTTOM OF WELL 30.14 BELOW GRADE

	<p>MONITORING WELL MW-14 CONSTRUCTION RECORD</p>
--	--

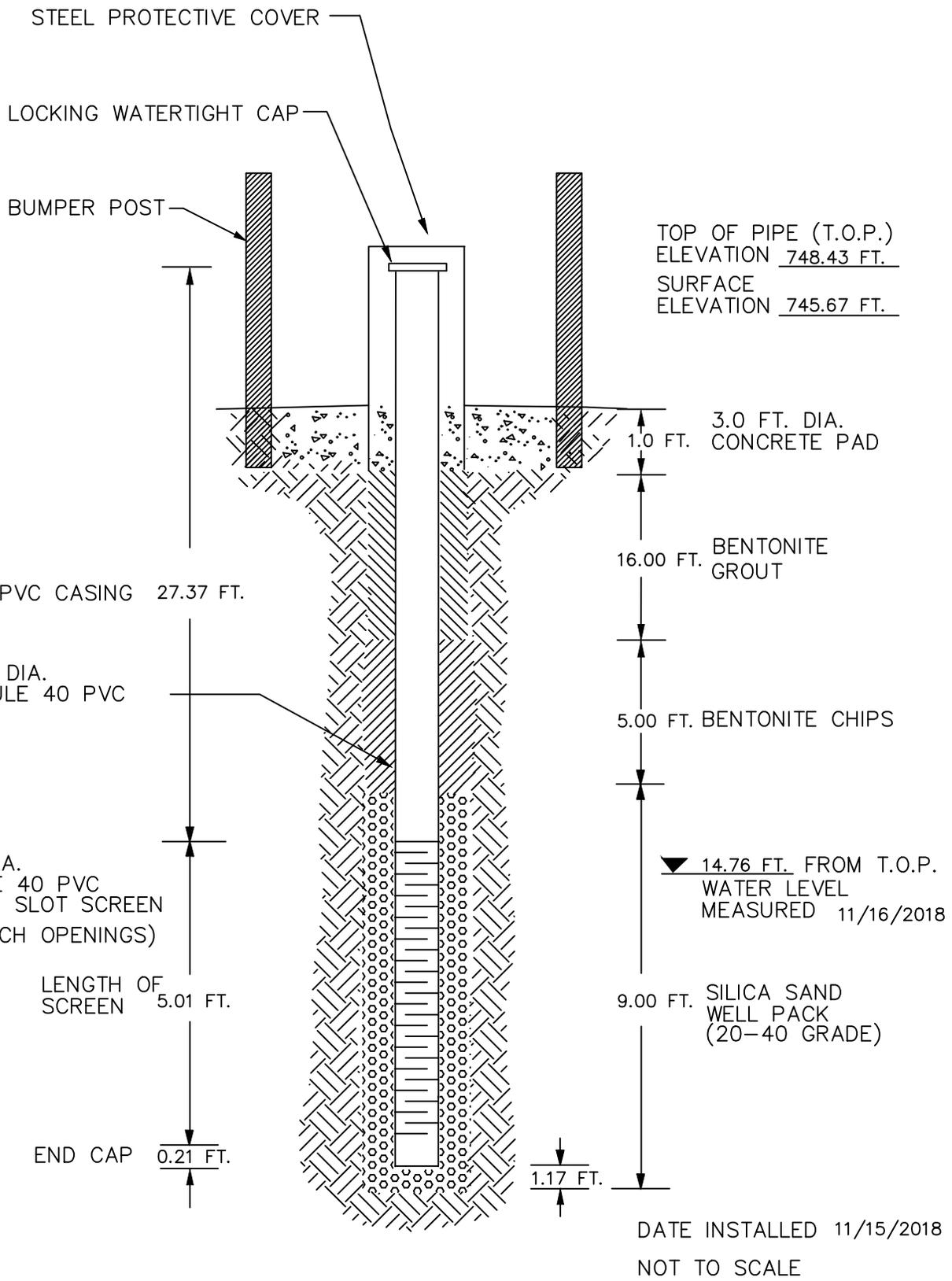


BOTTOM OF WELL 33.19 FT. BELOW TOC

BOTTOM OF WELL 30.51 FT. BELOW GRADE



MONITORING WELL  
MW-15  
CONSTRUCTION RECORD



BOTTOM OF  
WELL 32.59 FT.  
BELOW TOC

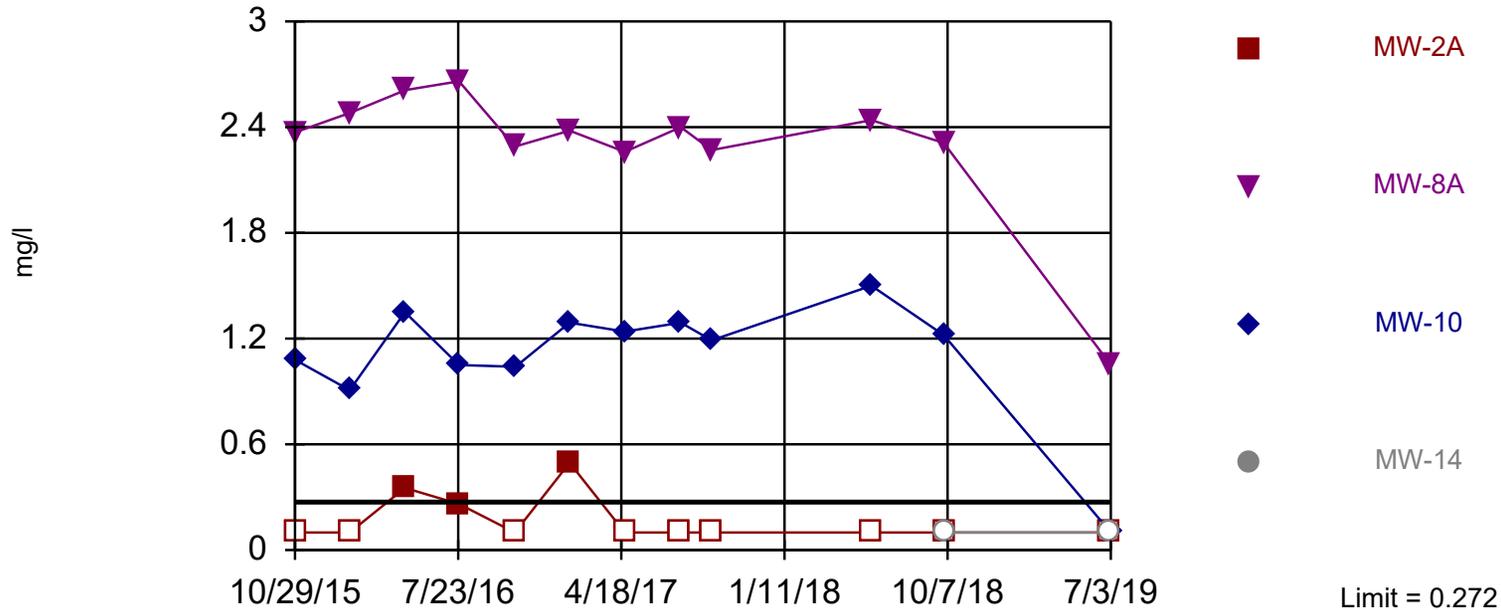
BOTTOM OF  
WELL 29.83 FT.  
BELOW GRADE

	<p>MONITORING WELL MW-16 CONSTRUCTION RECORD</p>
--	--

## **APPENDIX B – STATISTICAL EVALUATION**

Exceeds Limit: MW-8A

## Prediction Limit Interwell Non-parametric

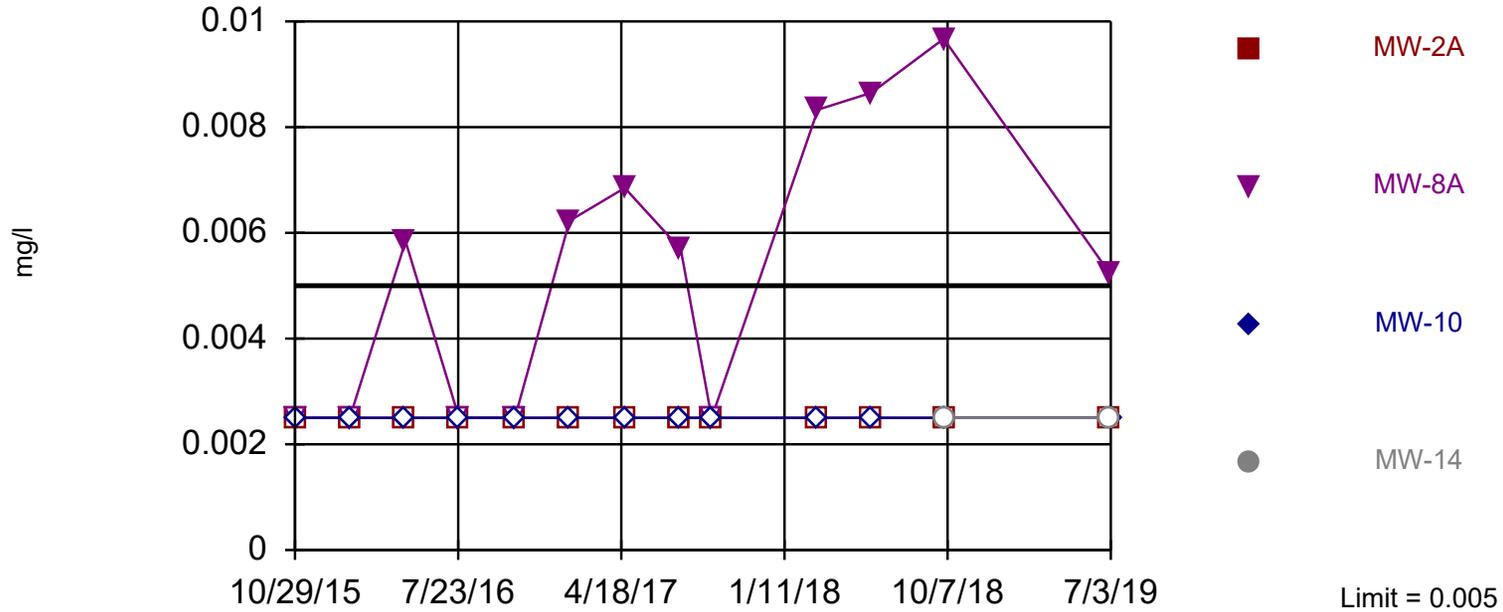


Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 29 background values. 65.52% NDs. Report alpha = 0.1212. Individual comparison alpha = 0.03179. Most recent point for each compliance well compared to limit. Distribution was found to be non-normal after removal of suspect values, so outliers could not be identified. Seasonality was not detected with 95% confidence.

Constituent: Boron Analysis Run 8/26/2019 10:05 AM View: AUG 2019 BKG Update  
BPU Client: Burns & McDonnell Data: BPU\_Groundwater\_CCR

Exceeds Limit: MW-8A

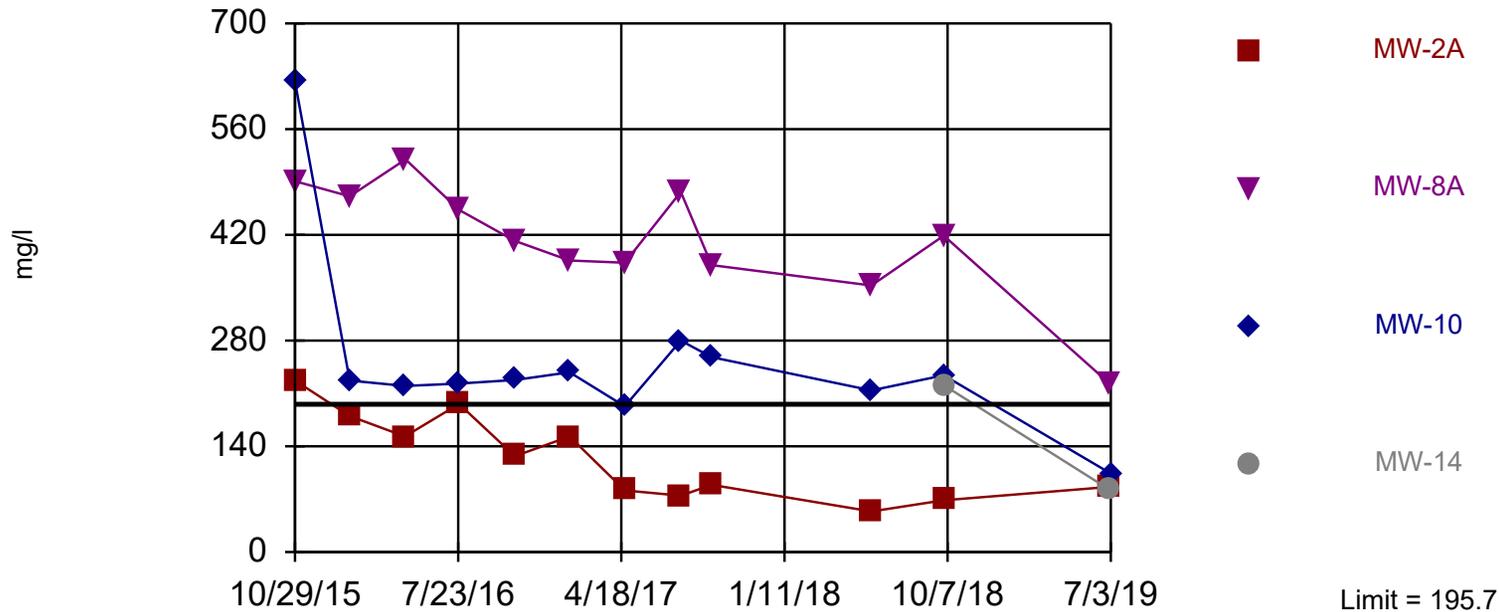
### Prediction Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values ( $n = 31$ ) were censored; limit is most recent reporting limit. Report alpha = 0.1143. Individual comparison alpha = 0.02988. Most recent point for each compliance well compared to limit. Distribution was found to be non-normal after removal of suspect values, so outliers could not be identified. Seasonality was not detected with 95% confidence.

Exceeds Limit: MW-8A

### Prediction Limit Interwell Parametric



Background Data Summary: Mean=122.7, Std. Dev.=30.3, n=29. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9803, critical = 0.926. Report alpha = 0.05. Individual comparison alpha = 0.0125. Most recent point for each compliance well compared to limit. EPA 1989 outlier screening was performed on the background data. No background outliers were found.

Constituent: Sulfate Analysis Run 8/26/2019 10:06 AM View: AUG 2019 BKG Update  
BPU Client: Burns & McDonnell Data: BPU\_Groundwater\_CCR

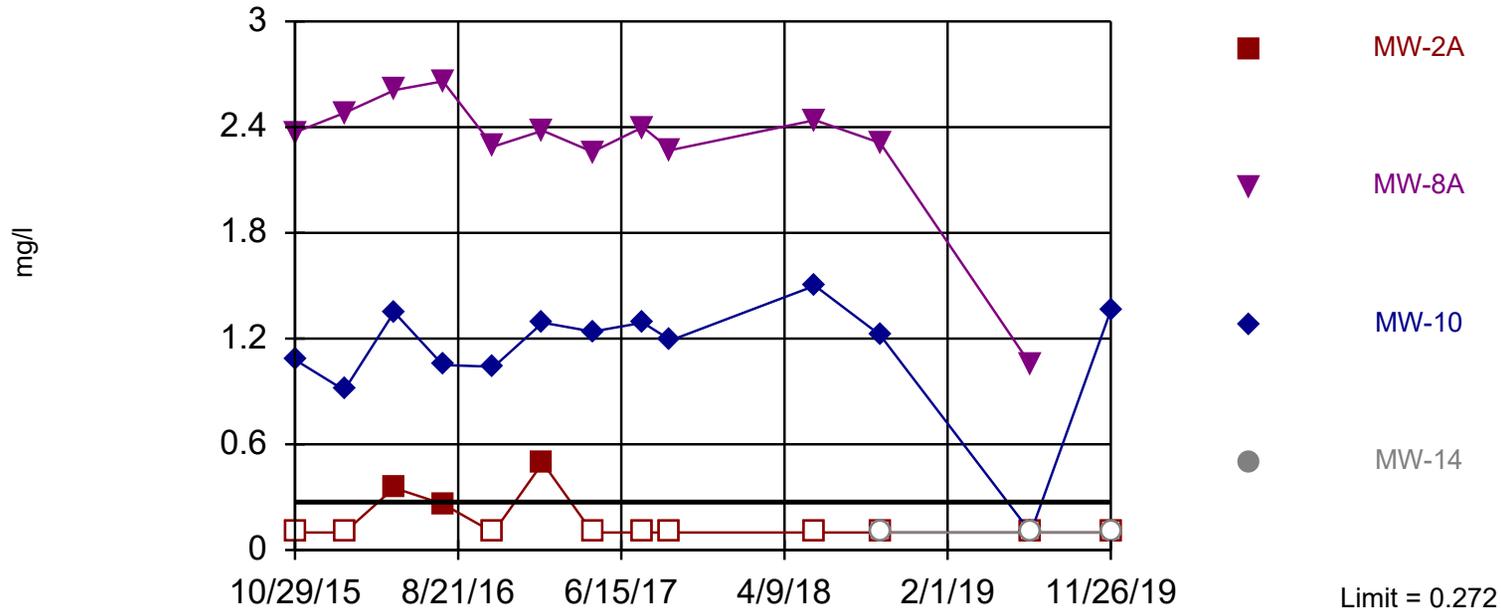
# Prediction Limit

BPU Client: Burns & McDonnell Data: BPU\_Groundwater\_CCR Printed 8/26/2019, 10:09 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
<b>Boron (mg/l)</b>	<b>MW-8A</b>	<b>0.272</b>	n/a	<b>7/1/2019</b>	<b>1.06</b>	<b>Yes</b>	<b>29</b>	<b>65.52</b>	n/a	<b>0.03179</b>	<b>NP Inter (NDs)</b>
<b>Molybdenum (mg/l)</b>	<b>MW-8A</b>	<b>0.005</b>	n/a	<b>7/1/2019</b>	<b>0.00524</b>	<b>Yes</b>	<b>31</b>	<b>100</b>	n/a	<b>0.02988</b>	<b>NP Inter (NDs)</b>
<b>Sulfate (mg/l)</b>	<b>MW-8A</b>	<b>195.7</b>	n/a	<b>7/1/2019</b>	<b>223</b>	<b>Yes</b>	<b>29</b>	<b>0</b>	<b>No</b>	<b>0.0125</b>	<b>Param Inter</b>

Exceeds Limit: MW-8A, MW-10

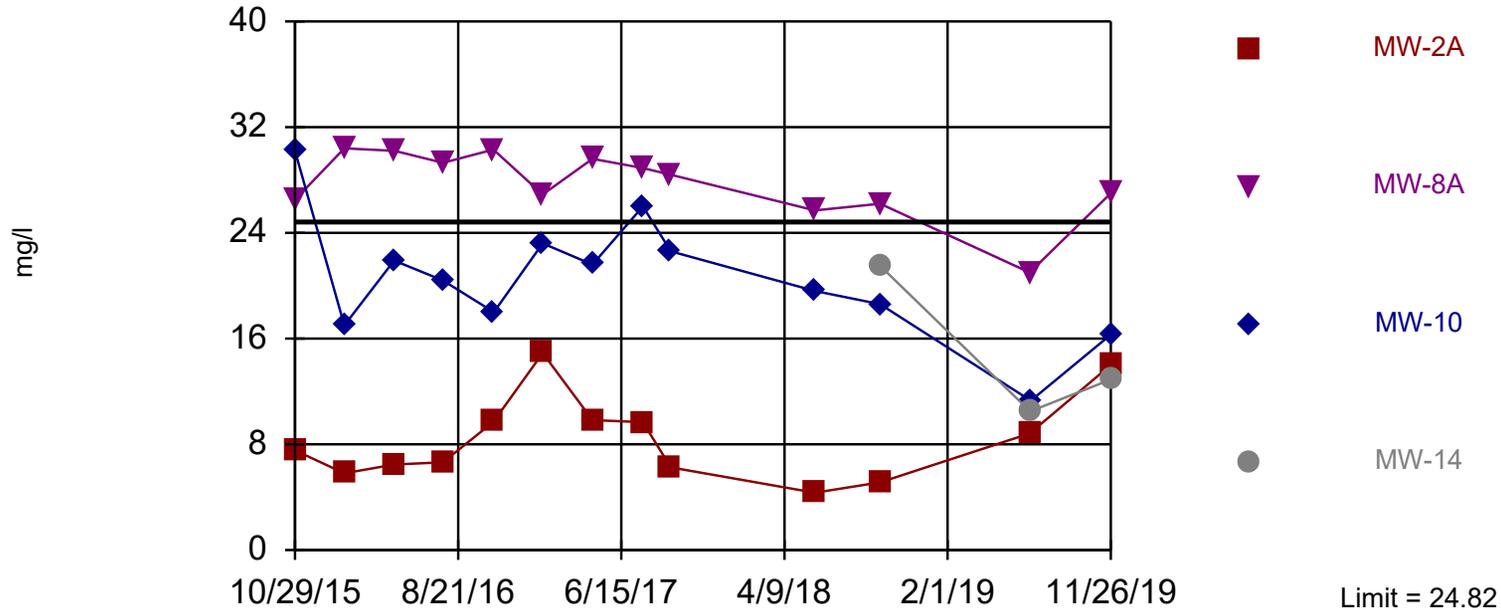
### Prediction Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 34 background values. 70.59% NDs. Report alpha = 0.1053. Individual comparison alpha = 0.02742. Most recent point for each compliance well compared to limit. Distribution was found to be non-normal after removal of suspect values, so outliers could not be identified. Seasonality was not detected with 95% confidence.

Exceeds Limit: MW-8A

### Prediction Limit Interwell Parametric

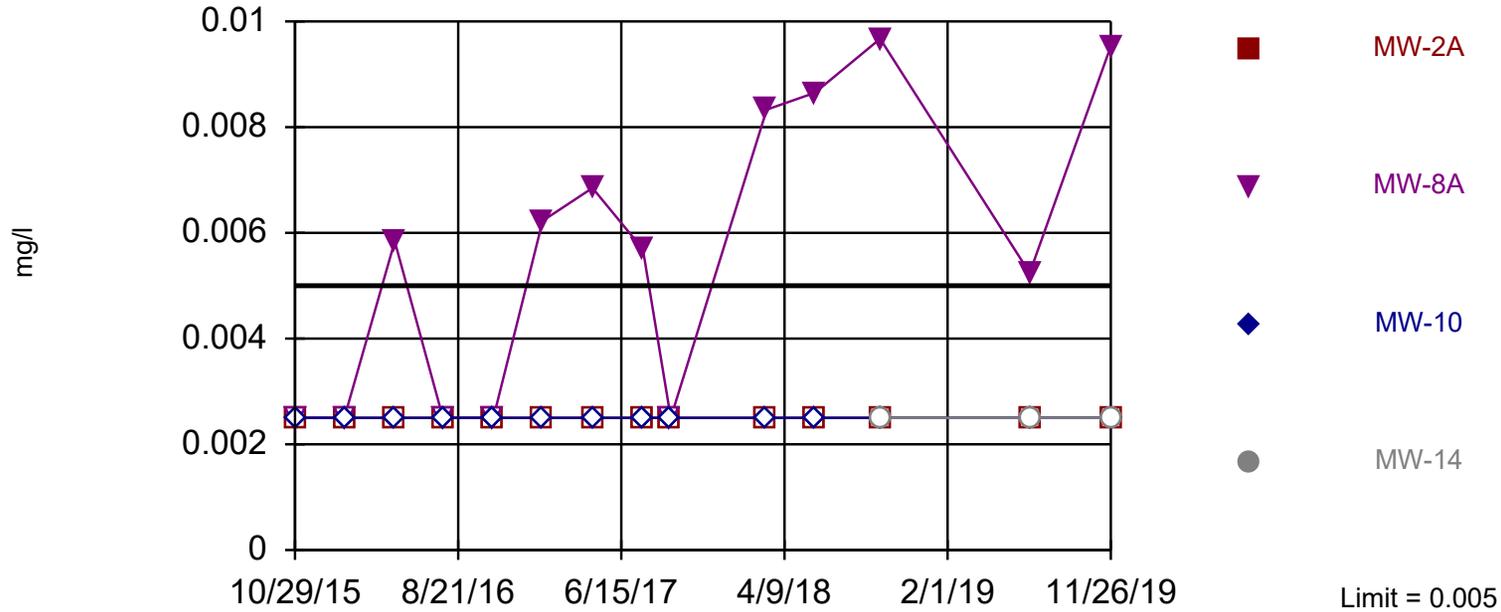


Background Data Summary (based on cube root transformation): Mean=1.971, Std. Dev.=0.3971, n=34. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.946, critical = 0.933. Report alpha = 0.05. Individual comparison alpha = 0.0125. Most recent point for each compliance well compared to limit. EPA 1989 outlier screening was performed on the background data. No background outliers were found.

Constituent: CHLORIDE Analysis Run 1/7/2020 2:55 PM View: AUG 2019 BKG Update  
 BPU Client: Burns & McDonnell Data: BPU\_Groundwater\_CCR

Exceeds Limit: MW-8A

### Prediction Limit Interwell Non-parametric

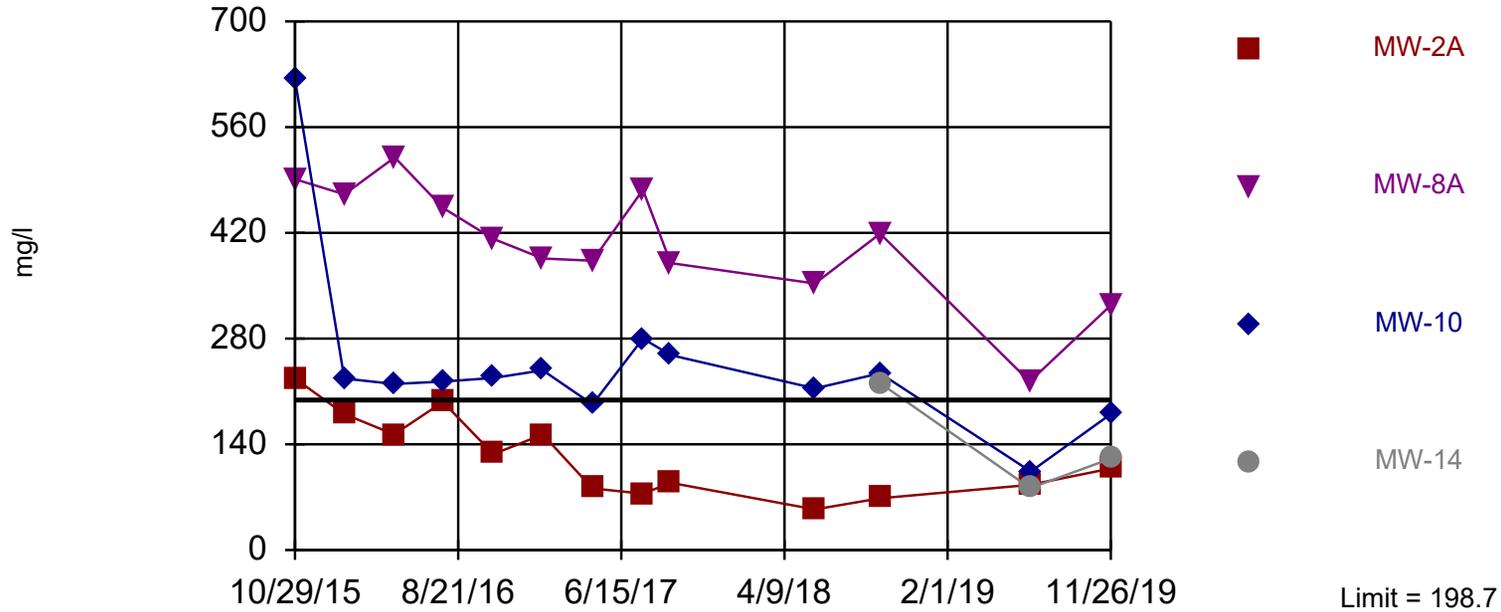


Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values ( $n = 36$ ) were censored; limit is most recent reporting limit. Report alpha = 0.1. Individual comparison alpha = 0.026. Most recent point for each compliance well compared to limit. Distribution was found to be non-normal after removal of suspect values, so outliers could not be identified. Seasonality was not detected with 95% confidence.

Constituent: Molybdenum    Analysis Run 1/7/2020 2:55 PM    View: AUG 2019 BKG Update  
BPU    Client: Burns & McDonnell    Data: BPU\_Groundwater\_CCR

Exceeds Limit: MW-8A

### Prediction Limit Interwell Parametric



Background Data Summary: Mean=122.4, Std. Dev.=32.04, n=34. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9796, critical = 0.933. Report alpha = 0.05. Individual comparison alpha = 0.0125. Most recent point for each compliance well compared to limit. EPA 1989 outlier screening was performed on the background data. No background outliers were found.

Constituent: Sulfate Analysis Run 1/7/2020 2:55 PM View: AUG 2019 BKG Update  
BPU Client: Burns & McDonnell Data: BPU\_Groundwater\_CCR

# Interwell Pred Limits

BPU Client: Burns & McDonnell Data: BPU\_Groundwater\_CCR Printed 1/7/2020, 2:57 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
<b>Boron (mg/l)</b>	<b>MW-8A</b>	<b>0.272</b>	n/a	<b>7/1/2019</b>	<b>1.06</b>	<b>Yes</b>	<b>34</b>	<b>70.59</b>	n/a	<b>0.02742</b>	<b>NP Inter (NDs)</b>
<b>Boron (mg/l)</b>	<b>MW-10</b>	<b>0.272</b>	n/a	<b>11/26/2019</b>	<b>1.36</b>	<b>Yes</b>	<b>34</b>	<b>70.59</b>	n/a	<b>0.02742</b>	<b>NP Inter (NDs)</b>
<b>CHLORIDE (mg/l)</b>	<b>MW-8A</b>	<b>24.82</b>	n/a	<b>11/26/2019</b>	<b>27</b>	<b>Yes</b>	<b>34</b>	<b>0</b>	x^(1/3)	<b>0.0125</b>	<b>Param Inter</b>
<b>Molybdenum (mg/l)</b>	<b>MW-8A</b>	<b>0.005</b>	n/a	<b>11/26/2019</b>	<b>0.00953</b>	<b>Yes</b>	<b>36</b>	<b>100</b>	n/a	<b>0.026</b>	<b>NP Inter (NDs)</b>
<b>Sulfate (mg/l)</b>	<b>MW-8A</b>	<b>198.7</b>	n/a	<b>11/26/2019</b>	<b>324</b>	<b>Yes</b>	<b>34</b>	<b>0</b>	<b>No</b>	<b>0.0125</b>	<b>Param Inter</b>

**APPENDIX C – MONITORING WELL DEVELOPMENT FIELD DOCUMENTATION**

## Well Development Form

Project Name: <u>Neoraman Well Development</u>		Project Number: <u>115924</u>		SW File Number:		Well Name: <u>MW-2A</u>				
<b>Project Information</b>				<b>Elevation of Piezometer</b>						
Facility Name: <u>Neoraman Power Plant</u>				Ground Surface Elevation (GS): <del>745.37</del>						
Location: <u>Kansas City, KS N 323923.74 E 2250166.32</u>				Top of Casing Elevation (TOC): <del>747.86</del>						
Location in Decimal Degrees: LatDD: LongDD:				Measuring Point Elevation (MP): <u>747.86</u>						
<b>Well Information</b>				<b>Well Volume Calculation</b>						
Date Drilled: <u>10-19-15 to 10-20-15</u>				$31.65 - 10.96 = 20.69$ $20.69 (0.0408) (2)^2 = 3.386$ <p style="font-size: small;">1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))<sup>2</sup>                      initial height of water column (ft) = total depth (ft) - initial depth to water (ft)</p>						
Borehole Depth: <u>30</u>		feet from <u>GS</u>								
Casing Depth: <u>31.64</u>		feet from <u>TOC</u>								
Depth to Top of Screen: <u>26.64</u>		feet from <u>TOC</u>								
Depth to Bottom of Screen: <del>26.64</del> <u>31.64</u>		feet from <u>TOC</u>								
Filter Top Depth: <u>31.64 N/A</u>		feet from								
Filter Bottom Depth: <u>N/A</u>		feet from								
Length of Casing Screened: <u>N/A 5.0</u>		feet								
Type of Formation Screened: <u>alluvial sand</u>										
<b>Development Method</b>										
Equipment:				Drilling Methods:						
Surge		Bail								
Airlift		Pump		<u>X</u>						
<b>Observations During Development</b>										
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
<u>4/24/19</u>	<u>16:27</u>	<del>10.96</del>	<u>31.65</u>	<u>0</u>	<u>0</u>	<u>18.2°C</u>	<u>7.2</u>	<u>0.869</u>	<u>244</u>	<u>Cloudy</u>
<u>4/24/19</u>	<u>16:29</u>	<del>11.26</del>	<u>31.65</u>	<u>3.5</u>	<u>3.5</u>	<u>18.2°C</u>	<u>7.2</u>	<u>0.874</u>	<u>43.2</u>	<u>Clear</u>
<u>4/24/19</u>	<u>16:32</u>	<del>11.30</del>	<u>31.65</u>	<u>3.5</u>	<u>7.0</u>	<u>18.0°C</u>	<u>7.2</u>	<u>0.877</u>	<u>10.0</u>	<u>Clear</u>
<u>4/24/19</u>	<u>16:35</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>10.5</u>	<u>17.8°C</u>	<u>7.3</u>	<u>0.868</u>	<u>289</u>	<u>Cloudy</u>
<u>4/24/19</u>	<u>16:38</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>14.0</u>	<u>17.3°C</u>	<u>7.2</u>	<u>0.867</u>	<u>57.2</u>	<u>Slightly cloudy</u>
<u>4/24/19</u>	<u>16:41</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>17.5</u>	<u>16.8°C</u>	<u>7.4</u>	<u>0.869</u>	<u>148</u>	<u>Slightly cloudy</u>
<u>4/24/19</u>	<u>16:43</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>21.0</u>	<u>17.1°C</u>	<u>7.1</u>	<u>0.867</u>	<u>39.6</u>	<u>Slightly cloudy to clear</u>
<u>4/24/19</u>	<u>16:45</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>24.5</u>	<u>17.1°C</u>	<u>7.2</u>	<u>0.875</u>	<u>182</u>	<u>Slightly cloudy</u>
<u>4/24/19</u>	<u>16:47</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>28.0</u>	<u>18.3</u>	<u>7.2</u>	<u>0.883</u>	<u>95.1</u>	<u>Slightly cloudy</u>
<u>4/24/19</u>	<u>16:49</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>31.5</u>	<u>17.7°C</u>	<u>7.2</u>	<u>0.881</u>	<u>38.4</u>	<u>clear</u>
<u>4/24/19</u>	<u>16:52</u>	<u>11.31</u>	<u>31.65</u>	<u>3.5</u>	<u>35.0</u>	<u>17.8°C</u>	<u>7.3</u>	<u>0.884</u>	<u>13.7</u>	<u>clear</u>

\*Note: TOC times otherwise noted in Remarks



# Well Development Form

Project Name: <u>Neurman Well Development</u>		Project Number: <u>115924</u>		SW File Number:		Well Name: <u>MW-4</u>				
<b>Project Information</b>				<b>Elevation of Piezometer</b>						
Facility Name: <u>Neurman Power Plant</u>				Ground Surface Elevation (GS): <u><del>745.57</del> 746.90</u>						
Location: <u>Kansas City, KS N 822801.957</u>		<u>E 2250170.153</u>		Top of Casing Elevation (TOC): <u>746.90</u>						
Location in Decimal Degrees: LatDD:		LongDD:		Measuring Point Elevation (MP): <u>746.90</u>						
<b>Well Information</b>				<b>Well Volume Calculation</b>						
Date Drilled:				$31.91 - 9.82 = 22.09$ $22.09 (0.0408) (4)^2 = 14.42 \text{ G}$ <p style="font-size: small;">1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))<sup>2</sup>                      initial height of water column (ft) = total depth (ft) - initial depth to water (ft)</p>						
Borehole Depth:		feet from								
Casing Depth: <u>32.24</u>		feet from <u>TOC</u>								
Depth to Top of Screen: <u>12.24</u>		feet from <u>TOC</u>								
Depth to Bottom of Screen: <u>32.24</u>		feet from <u>TOC</u>								
Filter Top Depth: <u>N/A</u>		feet from								
Filter Bottom Depth: <u>N/A</u>		feet from								
Length of Casing Screened: <u>20.0</u>		feet								
Type of Formation Screened: <u>alluvial sand</u>										
<b>Development Method</b>										
Equipment:				Drilling Methods:						
Surge		Bail								
Airlift		Pump		<u>X</u>						
<b>Observations During Development</b>										
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
<u>4/26/19</u>	<u>9:40</u>	<u>9.82</u>	<u>31.90</u>	<u>0</u>	<u>0</u>	<u>15.3°</u>	<u>8.2</u>	<u>0.492</u>	<u>112</u>	<u>Slightly cloudy</u>
<u>4/26/19</u>	<u>9:42</u>	<u>10.68</u>	<u>31.90</u>	<u>15</u>	<u>15</u>	<u>14.1°</u>	<u>7.9</u>	<u>0.543</u>	<u>76.4</u>	<u>clear</u>
<u>4/26/19</u>	<u>9:44</u>	<u>10.68</u>	<u>31.90</u>	<u>15</u>	<u>30</u>	<u>14.1°</u>	<u>7.7</u>	<u>0.594</u>	<u>50.1</u>	<u>clear</u>
<u>4/26/19</u>	<u>9:47</u>	<u>10.68</u>	<u>31.90</u>	<u>15</u>	<u>45</u>	<u>14.3°</u>	<u>7.5</u>	<u>0.600</u>	<u>31.7</u>	<u>clear</u>
<u>4/26/19</u>	<u>9:49</u>	<u>10.68</u>	<u>31.90</u>	<u>15</u>	<u>60</u>	<u>14.0°</u>	<u>7.5</u>	<u>0.683</u>	<u>26.9</u>	<u>clear</u>
<u>4/26/19</u>	<u>9:52</u>	<u>10.68</u>	<u>31.90</u>	<u>15</u>	<u>75</u>	<u>14.0°</u>	<u>7.5</u>	<u>0.712</u>	<u>34.4</u>	<u>clear</u>
<u>4/26/19</u>	<u>9:55</u>	<u>10.68</u>	<u>31.90</u>	<u>15</u>	<u>90</u>	<u>14.2°</u>	<u>7.4</u>	<u>0.695</u>	<u>14.4</u>	<u>clear</u>
			<u>*hard bottom</u>							

\*from TOC unless otherwise noted in Remarks

## Well Development Form

Project Name: <u>Neelman Well Development</u>		Project Number: <u>115924</u>		SW File Number:		Well Name: <u>MW-8A</u>				
<b>Project Information</b>				<b>Elevation of Piezometer</b>						
Facility Name: <u>Neelman Power Plant</u>				Ground Surface Elevation (GS): <u>747.99</u>						
Location: <u>Kansas City, KS</u>		N <u>323462.51</u>		E <u>2249342.67</u>		Top of Casing Elevation (TOC): <u>750.10</u>				
Location in Decimal Degrees: LatDD:				LongDD:						
<b>Well Information</b>				<b>Well Volume Calculation</b>						
Date Drilled: <u>10-19-15</u>				$35.06 - 14.57 = 20.49$ $20.49(0.0408)(2)^2 = 3.34 \text{ G}$ <p style="font-size: small;">1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))<sup>2</sup>                      initial height of water column (ft) = total depth (ft) - initial depth to water (ft)</p>						
Borehole Depth: <u>34.5</u>		feet from <u>GS</u>								
Casing Depth: <u>35.38</u>		feet from <u>TOC</u>								
Depth to Top of Screen: <u>30.38</u>		feet from <u>TOC</u>								
Depth to Bottom of Screen: <u>35.38</u>		feet from <u>TOC</u>								
Filter Top Depth: <u>N/A</u>		feet from								
Filter Bottom Depth: <u>N/A</u>		feet from								
Length of Casing Screened: <u>5.0</u>		feet								
Type of Formation Screened: <u>alluvial sand</u>										
<b>Development Method</b>										
Equipment:				Drilling Methods:						
Surge		Bail								
Airlift		Pump	<u>X</u>							
<b>Observations During Development</b>										
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
4/24/19	14:17	14.57	35.06	0	0	17.5 <sup>o</sup> C	7.6	0.571	over	dark brown
4/24/19	14:20	18.26	35.06	4	4	16.9 <sup>o</sup> C	7.3	0.745	over	very cloudy
4/24/19	14:24	18.39	35.20	4	8	16.8 <sup>o</sup> C	7.3	0.801	128	slightly cloudy
4/24/19	14:34	18.32	35.20	4	12	18.3 <sup>o</sup> C	7.3	0.848	over	brown
4/24/19	14:38	18.30	35.20	4	16	17.0 <sup>o</sup> C	7.4	0.874	111	cloudy
4/24/19	14:44	18.30	35.20	4	20	17.1 <sup>o</sup> C	7.4	0.867	over	very cloudy
4/24/19	14:47	18.30	35.20	4	24	16.6 <sup>o</sup> C	7.4	0.887	64.5	slight cloudy
4/24/19	14:52	18.30	35.20	4	28	16.9 <sup>o</sup> C	7.4	0.831	498	cloudy
4/24/19	14:56	18.30	35.20	4	32	17.0 <sup>o</sup> C	7.4	0.887	58.7	clear
4/24/19	14:59	18.30	35.20	4	36	16.8 <sup>o</sup> C	7.4	0.913	35.4	clear
4/24/19	15:02	18.30	35.20	4	40	16.9 <sup>o</sup> C	7.4	0.913	23.2	clear

\*from TOC unless otherwise noted in Remarks



## Well Development Form

<b>Project Name:</b> <u>Nearman Well Development</u>		<b>Project Number:</b> <u>115924</u>		<b>SW File Number:</b>		<b>Well Name:</b> <u>MIN-13</u>				
<b>Project Information</b>				<b>Elevation of Piezometer</b>						
Facility Name: <u>Nearman Power Plant (Offsite Well location)</u>				Ground Surface Elevation (GS): <u>745.67</u>						
Location: <u>Kansas City, KS N 325317.62 E 2438817.53</u>				Top of Casing Elevation (TOC): <u>748.43</u>						
Location in Decimal Degrees: LatDD: _____ LongDD: _____				Measuring Point Elevation (MP): <u>748.43</u>						
<b>Well Information</b>				<b>Well Volume Calculation</b>						
Date Drilled: <u>9-20-16</u>				$33.40 - 9.30 = 24.10$ $24.10(0.0408)(2)^2 = 3.93 \text{ G}$ <p style="font-size: small;">1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))<sup>2</sup>                      initial height of water column (ft) = total depth (ft) - initial depth to water (ft)</p>						
Borehole Depth: <u>30</u>		feet from <u>GS</u>								
Casing Depth: <u>33.48</u>		feet from <u>TOC</u>								
Depth to Top of Screen: <u>28.48</u>		feet from <u>TOC</u>								
Depth to Bottom of Screen: <u>33.48</u>		feet from <u>TOC</u>								
Filter Top Depth: <u>N/A</u>		feet from _____								
Filter Bottom Depth: <u>N/A</u>		feet from _____								
Length of Casing Screened: <u>5.0</u>		feet								
Type of Formation Screened: _____										
<b>Development Method</b>										
Equipment:				Drilling Methods:						
Surge		Bail								
Airlift		Pump		<u>X</u>						
<b>Observations During Development</b>										
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
<u>4/24/19</u>	<u>11:38</u>	<u>9.30</u>	<u>33.40</u>	<u>0</u>	<u>0</u>	<u>20.0°c</u>	<u>7.4</u>	<u>0.743</u>	<u>OVER</u>	<u>dark brown</u>
<u>4/24/19</u>	<u>11:41</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>4</u>	<u>16.0°c</u>	<u>7.3</u>	<u>0.850</u>	<u>528</u>	<u>cloudy</u>
<u>4/24/19</u>	<u>11:45</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>8</u>	<u>17.5°c</u>	<u>7.2</u>	<u>0.845</u>	<u>141</u>	<u>cloudy</u>
<u>4/24/19</u>	<u>11:54</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>12</u>	<u>18.0°c</u>	<u>7.3</u>	<u>0.833</u>	<u>318</u>	<u>cloudy</u>
<u>4/24/19</u>	<u>11:58</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>16</u>	<u>17.6°c</u>	<u>7.3</u>	<u>0.838</u>	<u>98.9</u>	<u>Slightly cloudy</u>
<u>4/24/19</u>	<u>12:03</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>20</u>	<u>18.9°c</u>	<u>7.4</u>	<u>0.848</u>	<u>464</u>	<u>cloudy</u>
<u>4/24/19</u>	<u>12:07</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>24</u>	<u>16.7°c</u>	<u>7.3</u>	<u>0.850</u>	<u>88.2</u>	<u>slightly cloudy</u>
<u>4/24/19</u>	<u>12:12</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>28</u>	<u>16.8°c</u>	<u>7.4</u>	<u>0.848</u>	<u>over</u>	<u>cloudy</u>
<u>4/24/19</u>	<u>12:16</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>32</u>	<u>16.0°c</u>	<u>7.3</u>	<u>0.845</u>	<u>156</u>	<u>slightly cloudy</u>
<u>4/24/19</u>	<u>12:19</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>36</u>	<u>16.3°c</u>	<u>7.3</u>	<u>0.838</u>	<u>114</u>	<u>slightly cloudy</u>
<u>4/24/19</u>	<u>12:22</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>40</u>	<u>16.5°c</u>	<u>7.3</u>	<u>0.847</u>	<u>93.4</u>	<u>slightly cloudy</u>
<u>4/24/19</u>	<u>12:25</u>	<u>9.30</u>	<u>33.40</u>	<u>4</u>	<u>44</u>	<u>17.0°c</u>	<u>7.4</u>	<u>0.840</u>	<u>67.9</u>	<u>slightly cloudy</u>

\*from TOC unless otherwise noted in Remarks



## Well Development Form

Project Name: <u>NEARMAN Well Development</u>		Project Number: <u>115924</u>		SW File Number:		Well Name: <u>MW-14</u>				
<b>Project Information</b>				<b>Elevation of Piezometer</b>						
Facility Name: <u>NEARMAN Power Plant</u>				Ground Surface Elevation (GS): <u>746.08</u>						
Location: <u>KANSAS City, KS N 324361.67</u>		<u>E 2936503.71</u>		Top of Casing Elevation (TOC): <u>749.98</u>						
Location in Decimal Degrees: LatDD:		LongDD:		Measuring Point Elevation (MP): <u>749.18</u>						
<b>Well Information</b>				<b>Well Volume Calculation</b>						
Date Drilled: <u>9-20-18</u>				$33.21 - 17.00 = 16.21$ $16.21(0.0408)(2)^2 = 2.65 \text{ G}$ 1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in)) <sup>2</sup> initial height of water column (ft) = total depth (ft) - initial depth to water (ft)						
Borehole Depth: <u>30</u>		feet from <u>GS</u>								
Casing Depth: <u>33.27</u>		feet from <u>TOC</u>								
Depth to Top of Screen: <u>28.27</u>		feet from <u>TOC</u>								
Depth to Bottom of Screen: <u>33.27</u>		feet from <u>TOC</u>								
Filter Top Depth: <u>N/A</u>		feet from								
Filter Bottom Depth: <u>N/A</u>		feet from								
Length of Casing Screened: <u>5</u>		feet								
Type of Formation Screened: <u>alluvial sand</u>										
<b>Development Method</b>										
Equipment:				Drilling Methods:						
Surge		Bail								
Airlift		Pump		<u>X</u>						
<b>Observations During Development</b>										
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
<u>4/23/19</u>	<u>9:20</u>	<u>17.00</u>	<u>33.21</u>	<u>0</u>	<u>0</u>	<u>10.9<sup>o</sup>C</u>	<u>7.1</u>	<u>0.778</u>	<u>over</u>	<u>brown</u>
<u>4/23/19</u>	<u>9:25</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>3</u>	<u>10.5<sup>o</sup>C</u>	<u>7.1</u>	<u>0.951</u>	<u>over</u>	<u>dark grey</u>
<u>4/23/19</u>	<u>9:27</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>6</u>	<u>10.6<sup>o</sup>C</u>	<u>7.3</u>	<u>0.942</u>	<u>733</u>	<u>cloudy</u>
<u>4/23/19</u>	<u>9:34</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>9</u>	<u>10.3<sup>o</sup>C</u>	<u>7.4</u>	<u>0.736</u>	<u>over</u>	<u>dark brown to very cloudy</u>
<u>4/23/19</u>	<u>9:37</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>12</u>	<u>10.2<sup>o</sup>C</u>	<u>7.3</u>	<u>0.725</u>	<u>190</u>	<u>cloudy</u>
<u>4/23/19</u>	<u>9:40</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>15</u>	<u>10.4<sup>o</sup>C</u>	<u>7.5</u>	<u>0.732</u>	<u>318</u>	<u>cloudy</u>
<u>4/23/19</u>	<u>9:44</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>18</u>	<u>10.5<sup>o</sup>C</u>	<u>7.4</u>	<u>0.716</u>	<u>76.2</u>	<u>slightly cloudy</u>
<u>4/23/19</u>	<u>9:47</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>21</u>	<u>10.6<sup>o</sup>C</u>	<u>7.3</u>	<u>0.726</u>	<u>43.4</u>	<u>clear</u>
<u>4/23/19</u>	<u>9:50</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>24</u>	<u>10.5<sup>o</sup>C</u>	<u>7.3</u>	<u>0.723</u>	<u>30.3</u>	<u>clear</u>
<u>4/23/19</u>	<u>9:54</u>	<u>17.00</u>	<u>33.21</u>	<u>3</u>	<u>27</u>	<u>10.6<sup>o</sup>C</u>	<u>7.3</u>	<u>0.725</u>	<u>16.7</u>	<u>clear</u>

\*from TOC unless otherwise noted in Remarks

## Well Development Form

Project Name: <u>Nearman Well Development</u>		Project Number: <u>115924</u>		SW File Number:		Well Name: <u>MW-15</u>				
<b>Project Information</b>				<b>Elevation of Piezometer</b>						
Facility Name: <u>Nearman Power Plant</u>				Ground Surface Elevation (GS): <u>230.20</u>						
Location: <u>Kansas City, KS</u>		N <u>323020.60</u>		E <u>2935004.36</u>		Top of Casing Elevation (TOC): <u>752.88</u>				
Location in Decimal Degrees: LatDD:				LongDD:						
Measuring Point Elevation (MP): <u>752.83</u>										
<b>Well Information</b>				<b>Well Volume Calculation</b>						
Date Drilled: <u>9-20-18</u>				$33.62 - 14.32 = 19.3$ $19.3 (0.0408)(2)^2 = 3.15 \text{ G}$ <p style="font-size: small;">1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))<sup>2</sup>                      initial height of water column (ft) = total depth (ft) - initial depth to water (ft)</p>						
Borehole Depth: <u>30</u>		feet from <u>GS</u>								
Casing Depth: <u>32.70</u>		feet from <u>TOC</u>								
Depth to Top of Screen: <u>27.70</u>		feet from <u>TOC</u>								
Depth to Bottom of Screen: <u>32.70</u>		feet from <u>TOC</u>								
Filter Top Depth: <u>N/A</u>		feet from								
Filter Bottom Depth: <u>N/A</u>		feet from								
Length of Casing Screened: <u>5.0</u>		feet								
Type of Formation Screened: <u>alluvial sand</u>										
<b>Development Method</b>										
Equipment:				Drilling Methods:						
Surge		Bail								
Airlift		Pump		<u>X</u>						
<b>Observations During Development</b>										
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
4/24/19	9:38	14.32	32.62	0	0	14.7 <sup>o</sup> C	7.8	0.718	over	dark brown
4/24/19	9:40	14.32	32.62	3.5	3.5	14.5 <sup>o</sup> C	7.9	0.726	over	very cloudy
4/24/19	9:43	14.32	33.62	3.5	7.0	14.2 <sup>o</sup> C	7.9	0.717	293	cloudy
4/24/19	9:51	14.32	33.62	3.5	10.5	14.0 <sup>o</sup> C	7.8	0.712	over	dark brown to very cloudy
4/24/19	9:54	14.32	33.62	3.5	14.0	13.9 <sup>o</sup> C	7.8	0.717	237	very cloudy
4/24/19	10:00	14.32	33.62	3.5	17.5	14.2 <sup>o</sup> C	7.8	0.717	over	dark brown
4/24/19	10:04	14.32	33.62	3.5	20.0	13.9 <sup>o</sup> C	7.9	0.709	320	very cloudy
4/24/19	10:08	14.32	33.62	3.5	<del>24.5</del> 24.5	14.0 <sup>o</sup> C	7.8	0.715	116	cloudy
4/24/19	10:11	14.32	33.62	3.5	28.0	14.2 <sup>o</sup> C	7.8	0.714	81.1	cloudy
4/24/19	10:18	14.32	33.62	3.5	30.5	14.5 <sup>o</sup> C	7.8	0.711	over	brown
4/24/19	10:21	14.32	33.62	3.5	35.0	14.1 <sup>o</sup> C	7.8	0.713	416	cloudy
4/24/19	10:25	14.32	33.62	3.5	38.5	13.8 <sup>o</sup> C	7.9	0.715	278	cloudy

\*from TOC unless otherwise noted in Remarks



Monday, Apr 12, 2014 115924 O'Haney  
J. Hermanson

Task: Well Development

Weather: 70s, 5 mph SW, mostly cloudy

Personnel: Olivia Haney + Jonathan Hermanson

0830: Gather equipment & move to field environment

1045: Check in @ Herman gaged shack

1100: Arrive @ V-3-HC to develop TD: 133.45 WEL: 17.40

1125: Begin well development

1130: Meet w/ B. Hoge & S. Martin

1200: Begin well development

1330: Complete well development @ P-3

1340: Decon Development equipment and move to  
P-1 to set up TD: 119.60 WEL: 19.55

1400: Begin well development @ P-1

1445: Burn batteries dead, running pump off car  
battery

1510: Complete well development @ P-1

1550: Decon Development equipment and move to  
P-2 to set up TD: 132.90 WEL: 19.38

1620: Begin well development @ P-2

1720: Complete well development @ P-2

1735: Decon Development equipment and move to  
TH-4 to set up TD: 107.60 WEL: 17.21

1740: Begin well development @ TH-4

1830: Complete well development @ TH-4

1855: Decon equipment & organize for tomorrow

1910: Check out w/ bagged, call B. Hoge, also site  
from dinner

Tuesday, April 23, 2014 115934 O'Haney  
J. Hermanson 3

Task: Well Development

Weather: 70s, 5 mph W, overcast

Personnel: Olivia Haney + Jonathan Hermanson

0700: Move to site

0720: Arrive on site & check in w/ gaged

0730: Set up @ L-1 WEL: 19.05 TD: 122.98

0750: Begin well development @ L-1

0855: Complete development @ L-1

0900: Decon equipment & move to set up @ MW-14

TD: 33.21 WEL: 17.00

0920: Begin well development @ MW-14

0955: Complete well development @ MW-14

1000: Decon equipment & set up @ P-2W TD: 120.38 WEL: 21.75

1025: Begin well development @ P-2W WEL: 22.1W

1100: Blown fuse on controller, pump stopped working  
checked for solution & called F&E, blown fuse

1145: Continue well development @ P-2W

1205: Complete well development @ P-2W

1230: Decon equipment & move to TH-3 to set up

TD: 134.23 WEL: 18.00

1245: Begin well development

1245: Fuse popped, replacing fuse

1325: Continue pumping TH-4

1335: Fuse pop, call B. Hoge & F&E for

solution, will replace fuse & continue using  
controller. F&E will replace controller & fuse.

1355: Continue pumping TH-3

Return to site

4-23-19

115924

o'neary  
J. Hummer

1505: complete well development @ TH-3

1510: Decon equipment and set up @ MW-11

ID: 30.53 well: 16.23

1522: Begin well development @ MW-11

1500: complete well development @ MW-11

1605: Decon equipment + clean up for Friday

1615: Check out w/ guard & off site

*J. Hummer*  
Hummer  
4/23-19

Wednesday, Apr 18, 2019

115924

o'neary

5

J. Hummer

Task: Well Development

Notes: See 5 mph w/ circumvent to party slowly

Personnel: Officer Harry + Jonathan Hummer

0730: Arrive on site & check in with Devon guard

0740: Arrive @ TH-2 to party well

0745: obstruction @ 23', unable to push pump past

bottom. Settings by instruction, will set pump

@ 23' & not surge well screen. 6 well screens

will be down. Development will stop when parameter

stabilizes. ID: 95.07

well: 13.38

0820: Begin well development @ TH-2

0840: Begin Total Depth gauging

ID	ID	Notes
P-3	133.50	hard bottom
P-1	119.69	hard bottom
P-2	123.19	some soft, rest hard bottom
MW-19	132.95	hard bottom
TH-4	33.24	softness at bottom
P2-14	121.03	hard bottom
TH-3	134.90	hard bottom
TH-2	95.02	hard bottom - some exposure
MW-11	30.54	hard bottom

0900: complete well development @ TH-2

0915: Decon equipment + set up @ MW-15

ID: 13.64

well: 14.32

1100: complete well development @ MW-15

4-24-19 11524 O. Henry  
J. Ferriss  
1110: Deco equipment & set up @ MW-3  
TD: 33.42 WL: 9.80  
1140: Begin purging MW-3 for development  
1245: Complete development @ MW-3  
1250: Deco equipment & set up @ MW-16  
TD: 32.56 WL: 14.7 TD: 9.60  
1315: Begin well development @ MW-16  
1345: Complete well development @ MW-16  
1355: Deco equipment & set up @ MW-8A  
WL: 14.57 TD: 35.06  
1415: Begin well development @ MW-8A  
1505: Complete well development @ MW-8A  
1515: Deco equipment & set up @ MW-10  
TD: 29.64 WL: 9.30  
1530: Begin well development @ MW-10  
1600: Complete well development @ MW-10  
1605: Deco development equipment & set up @ MW-2A  
TD: 31.65 WL: 10.96  
1625: Begin well development @ MW-2A  
1655: Complete well development @ MW-2A  
1700: Deco development equipment & set up @ MW-12  
1730: Begin development @ MW-12 TD: 31.34  
WL: 8.34, had bottom, but 3' less than expected  
Contracted again  
1810: Pump pulsing and shutting off, looking for  
oil, changed battery, pumping normally  
1830: Continue purging MW-12

4-24-19 11524 O. Henry  
J. Ferriss  
1855: Complete development of MW-12  
1900: Clean up equipment, lock out well guard  
1915: Off-site

~~John Korman~~  
4-24-19

8 April 25, 2019

11504

O. Murray  
J. Harrison

Task: well development

Weather: SW 60s, S. wind, dense fog to partly cloudy

Personnel: Jonathan Harrison & Orlin Murray

0730: Arrive onsite and check in w/ guard

0735: Attempt to get generator, w/ Brown unavailable

0740: team left, used to run generator from pond to truck, generator tied down in truck

0745: Site safety, tailgate meeting & safety meeting

0835: At MW 9 to set up TD 60.05 w: 15.18

0910: Begin purging MW 9

1010: Call C. King, only gave 1" better logs from start of purging, surge equipment will arrive, surge are not here & wait for tubing to arrive

1030: Complete well development @ MW 9

1035: Pick up & down equipment

1100: Move to set up @ MW 6 TD: 43.91

w: 12.25

1150: Begin purging MW 6 for well development

1235: Complete well development @ MW 6

1245: Clean up equipment, when pulling generator pump out of well, pump became stuck @ TD. After attempting to pull it out and finding we could not, will leave pump and hose in well while waiting for skitter, will proceed to MW 3 & pump w/ 2" pump & surge w/ pump

1315: Down 2" pump cable & tubing

4-15-19

11504

O. Murray  
J. Harrison

1030: Begin development @ MW 3

w: 13.22

TD: 33.87

1430: slowest boring w/ 2" pump

1530: Complete well development @ MW 3

1630: @ MW 4 to measure total depth TD: 31.96

16:36 @ MW 7 to measure total depth TD: 49.72

Will return to develop MW 11 & MW 7

1635: Check out w/ Newman guard

1635: Off-site

*Jonathan Harrison*

4-25-19

Return to Harrison

10 4-26-19

HANEY / SCHWAB

0645 Meet @ OFFICE to discuss SUPPLIES +

TALKING MEETING

0745 Leave ICE OFFICE

0830 Arrive on-site / Sign in @ CATS.

0845 Set up @ MW-4

0850 Calibrate pH records meter, Turb meter  
NUMSEN: 60" clean skews, clean, slight  
breeze out of SW

0910 measure TP @ MW-4 31.90 WL = 9.82  
6WV = 90 gal

0940 Final Pump 90 gal @ 6 gal/min

Final TD = 31.90 → Bottom is HARD

1030 Set up @ MW-7 WL = 15.93 TD = 49.68

1330 Final Development TD = 49.87

1400 Arrive @ MW-6

1415 Run well camera down to view set up  
on top of Pump

→ water is very cloudy, HANEY to see electrical  
line, Assume closeness is in response to  
sediment @ bottom of well looking in pump, Also  
look @ original TDs + constructed TDs +  
measurement to Top of pump.

1500 Able to pull up 4" pump

Final TD = 43.48' From 42.91'

→ There may be some fine silt @

bottom of well

1520 off site

4-26-19

April 29, 2019

115924

J. Heaman

Task: Well Development

Weather: 50s, 6-10 mph W, overcast

Personnel: Jonathan Heaman

1020: on-site from flow gauging, @ MW-6

TD: 43.48' bgs

Remove 3 bailers to see if sediment had  
settled to bottom and pump removed, water removed  
none clear with no sign of sediment on bales

1040: off site to return Hwy way

1105: Set up @ MW-1B TD: 39.20 WL: 6.90

1130: Begin pumping MW-1B for well development

1135: Battery dead, will replace & continue

1240: Second battery dead after 6 well volumes

pumped, all parameters stable, turbidity is 512,  
will purchase replacement battery & continue

1315: At MW-6 to retrieve bales, some

sediment attached to bottom of bales, TD: 43.50' bgs

1320: off site

1425: on-site to continue well development

1500: Complete well development @ MW-1B

1505: Decom equip

1515: off-site

Jonathan Heaman 4-29-19

Pat in the Rain

Groundwater monitoring wells

Monitoring Well ID	Time	Ft. Water (before)	Ft. Ground (before)	(ft.bTOC)	pH	Temp©	Ft. Water (after)	Ft. Ground (after)
2A	14:00	5.75	31.45	31.68			5.7	31.45
	14:05	Not Measured	Not Measured	Not Measured	7.01	23.4	Not Measured	Not Measured
30 gal purged	14:10	Not Measured	Not Measured	Not Measured	6.99	19.3	Not Measured	Not Measured
	14:14	Not Measured	Not Measured	Not Measured	6.98	19.1	Not Measured	Not Measured
	14:20	Not Measured	Not Measured	Not Measured	6.97	17.2	Not Measured	Not Measured
	14:23	Not Measured	Not Measured	Not Measured	7.01	17.2	Not Measured	Not Measured
	14:26	Not Measured	Not Measured	Not Measured	6.99	16.2	Not Measured	Not Measured
MW-3	10:18	5.05	33.75	33.96	7.11	Not Measured	5.2	34.25
	10:18	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
115 gal purged	10:19	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	10:20	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	10:22	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	10:23	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	10:24	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	10:25	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	10:27	Not Measured	Not Measured	Not Measured	7.11	Not Measured	Not Measured	Not Measured
	10:28	Not Measured	Not Measured	Not Measured	7.01	20	Not Measured	Not Measured
	10:29	Not Measured	Not Measured	Not Measured	6.98	18.8	Not Measured	Not Measured
	10:30	Not Measured	Not Measured	Not Measured	6.95	18.2	Not Measured	Not Measured
	10:32	Not Measured	Not Measured	Not Measured	6.91	17.1	Not Measured	Not Measured
	10:33	Not Measured	Not Measured	Not Measured	6.92	16.8	Not Measured	Not Measured
	10:34	Not Measured	Not Measured	Not Measured	6.91	16.4	Not Measured	Not Measured
	10:36	Not Measured	Not Measured	Not Measured	6.9	16.3	Not Measured	Not Measured
	10:37	Not Measured	Not Measured	Not Measured	6.89	15.9	Not Measured	Not Measured
	10:38	Not Measured	Not Measured	Not Measured	6.91	15.7	Not Measured	Not Measured
	10:39	Not Measured	Not Measured	Not Measured	6.87	15.7	Not Measured	Not Measured
	10:40	Not Measured	Not Measured	Not Measured	6.88	15.5	Not Measured	Not Measured
	10:41	Not Measured	Not Measured	Not Measured	6.87	15.3	Not Measured	Not Measured
	10:42	Not Measured	Not Measured	Not Measured	6.86	15.2	Not Measured	Not Measured
	10:44	Not Measured	Not Measured	Not Measured	6.86	15.2	Not Measured	Not Measured
	10:45	Not Measured	Not Measured	Not Measured	6.86	15.2	Not Measured	Not Measured



Groundwater monitoring wells

Monitoring Well ID	Time	Ft. Water (before)	Ft. Ground (before)	(ft.bTOC)	pH	Temp©	Ft. Water (after)	Ft. Ground (after)
MW-8A		9.35	34.95	35.17			9.4	35.05
	11:32	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
40 gal purged	12:04	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	12:13	Not Measured	Not Measured	Not Measured	7.39	21.9	Not Measured	Not Measured
	12:19	Not Measured	Not Measured	Not Measured	7.41	20.8	Not Measured	Not Measured
	12:24	Not Measured	Not Measured	Not Measured	7.4	19.2	Not Measured	Not Measured
	12:29	Not Measured	Not Measured	Not Measured	7.41	18.5	Not Measured	Not Measured
	12:34	Not Measured	Not Measured	Not Measured	7.4	18.1	Not Measured	Not Measured
	12:38	Not Measured	Not Measured	Not Measured	7.41	18.5	Not Measured	Not Measured



## Groundwater monitoring wells

Monitoring Well ID	Time	Ft. Water (before)	Ft. Ground (before)	(ft.bTOC)	pH	Temp©	Ft. Water (after)	Ft. Ground (after)
MW-9	16:21	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:22	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:23	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:24	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:25	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:26	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:27	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:28	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:29	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:30	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:31	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:32	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:33	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:34	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:35	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:36	Not Measured	Not Measured	Not Measured	7.27	Not Measured	Not Measured	Not Measured
MW-10		3.325	29.4	29.65	Not Measured	Not Measured	4.4	29.4
	12:14	Not Measured	Not Measured	Not Measured	7.33	20.3	Not Measured	Not Measured
30 Gal purged	12:18	Not Measured	Not Measured	Not Measured	7.31	17.2	Not Measured	Not Measured
	12:22	Not Measured	Not Measured	Not Measured	7.26	16.9	Not Measured	Not Measured
	12:26	Not Measured	Not Measured	Not Measured	7.26	16	Not Measured	Not Measured
	12:30	Not Measured	Not Measured	Not Measured	7.26	16.2	Not Measured	Not Measured
	12:34	Not Measured	Not Measured	Not Measured	7.26	16	Not Measured	Not Measured
MW-11		8.9	30.27	30.6	Not Measured	Not Measured	8.91	30.35
	14:07	Not Measured	Not Measured	Not Measured	6.6	22.8	Not Measured	Not Measured
25 gal purged	14:10	Not Measured	Not Measured	Not Measured	6.55	18.7	Not Measured	Not Measured
	14:14	Not Measured	Not Measured	Not Measured	6.56	17.2	Not Measured	Not Measured
	14:20	Not Measured	Not Measured	Not Measured	6.57	16.7	Not Measured	Not Measured
	14:27	Not Measured	Not Measured	Not Measured	6.58	15.3	Not Measured	Not Measured

Groundwater monitoring wells								
Monitoring Well ID	Time	Ft. Water (before)	Ft. Ground (before)	(ft.bTOC)	pH	Temp©	Ft. Water (after)	Ft. Ground (after)
MW-12		7.34	31.05	31.38	Not Measured	Not Measured	7.35	31.1
	13:53	Not Measured	Not Measured	Not Measured	6	19.6	Not Measured	Not Measured
25 gal purged	14:07	Not Measured	Not Measured	Not Measured	6	18.7	Not Measured	Not Measured
pH and Temp Meter Ran out of battery	14:21	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	14:35	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	14:53	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
MW-13		4.05	33.2	33.48	Not Measured	Not Measured	4.09	33.22
30 Gal purged	15:40	Not Measured	Not Measured	Not Measured	7.02	19.8	Not Measured	Not Measured
	15:44	Not Measured	Not Measured	Not Measured	7.13	18	Not Measured	Not Measured
	15:48	Not Measured	Not Measured	Not Measured	7.16	17.1	Not Measured	Not Measured
	15:52	Not Measured	Not Measured	Not Measured	7.2	17.2	Not Measured	Not Measured
	15:56	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured
	16:02	Not Measured	Not Measured	Not Measured	7.1	18.9	Not Measured	Not Measured
MW-14		13.53	33.025	33.27	Not Measured	Not Measured	13.235	33.025
20 gal purged	14:19	Not Measured	Not Measured	Not Measured	6.84	17.5	Not Measured	Not Measured
	14:26	Not Measured	Not Measured	Not Measured	7.11	14.2	Not Measured	Not Measured
	14:33	Not Measured	Not Measured	Not Measured	7.2	14.3	Not Measured	Not Measured
	14:39	Not Measured	Not Measured	Not Measured	7.2	12.6	Not Measured	Not Measured
MW-15		5.65	32.45	Not Measured	Not Measured	Not Measured	5.65	32.5
30 Gal purged	11:56	Not Measured	Not Measured	Not Measured	7.05	15.1	Not Measured	Not Measured
	11:59	Not Measured	Not Measured	Not Measured	7.82	13.2	Not Measured	Not Measured
	12:01	Not Measured	Not Measured	Not Measured	7.79	13.3	Not Measured	Not Measured
	12:04	Not Measured	Not Measured	Not Measured	7.73	10.6	Not Measured	Not Measured
	12:06	Not Measured	Not Measured	Not Measured	7.71	9.9	Not Measured	Not Measured
	12:09	Not Measured	Not Measured	Not Measured	7.69	9.3	Not Measured	Not Measured

Groundwater monitoring wells

Monitoring Well ID	Time	Ft. Water (before)	Ft. Ground (before)	(ft.bTOC)	pH	Temp©	Ft. Water (after)	Ft. Ground (after)
MW-16		4.65	32.4	32.51	Not Measured	Not Measured	4.7	32.4
30 Gal purged	15:16	Not Measured	Not Measured	Not Measured	6.73	22.3	Not Measured	Not Measured
	15:18	Not Measured	Not Measured	Not Measured	6.74	19.8	Not Measured	Not Measured
	15:21	Not Measured	Not Measured	Not Measured	6.74	19.2	Not Measured	Not Measured
	15:23	Not Measured	Not Measured	Not Measured	6.74	18.2	Not Measured	Not Measured
	15:26	Not Measured	Not Measured	Not Measured	6.73	17.7	Not Measured	Not Measured
	15:29	Not Measured	Not Measured	Not Measured	6.78	17.7	Not Measured	Not Measured

**APPENDIX D – GROUNDWATER SAMPLING FIELD DOCUMENTATION**

## FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-1-19 SITE: Nearman - CCR PID READING at WELL HEAD (ppm): ---

PROJECT NUMBER: 88777 WEATHER: 90s, 5-10 mph w, partly cloudy

WELL NUMBER: MW-2A DEPTH TO WATER (ft): 5.82

TOTAL DEPTH (ft): NA - PUMP WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/ = \_\_\_\_\_ total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1600	I	300	6.93	15.11	0.652	47.5	-20.4	2.06	5.82
1605	0.40	300	6.88	14.45	0.627	7.29	-28.7	1.46	5.82
1510	0.80	300	6.86	14.30	0.625	8.64	-34.9	0.92	5.82
1515	1.20	300	6.84	14.25	0.627	5.94	-40.5	0.71	5.82
1520	1.60	300	6.83	14.28	0.627	4.25	-44.0	0.50	5.82
1525	2.00	300	6.85	14.25	0.627	3.67	-45.0	0.45	5.82
1530	2.40	300	6.85	14.26	0.627	3.81	-47.1	0.43	5.82

Continued on back (circle one) yes / no

**SAMPLING**

Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1535	2.40	6.85	14.26	0.627	3.81	-47.1	0.43	5.82	-

FINAL DEPTH TO WATER (ft TOC): 5.82 TIME FINAL DEPTH TAKEN: 1535 1535

SAMPLE ID: MW-2A/6w01 SAMPLE ID FOR QC: Rup-1/6w01

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & IV Parameters

FERROUS IRON (mg/L): \_\_\_\_\_ IDW TOTAL: 2.40 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	<i>Jonathan Hermanson</i>	7-1-19
REVIEWED:	_____	_____	_____



## FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-2-19 SITE: Nearman - CCR PID READING at WELL HEAD (ppm): \_\_\_\_\_

PROJECT NUMBER: 88777 WEATHER: 70s, 0-5 mph, clear sky

WELL NUMBER

DEPTH TO WATER (ft): 14.10

MW-14

TOTAL DEPTH (ft): 14.10 WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/ = \_\_\_\_\_ total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0745	I	300	6.46	12.15	0.666	236	7.9	3.05	14.10
0750	0.40	300	6.84	11.28	0.690	17.3	-18.7	2.24	14.10
0755	0.80	300	6.88	11.19	0.690	11.0	-24.4	1.83	14.10
0800	1.20	300	6.90	11.09	0.690	7.52	-28.7	1.79	14.10
0805	1.60	300	6.93	11.00	0.689	4.16	-30.4	1.80	14.10

Continued on back (circle one) yes / no

**SAMPLING**

Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
0810	1.60	6.93	11.00	0.689	4.16	-30.4	1.80	14.10	-

FINAL DEPTH TO WATER (ft TOC): 14.10 TIME FINAL DEPTH TAKEN: 0810

SAMPLE ID: MW-14/6w01 SAMPLE ID FOR QC: \_\_\_\_\_

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & IV Parameters

FERROUS IRON (mg/L): - IDW TOTAL: 1.60 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

NAME: Jonathan Hermanson SIGNATURE: [Signature] DATE: 7-2-19

PREPARED: \_\_\_\_\_ REVIEWED: \_\_\_\_\_







## FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-3-19 SITE: Nearman - CCR PID READING at WELL HEAD (ppm): \_\_\_\_\_

PROJECT NUMBER: 88777 WEATHER: 74, 5 mph SW, cloudy

WELL NUMBER

DEPTH TO WATER (ft): 4.62

MW-10

TOTAL DEPTH (ft): N/A pump WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/ = \_\_\_\_\_ total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump ~~Non~~dedicated Bladder Pump Bailor Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0925	I	300	7.03	15.81	0.762	76.2	27.1	6.85	4.62
0930	0.40	300	7.04	14.88	0.596	21.3	29.3	5.23	4.84
0935	0.80	300	7.11	14.25	0.596	9.1	19.9	4.86	4.84
0940	1.20	300	7.15	14.19	0.596	7.21	19.1	4.80	4.84
0945	1.60	300	7.15	14.12	0.596	8.27	17.5	4.71	4.84
0950	2.00	300	7.15	14.00	0.596	6.40	14.7	4.57	4.84
0955	2.40	300	7.16	14.00	0.596	6.87	11.3	4.55	4.84
1000	2.80	300	7.20	14.00	0.598	7.97	14.5	4.67	4.84
Continued on back (circle one) yes <u>nd</u>									

**SAMPLING**

Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
<del>1005</del>	<u>2.80</u>	<u>7.20</u>	<u>14.00</u>	<u>0.598</u>	<u>7.97</u>	<u>14.5</u>	<u>4.67</u>	<u>4.84</u>	<u>-</u>

FINAL DEPTH TO WATER (ft TOC): 4.84 TIME FINAL DEPTH TAKEN: 1005

SAMPLE ID: MW-10/6201 SAMPLE ID FOR QC: -

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & IV Parameters

FERROUS IRON (mg/L): - IDW TOTAL: 2.80 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

NAME: Jonathan Hermanson SIGNATURE: [Signature] DATE: 7-3-19

REVIEWED: \_\_\_\_\_

# FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-2-19 SITE: Nearman - CCR PID READING at WELL HEAD (ppm): 0.7

PROJECT NUMBER: 88777 WEATHER: 80s, 5-10 mph w, clear sky

WELL NUMBER: \_\_\_\_\_ DEPTH TO WATER (ft): 4.50

MW-13

PURGING: \_\_\_\_\_ TOTAL DEPTH (ft): 11.0 WELL DIAMETER (inches): 2.0

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/foot = \_\_\_\_\_ total gallons/casing volume  
in casing \_\_\_\_\_ foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1105	<u>I</u>	<u>200</u>	<u>7.21</u>	<u>18.23</u>	<u>0.633</u>	<u>77.5</u>	<u>-75.1</u>	<u>1.21</u>	<u>4.50</u>
1110	<u>0.26</u>	<u>200</u>	<u>7.12</u>	<u>17.53</u>	<u>0.651</u>	<u>57.3</u>	<u>-80.1</u>	<u>0.85</u>	<u>4.50</u>
1115	<u>0.53</u>	<u>200</u>	<u>7.05</u>	<u>17.39</u>	<u>0.658</u>	<u>48.2</u>	<u>-86.4</u>	<u>0.51</u>	<u>4.50</u>
1120	<u>0.80</u>	<u>200</u>	<u>7.02</u>	<u>17.21</u>	<u>0.664</u>	<u>31.8</u>	<u>-82.6</u>	<u>0.45</u>	<u>4.50</u>
1125	<u>1.06</u>	<u>200</u>	<u>6.98</u>	<u>17.21</u>	<u>0.668</u>	<u>31.0</u>	<u>-84.8</u>	<u>0.41</u>	<u>4.50</u>
1130	<u>1.33</u>	<u>200</u>	<u>6.96</u>	<u>17.27</u>	<u>0.672</u>	<u>29.2</u>	<u>-84.2</u>	<u>0.45</u>	<u>4.50</u>
1135	<u>1.60</u>	<u>200</u>	<u>6.94</u>	<u>17.18</u>	<u>0.677</u>	<u>26.7</u>	<u>-84.2</u>	<u>0.26</u>	<u>4.50</u>
1140	<u>1.86</u>	<u>200</u>	<u>6.91</u>	<u>17.10</u>	<u>0.683</u>	<u>20.0</u>	<u>-83.2</u>	<u>0.28</u>	<u>4.50</u>
1145	<u>2.13</u>	<u>200</u>	<u>6.90</u>	<u>17.23</u>	<u>0.688</u>	<u>16.7</u>	<u>-81.6</u>	<u>0.35</u>	<u>4.50</u>

Continued on back (circle one) yes / no

SAMPLING Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
<u>1220</u>	<u>3.46</u>	<u>6.79</u>	<u>17.21</u>	<u>0.698</u>	<u>11.12</u>	<u>-69.5</u>	<u>0.19</u>	<u>4.50</u>	<u>-</u>

FINAL DEPTH TO WATER (ft TOC): 4.50 TIME FINAL DEPTH TAKEN: 12:15

SAMPLE ID: MW-13/6201 SAMPLE ID FOR QC: \_\_\_\_\_

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & IV Parameters

FERROUS IRON (mg/L): \_\_\_\_\_ IDW TOTAL: 3.46 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

NAME: Jonathan Hermanson SIGNATURE: Jonathan Hermanson DATE: 7-2-19

REVIEWED: \_\_\_\_\_



## FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-1-19 SITE: Nearman - CCR PID READING at WELL HEAD (ppm): --

PROJECT NUMBER: 88777 WEATHER: 90, now ind, clear sky

WELL NUMBER

DEPTH TO WATER (ft): 13.45

MW-14

TOTAL DEPTH (ft): Nm-pug WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/ = \_\_\_\_\_ total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
<del>0960</del>	<u>1</u>	<u>300</u>	<u>7.00</u>	<u>11.78</u>	<u>0.682</u>	<u>1064</u>	<u>-8.0</u>	<u>2.28</u>	<u>13.45</u>
<u>0955</u>	<u>0.40</u>	<u>300</u>	<u>7.02</u>	<u>11.27</u>	<u>0.679</u>	<u>613</u>	<u>-11.2</u>	<u>2.17</u>	<u>13.45</u>
<u>1000</u>	<u>0.80</u>	<u>300</u>	<u>6.98</u>	<u>10.99</u>	<u>0.689</u>	<u>53.6</u>	<u>72.8</u>	<u>1.72</u>	<u>13.45</u>
<u>1005</u>	<u>1.20</u>	<u>300</u>	<u>6.98</u>	<u>10.95</u>	<u>0.692</u>	<u>36.5</u>	<u>57.6</u>	<u>1.50</u>	<u>13.45</u>
<u>1010</u>	<u>1.60</u>	<u>300</u>	<u>6.98</u>	<u>10.88</u>	<u>0.692</u>	<u>32.5</u>	<u>17.4</u>	<u>1.70</u>	<u>13.45</u>
<u>1015</u>	<u>2.00</u>	<u>300</u>	<u>6.99</u>	<u>10.83</u>	<u>0.692</u>	<u>25.8</u>	<u>-10.2</u>	<u>1.79</u>	<u>13.45</u>
<u>1020</u>	<u>2.40</u>	<u>300</u>	<u>6.99</u>	<u>10.76</u>	<u>0.692</u>	<u>11.7</u>	<u>-14.9</u>	<u>1.75</u>	<u>13.45</u>
<u>1025</u>	<u>2.80</u>	<u>300</u>	<u>6.95</u>	<u>10.77</u>	<u>0.693</u>	<u>4.26</u>	<u>-9.4</u>	<u>1.72</u>	<u>13.45</u>
Continued on back (circle one) yes <u>(nd)</u>									

**SAMPLING**

Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
<u>1030</u>	<u>2.80</u>	<u>6.95</u>	<u>10.77</u>	<u>0.693</u>	<u>4.26</u>	<u>-4.4</u>	<u>1.72</u>	<u>13.45</u>	<u>—</u>

FINAL DEPTH TO WATER (ft TOC): 13.45 TIME FINAL DEPTH TAKEN: 1030

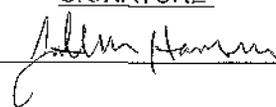
SAMPLE ID: MW-14/6wq SAMPLE ID FOR QC: \_\_\_\_\_

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & IV Parameters

FERROUS IRON (mg/L): — IDW TOTAL: 2.80 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		<u>7-1-19</u>
REVIEWED:	_____		

# FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-1-19 SITE: Nearman - CCR PID READING at WELL HEAD (ppm): ---

PROJECT NUMBER: 88777 WEATHER: 90s, no wind, clear sky

WELL NUMBER: \_\_\_\_\_ DEPTH TO WATER (ft): 9.65

MW-15

TOTAL DEPTH (ft): N/A WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/ \_\_\_\_\_ total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1150	1	300	7.64	12.32	0.659	16.7	-66.3	1.47	9.65
1155	0.40	300	7.58	10.98	0.680	13.8	-72.9	0.58	9.65
1200	0.80	300	7.55	10.72	0.678	10.14	-76.7	0.55	9.65
1205	1.20	300	7.54	10.75	0.676	7.31	-78.0	0.50	9.65
1210	1.60	300	7.55	10.85	0.676	4.11	-79.0	0.59	9.65

Continued on back (circle one) yes  no

**SAMPLING**

Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1215	1.60	7.55	10.85	0.676	4.11	-79.0	0.59	9.65	—

FINAL DEPTH TO WATER (ft TOC): 9.65 TIME FINAL DEPTH TAKEN: 1215

SAMPLE ID: MW-15/6201 SAMPLE ID FOR QC: \_\_\_\_\_

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & IV Parameters

FERROUS IRON (mg/L): \_\_\_\_\_ IDW TOTAL: 1.60 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

	NAME	SIGNATURE	DATE
PREPARED:	<u>Jonathan Hermanson</u>	<u>[Signature]</u>	<u>7-1-19</u>
REVIEWED:	_____	_____	_____

## FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-1-19 SITE: Nearman - CCR PID READING at WELL HEAD (ppm): \_\_\_\_\_

PROJECT NUMBER: 88777 WEATHER: ☀️ no wind, clear sky

WELL NUMBER: \_\_\_\_\_ DEPTH TO WATER (ft): 4.70

MW-16

TOTAL DEPTH (ft): 32.45 WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/ = \_\_\_\_\_ total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0820	I	300	6.53	16.04	1.118	6.04	-65.0	1.59	4.70
0825	0.40	300	6.54	15.50	1.2013	4.11	-78.6	3.10	4.70
0830	0.80	300	6.54	15.32	1.288	3.18	-84.9	8.44	4.70
0835	1.20	300	6.57	15.17	1.275	3.43	-93.1	2.03	4.70
0840	1.60	300	6.57	15.17	1.273	3.39	-97.4	1.20	4.70
0845	2.00	300	6.58	15.13	1.272	3.18	-99.2	0.51	4.70
0850	2.40	300	6.58	15.09	1.270	2.91	-99.7	0.45	4.70
0855	2.80	300	6.58	15.08	1.265	2.72	-100.2	0.32	4.70

Continued on back (circle one) yes / no

**SAMPLING**

Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
0900	2.80	6.58	15.08	1.265	2.72	-100.2	0.32	4.70	-

FINAL DEPTH TO WATER (ft TOC): 4.70 TIME FINAL DEPTH TAKEN: 0900

SAMPLE ID: MW-16/GW01 SAMPLE ID FOR QC: \_\_\_\_\_

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & IV Parameters

FERROUS IRON (mg/L): \_\_\_\_\_ IDW TOTAL: 2.80 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	<i>Jonathan Hermanson</i>	7-1-19
REVIEWED:	_____	_____	_____

July 1, 2019

88777

J. Hermon

CCR GW monitoring

Personnel: Jonathan Hermon

Weather: 80s-90s, 0-5 mph SW, partly cloudy

0645: Get ice

0710: arrive on site a clock in w/ guard

0715: Begin site recon to determine feasibility to

do/w/s/ collect sample from MW-10.

Will monitor water level at ~~top~~ casing still found  
to near top of casing @ MW-10, if water is

still high @ end of day tomorrow 7.2.19

waters will be used to collect sample & VC

0715: @ MW-16 to install dedicated bladder pump  
& to set up

0755: TD: 32.45' <sup>b70c</sup>, 10' screen, Dedicate bladder pump  
to p set @ 28.15' <sup>b70c</sup>

0800: calibrate equipment

pH: 4.00/4 7.00/7 10.00/10

temp: 0.84/0 9.92/10

ORP: 1.409/1.409

ORP: 237.5

DO: 100.0%

0820: Begin purging MW-10

0900: Collect MW-10/bw01 for CCR App. III & IV

0930: At MW-14 to set up

0950: Begin purging MW-14

1030: Collect MW-14/bw01 for CCR App. III & IV

7-1-19

88777

J. Hermon

1050: Set up @ MW-15, cannot locate well log,  
look @ previous column, still cannot locate it,

contact Armonn who is here this

1140: Access well log

1150: Begin purging MW-15

1215: Collect MW-15/bw01 for App. III & IV

1235: Set up @ MW-8A

1240: Begin purging MW-8A

1405: Collect MW-8A/bw01/MS/MSD for App. III & IV

1450: Set up @ MW-2A

1500: Begin purging MW-2A

1525: Collect Dup-1/bw01 & MW-2A/bw01 for

Appendix III & IV parameters

1555: Set up @ MW-3

1610: Begin purging MW-3

1645: Collect MW-3/bw01

1655: Clean up ~~office~~ on site & org notes for  
to morrow

1700: Off site

~~Jonathan Hermon~~

7-1-19

July 2, 2014

88777

J. Harrison

Task: CER GW monitoring

Weather: 70s-90s, 0-10 mph W, clear sky

Personnel: Jonathan Harrison

0645: Get ice

0710: on-site &amp; check in w/ ground

0720: At MW-19 to set up & calibrate pump, resampling because microinjection that monitoring well had been developed, well developed by CERBPB after sampling on 7-1-14.

pH: 4.00/4 7.00/7 9.99/1.0

Con: 1.400/1.400

Turb: 0.84/0 9.94/1.0

ORP: 232.5

DO: 100.070

0745: Begin pushing MW-14

0810: Collect MW-14/6m for App. III & IV

0825: At MW-10 to collect Floodwater 1 for App. III & IV parameters of water table ground monitoring well

0850: At MW-4 to set up

0905: Begin pushing MW-4

0920: Collect Floodwater 2 for App III & IV parameters Groundwater north of MW-4

0945: Collect MW-4/6m & Comp-2/6m for Appendix III & IV parameters

Leave entry: 0925: K. Brown on-site, discuss development

7-2-14

88777

J. Harrison

at MW-10, BPA will develop well this morning

so we can collect sample tomorrow, 7-3-14.

Issues will be arisen, safety contacted to determine if all safety requirements met

1035: At MW-13 to set up

1105: Begin pushing MW-13

1220: Collect MW-13/6m for App III & IV parameters  
 work on to KORE project to sample MW-18

Jonathan Harrison

7-3-14

July 3, 2014

88777

J. Harrison

Task: CLE groundwater monitoring

Weather: 70s-80s, 5-10 mph SW, partly cloudy

Personnel: Jonathan Harrison

0800: Get ice

0825: Arrive on-site

0830: At MW-10 to set up &amp; calibrate equipment

pH: 4.00/4      2.00/7      100%/10

Con: 1.409 / 1.409

Turb: 0.8/0      10.3%/0

ORP: 237.5

DO: 100.070

0855: Tyler, BPA, onsite to help w/ set up &amp; samples

0925: Begin paying MW-10

1005: Collect MW-10 Ground for Appendix III & IV

1030: Clean up, check out well ground, off-site to

keep samples etc

Jonathan Harrison

7-3-14





## FIELD GROUND-WATER SAMPLING REPORT

DATE: 11-26-19 SITE: KCBPU - Nearman PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 40s, 5 mph NE, overcast

WELL NUMBER

DEPTH TO WATER (ft): 11.40

MW-4

TOTAL DEPTH (ft): 31.98 WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: — ft of water X — gallons/ = — total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other —

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1450	1	300	6.78	14.50	1.011	1.62	37.3	3.13	11.40
1455	0.40	300	6.77	14.70	1.034	1.66	34.4	1.51	11.40
1500	0.80	300	6.87	14.79	0.826	1.46	37.4	1.75	11.40
1505	1.20	300	6.89	14.81	0.803	1.22	36.8	1.82	11.40
1510	1.60	300	6.89	14.85	0.801	1.00	36.8	1.72	11.40
1515	2.00	300	6.90	14.90	0.796	0.51	36.7	1.65	11.40

Continued on back (circle one) yes / no

**SAMPLING**

Equipment Used: Same as above Other —

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1520	2.00	6.90	14.90	0.796	0.51	36.7	1.65	11.40	—

FINAL DEPTH TO WATER (ft TOC): 11.40 TIME FINAL DEPTH TAKEN: 1520

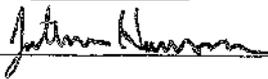
SAMPLE ID: MW-4/GW02 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & select Appendix IV

FERROUS IRON (mg/L): — IDW TOTAL: 20 gal

METER MODEL No.: YSI MPS 556

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		11-26-19
REVIEWED:	_____	_____	_____





## FIELD GROUND-WATER SAMPLING REPORT

DATE: 11-26-19 SITE: KCBPU - Nearman PID READING at WELL HEAD (ppm): -

PROJECT NUMBER: 88777 WEATHER: 40s, 5 mph E, overcast

WELL NUMBER

DEPTH TO WATER (ft): 16.56

MW-10

TOTAL DEPTH (ft): 29.60 WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: \_\_\_\_\_ ft of water X \_\_\_\_\_ gallons/ = \_\_\_\_\_ total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other \_\_\_\_\_

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1200	I	300	6.75	14.88	0.970	15.2	5.6	7.52	16.56
1205	0.40	300	6.73	15.47	1.267	5.39	9.0	2.61	10.59
1210	0.80	300	6.23	15.49	1.274	2.33	16.4	1.61	16.59
1215	1.20	300	6.73	15.98	1.276	1.52	12.4	1.11	10.59
1220	1.60	300	6.73	15.42	1.275	1.39	13.0	0.95	10.59
1225	2.00	300	6.74	15.42	1.274	1.17	13.4	0.78	10.59
1230	2.40	300	6.74	15.41	1.274	1.05	13.6	0.71	10.59
1235	2.80	300	6.74	15.43	1.273	3.11	14.0	0.59	10.59

Continued on back (circle one) yes /  no

**SAMPLING**

Equipment Used: Same as above Other \_\_\_\_\_

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1240	2.80	6.74	15.93	1.273	3.11	14.0	0.59	10.59	-

FINAL DEPTH TO WATER (ft TOC): 10.59 TIME FINAL DEPTH TAKEN: 1240

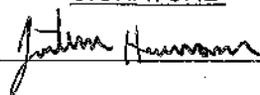
SAMPLE ID: MW-10 SAMPLE ID FOR QC: -

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & select Appendix IV

FERROUS IRON (mg/L): \_\_\_\_\_ IDW TOTAL: 2.80 gal

METER MODEL No.: YSI MPS 556

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		11-26-19
REVIEWED:	_____	_____	_____





## FIELD GROUND-WATER SAMPLING REPORT

DATE: 11-26-19 SITE: KCBPU - Nearman PID READING at WELL HEAD (ppm):     

PROJECT NUMBER: 88777 WEATHER: 40s, S mph NE, overcast

WELL NUMBER

DEPTH TO WATER (ft): 17.45

MW-14

TOTAL DEPTH (ft): 33.27 WELL DIAMETER (inches): 2

PURGING

CASING VOLUME CALCULATION:      ft of water X      gallons/ =      total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other     

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0845	I	300	6.61	16.11	0.831	4.54	11.9	8.69	17.45
0850	0.80	300	6.85	17.77	0.842	3.65	7.1	3.28	17.45
0855	0.80	300	6.92	17.82	0.844	2.42	8.4	3.74	17.45
0900	1.20	300	6.93	17.88	0.845	2.03	11.9	<del>6.53</del> 4.6	17.45
0905	1.60	300	6.94	17.84	0.844	1.68	12.9	1.44	17.45
0910	2.00	300	6.94	17.86	0.843	1.46	11.6	1.38	17.45
Continued on back (circle one) yes / <u>no</u>									

SAMPLING

Equipment Used: Same as above Other     

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
0915	2.00	6.94	17.86	0.843	1.46	11.6	1.38	17.45	Bubbles in water

FINAL DEPTH TO WATER (ft TOC): 17.45 TIME FINAL DEPTH TAKEN: 0915

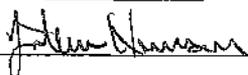
SAMPLE ID: MW-14/6202 SAMPLE ID FOR QC:     

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & select Appendix IV

FERROUS IRON (mg/L):      IDW TOTAL: 2.0 gal

METER MODEL No.: YSI MPS 556

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: N/A

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		11-26-19
REVIEWED:			



## FIELD GROUND-WATER SAMPLING REPORT

DATE: 11-25-19 SITE: KCBPU - Nearman PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 50s, 5 mph W, partly cloudy

WELL NUMBER

DEPTH TO WATER (ft): 12.22

MW-16

TOTAL DEPTH (ft): 32.64 WELL DIAMETER (inches): 2

**PURGING**

CASING VOLUME CALCULATION: — ft of water X — gallons/ = — total gallons/casing volume  
in casing foot

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other —

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1155	I	300	5.33	14.63	1.201	7.93	63.8	2.59	12.22
1200	0.40	300	<del>5.33</del>	14.41	1.195	1.98	77.9	1.12	12.22
1205	0.80	300	7.5-226	14.39	1.191	0.85	74.0	0.89	12.22
1210	1.20	300	6.9	14.34	1.185	1.45	79.6	0.95	12.22
1215	1.60	300	6.8	14.33	1.181	2.74	85.8	0.92	12.22
1220	2.00	300	6.8	14.32	1.179	0.51	89.6	0.96	12.22
Continued on back (circle one) yes / <u>no</u>									

**SAMPLING**

Equipment Used: Same as above Other —

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1225	2.00	6.8	14.32	1.179	0.51	89.6	0.96	12.22	—

FINAL DEPTH TO WATER (ft TOC): 12.22 TIME FINAL DEPTH TAKEN: 1220

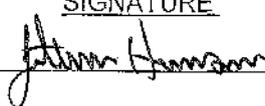
SAMPLE ID: MW-16/GW02 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Appendix III & select Appendix IV

FERROUS IRON (mg/L): — IDW TOTAL: 2.00 gal

METER MODEL No.: YSI MPS 556

CHECKED FLOW THROUGH CELL FOR LEAKS:  COMMENTS: NIA

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		11-25-19
REVIEWED:			

July 3, 2014

88773

J. Krumm

Task: EHE groundwater monitoring

Weather: 70s-80s, 5-10 mph SW, partly cloudy

Personnel: Jonathan Krumm

0800: Get ice

0825: Arrive on-site

0830: At MW-10 to set up &amp; calibrate equipment

pH: 4.00/4 2.00/7 10.0/10

Con: 1.409 / 1.409

Turb: 28% 10.3%/0

ORP: 237.5

DO: 100.070

0855: Tyler, BPA, onsite to help w/ set up &amp; sample

0925: Begin pushing MW-10

1005: Collected MW-10/6/02 for App III & App IV

1030: Clean up, check out w/ guard, out-site to

keep samples etc

Jonathan Krumm

7-3-14

November 25, 2014

88773

J. Krumm

Weather: 40s-60s, S-15 W, cloudy

Personnel: Jonathan Krumm

Task: Semi-annual GW monitoring

0700: Calibrate equipment

pH: 4.0/4 2.0/7 10.0/10

Con: 1.409 / 1.409 Turb: 20.6% 10.0%/10

DO: 99.970

ORP: 220.0/220

0815: Depart from the office to get ice &amp; ice

1015: Arrive on-site &amp; set up @ MW-13

1025: Begin pushing MW-13

1055: Collected MW-13/6/02 for App III & App IV <sup>Select</sup>

1150: Set up @ MW-16

1155: Begin pushing MW-16

1200: Collected ~~etc~~ not reading properly on YSI

callibrate stock meter: 4.0/4 2.0/7 10.0/10

1225: Collected MW-16/6/02 for App III & selected IV

1245: Check in w/ Lawrence guard

1255: At MW-19 to set up

1300: Begin pushing MW-19

Collected MW-19 for App III & App IV <sup>Select</sup> (in)

1310: DO not sensing properly, recalibrate sensors

to fix problem, but after 5 minutes problem persists, unable to regain to try to fix problem &amp; sensors will

measure F/E will send ~~etc~~ replacement for 2

will continue on to H/W gradually

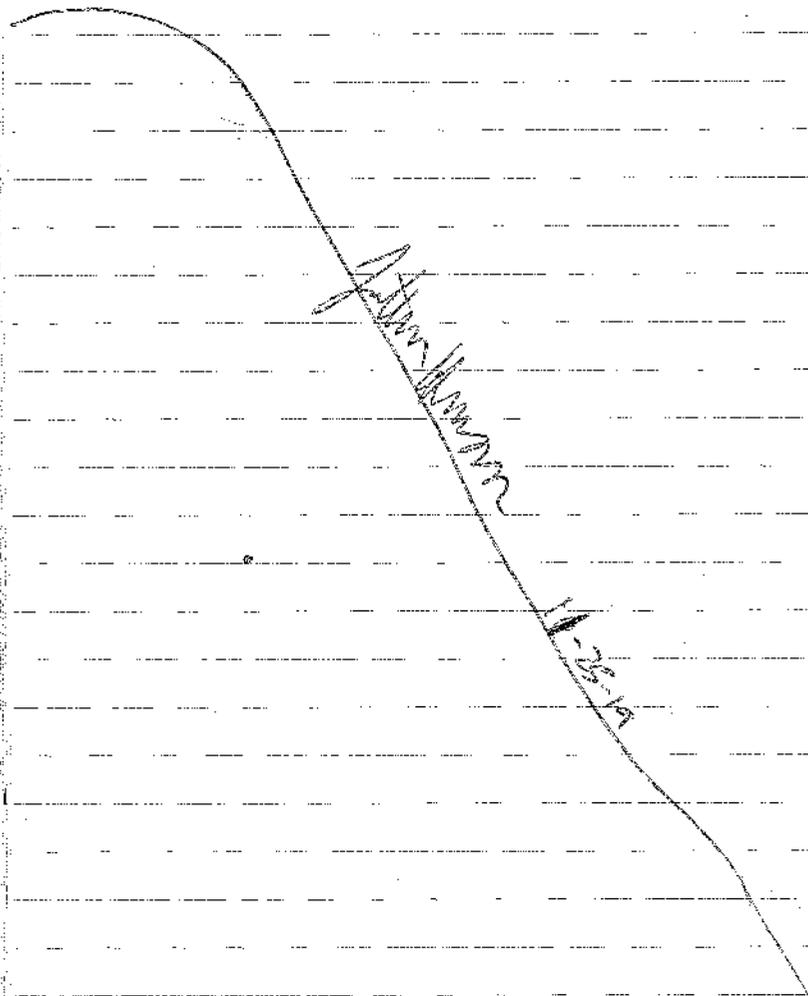
11-25-19

88777

J. Hermanson

1600: Replacement YSI dropped etc, will continue  
 new/call record of water levels.

MW-13 will be recollect due to elevated  
 DO.



Friday, Dec 26, 2019

88773

J. Hermanson

Task: Semi annual GW monitoring  
 weather: 90s-80s, 5-20 mph ESE, cloudy

Personnel: Jonathan Hermanson

0620: Calibrate Equipment

#1: 4/14 7.0017 9.6114

Location: 1140011, 114011 DO: 10.270

ORP: 2201120

Temp: 0.05/10 8.95/10

0650: Leave for site

0710: Arrive at site & set up @ MW-13

0725: Begin purging MW-13

0730: collect MW-13/bw02 for Appendix III & select II

0840: Set up @ MW-14

0845: Begin purging MW-14

0915: collect MW-14/bw02 for App III & select II parameters

0930: Set up @ MW-15

0935: Begin purging MW-15

1010: collect MW-15/bw02 for App III & select II parameters

1025: Set up @ MW-8A

1030: Begin purging MW-8A

1125: collect MW-8A/bw02/bw03 for

Appendix III & select parameters

1155: Set up @ MW-10

1200: Begin purging MW-10

1240: collect MW-10/bw02 for App III & select parameters

1255: Set up @ MW-2A

11-20-19

98777

J. Harrison

1300: Begin purging MW-2A

1330: Collect MW-2A/GW02 & Deep-1/GW02

for Appendix II &amp; the parasites

1355: Set up @ MW-3

1400: Begin purging MW-3

1435: Collect MW-3/GW02 for App. III & select II

1445: Set up @ MW-4

1450: Begin purging MW-4

1520: Collect MW-4/GW02 for App. II & select II

1530: Clean up &amp; pack coolers

1545: Get 620 to deep coolers at E. city.

~~J. Harrison  
11-20-19~~

Thursday, October 31, 2019 11:30 AM J. Kinnison

Task: Check new-03 if enough water to sample

Weather: 23, 5 mph W, clear sky

Personnel: Jonathan Kinnison

0730: Arrive onsite @ Quilley's pond station

& check on well ground.

0735: At new-03 in check well: 96.48,

Not enough volume to collect sample, well is considered "dry"

0750: Check out of ground, offset

~~Jonathan Kinnison~~  
10-31-19

Monday, November 25, 2019 11:30 AM J. Kinnison

Task: New gaging

Weather: 50s, 5 mph W, partly cloudy

Personnel: Jonathan Kinnison

1100: Arrive C. Kinnison water & check well ground

HW: 13.0 @ 1130

HW: 2:14.9 @ 1130

MO River: 739.5

Temp: 46°F

IGEM: 23%

Baseline: 74.7

1400: Begin gaging wells

ID	Time	WZ	Notes
P-3	1425	17.83	-
P-1	1427	19.76	-
L-1	1429	19.78	needs new low
P-2	1432	21.07	-
HW-2	1435	42.46	pump B on
WASSON	97.52		
TH-4	1438	18.10	New lock needed
P2-LW	1441	21.91	
HW-1	1445	31.70	pump 2 on
WASSON	93.3		
TH-3	1449	20.87	New lock needed
River	1452	12.55	
TH-2	1455	14.20	
HW-3	1458	16.05	
MU-14	1457	17.47	
MU-15	1456	15.62	
MU-11	1501	17.05	

ID	Time	W/C	Notes
MW-8	1510	18.94	-
MW-10	1514	10.61	new lock needed
MW-20	1522	12.63	new lock needed
MW-3	1525	14.85	-
MW-4	1528	11.52	-
MW-12	1533	11.04	new lock needed
MW-6	1538	14.96	TD: 43.37
MW-3	1620	20.08	-
MW-13	1610	10.74	-
MW-16	1616	12.19	-
MW-13	1625	10.34	no lock, section empty

1130 Return toyc of's etc

*John Johnson*  
11-25-79

## **APPENDIX E – ANALYTICAL REPORTS AND DATA VALIDATION**

# Memorandum



Date: August 26, 2019  
To: Brian Hoye  
From: Kortney Blaufuss  
Re: Quality Assurance/Quality Control (QA/QC) Review of Analytical Data  
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas  
Nearman Creek Power Station Bottom Ash Pond – July 2019  
Project No. 88777

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Groundwater samples were collected to establish background conditions at the Nearman Creek Power Station Bottom Ash Pond at the Kansas City Board of Public Utilities (BPU) site in Kansas City, Kansas. The samples were collected July 1 through 3, 2019 and submitted to Pace Analytical National Center for Testing and Innovation of Mount Juliet, Tennessee (PACE) for analysis by one or more of the following methods:

<u>Parameters</u>	<u>Analytical Method</u>
Total Metals <sup>1</sup>	SW-846 6010B/6020
Total Mercury	SW-846 7470A
Total Dissolved Solids (TDS)	SM 2540 C-2011
Anions (chloride, fluoride, sulfate)	SW-846 9056A
pH	SW-846 9040C
Radium 226 and 228 <sup>2</sup> (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0/9320 (radium-228)

Notes:

<sup>1</sup>Metals performed by SW-846 6010B include barium, beryllium, boron, cadmium, calcium, chromium, cobalt, lithium and molybdenum. Metals performed by SW-846 6020 include antimony, arsenic, lead, selenium and thallium.

<sup>2</sup>Project reporting requirements per the Sampling and Analysis Plan are for a combined radium-226/radium-228 concentration. These were measured separately, and the combined result was calculated and reported by the laboratory.

A Stage I data review was performed for Quality Assurance (QA)/Quality Control (QC) results in association with the samples collected to evaluate the results for any method-specific requirements. Data qualifiers, when appropriate, were added to the data as recommended in the guidelines presented in *National Functional Guidelines for Inorganic Superfund Methods Data Review* (NFGI) (USEPA, 2017). Any data qualifiers added during the course of this review are presented on Table 1.

1. Chain-of-Custody (COC) – The relinquished and received signatures, times, and dates on the COCs were present. The following were also noted:

- Sample Delivery Group (SDG) L1115520 and L1115755: Samples DUP-2, Floodwater 1 and Floodwater 2 were placed on hold and not analyzed for this sampling event.
- The lab noted upon arrival that sample containers for MW-8A were labeled as the Matrix Spike/Matrix Spike Duplicate (MS/MSD). Upon receiving update sample collection information, the MS/MSD sample containers were re-labeled as MW-2A as indicated by the COC. MS/MSD analyses were performed on the correct sample containers (MW-2A).

# Memorandum *(continued)*



August 26, 2018

Page 2

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate background parameters for the July groundwater sampling event.
3. Holding Times – All samples were analyzed within the recommended method holding times except for the following:
  - The laboratory pH value for one or more samples in SDGs L1115520 and L1116030 were not measured within the recommended 24-hour holding time. Because pH was also measured in the field at the time of sample collection and no significant differences were noted, these laboratory pH results were qualified as estimated (J) rather than rejected.
4. Sample Preservation – All samples were received by the laboratory within the recommended 4 degrees Celsius (°C)  $\pm$  2 °C sample preservation temperature range.
5. Laboratory Method Blanks – Method blanks were reviewed to determine the potential for sample cross contamination due to handling within the laboratory. With the following exceptions, no detections of target analytes were noted in the method blanks:
  - Calcium was detected in the method blank for batch WG1313685 at a low-level concentration below the reporting limit. The associated sample was greater than five times the method blank, so no qualifiers were required.
  - Sulfate was detected in the method blank for batch WG1310272. The associated sample was greater than five times the method blank, so no qualifiers were required.
  - Radium-226 and radium-228 were detected in the method blanks. Because the majority of the associated samples had combined radium values less than five times the combined blank value, the data was evaluated as follows:

Historical data shows radium (226 and/or 228) has been detected above the reporting limit in more than one sampling event, and there is also a level of uncertainty in radium results that is not typically addressed, or relevant information provided for this scope of work. Thus, rather than qualifying all samples nondetect (U) based on the radium-226/228 method blank detections, and because these data will be used for statistical analyses, the samples were qualified as follows:

- SDG L1115755: All associated samples, except MW-3, had combined radium values less than five times the combined blank value. It's unknown if these combined radium results are due to possible cross-contamination or accurate concentrations. Because combined radium has historically been detected in these wells, they were qualified as estimated (J) based on professional judgment.

August 26, 2018

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- SDG L1116033: The associated sample had a combined radium value greater than five times the combined blank value. Cross contamination was not a concern and no qualifiers were necessary.
6. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – The LCS contains a matrix similar to that of the sample that has been spiked with known concentrations of target analytes. The LCS is prepared and analyzed by the same method as the samples. As a measure of analytical accuracy, the results of the LCS are compared against the known analyte concentrations in the spike to determine the percent recovery (REC). The purpose of the LCS is to determine the performance of the laboratory with respect to analyte recovery, independent of field sample matrix interference. For some methods, the lab performed a LCSD. The results between the LCS and LCSD were compared with each other for reproducibility using the relative percent difference (RPD). All LCS/LCSD RECs and/or RPDs were within their respective QC limits.
  7. Matrix Spike/Matrix Spike Duplicates (MS/MSD) – MS/MSDs are typically run for organic and inorganic analyses. A sample is split into three portions (original, MS and MSD), and a known amount of a target analyte is added (spiked) to two portions (MS and MSD) of the sample. The results of these two portions are compared with each other for reproducibility using the RPD. They are also compared against the unspiked portion of the sample for REC of the spike. Qualification is typically limited to the spiked sample for any MS/MSD issues, unless otherwise noted. The site specific MS/MSD was performed on sample MW-2A. All site-specific MS/MSD analyses were within their respective QC limits, except for the following:
    - Low MS/MSD RECs for calcium were noted. However, the spike amount was less than four times the parent sample concentration. No conclusion could be drawn from this MS/MSD analysis, and no qualification was necessary.
    - Sulfate MS/MSD results were flagged with an “E” by the laboratory to indicate that the concentration exceeded the calibration range of the instrument. No conclusions could be made regarding the accuracy of these spikes, and no data were qualified.
  8. Laboratory Duplicate Results – In instances where a MS/MSD was not applicable, laboratory duplicate analyses were performed. Laboratory duplicates provide information on the ability to reproduce lab results and to account for error introduced from handling, shipping, storage, preparation, and lab analysis. All project-specific laboratory duplicate results were within control limits.
  9. Field Duplicate Results – Field duplicate results provide information on the ability to reproduce field results and account for error introduced from handling, shipping, storage, preparation, and analysis of field samples. There are no specific USEPA criteria for qualifying data from field duplicate results. Depending upon the sample concentration, one of the following criteria based upon NFGI is applicable:

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- Is the compound detected in both portions?
- If the sample concentrations are greater than 5 times the detection limit, then the maximum allowable RPD is 20 percent for water samples.
- If the sample concentrations are less than 5 times the detection limit, then a sensitivity test is applied. For the sensitivity test, the sample concentrations must agree within  $\pm$  the lower detection limit for water samples.
- If the radium results are reported above their minimum detectable activity (MDA), the normalized difference (also called the relative error ratio) between the duplicate pair was calculated. The maximum normalized difference is 1.96 for the radium samples.

One field duplicate pair was collected for the July 2019 sampling event. Table 2 presents the side-by-side comparison of the field duplicate detections. Qualifiers are not typically added based on the field duplicate review unless otherwise noted. The higher of the two concentrations are considered more viable for use in reporting.

- MW-2A // Dup-1: All field duplicate results were adequately replicated.
10. Detection and Quantitation Limits – Dilutions were noted for sulfate in the following samples, to account for high concentrations of target analytes and/or matrix interferences: MW-8A, MW-13, MW-15, MW-16 and MW-10. No qualifiers were added based on dilutions.
  11. Conclusion – The data were reviewed for achievement of any method-specified QA/QC criteria. Table 1 presents a summary of data qualifiers that were qualified during the course of this review. The data are valid for use, as qualified, in reporting the results of this investigation.

## Attachments

Table 1: Data Qualifiers

Table 2: Field Duplicate Results (Detections Only)

**Table 1**  
**Data Qualifiers**  
**Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas**  
**Nearman Creek Power Station Bottom Ash Pond – July 2019**

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A	L1115520-01	pH	J	Immediate pH analysis is recommended. All pH measurements for these samples were performed more than 24 hours after sample collection. Because field pH measurements were also recorded and no significant differences were noted, the results were qualified as estimated (J) rather than rejected (R).
MW-3	L1115520-02			
MW-4	L1115520-03			
MW-8A	L1115520-04			
MW-13	L1115520-05			
MW-14	L1115520-06			
MW-15	L1115520-07			
MW-16	L1115520-08			
DUP-1 (MW-2A)	L1115520-09			
MW-10	L1116030-01			
MW-2A	L1115755-01	Combined Radium	J	Method Blank Detection Because combined radium has historically been detected in these wells, they were qualified as estimated (J) based on professional judgment. See Text
MW-4	L1115755-03			
MW-8A	L1115755-04			
MW-13	L1115755-05			
MW-14	L1115755-06			
MW-15	L1115755-07			
MW-16	L1115755-08			
DUP-1 (MW-2A)	L1115755-09			

J - Qualified as estimated

R - Data was rejected

**Table 2**  
**Field Duplicate Results (Detections Only)**  
**Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas**  
**Nearman Creek Power Station Bottom Ash Pond – July 2019**

Parameter	Unit	MW-2A L1115520-01	Dup-1 L1115520-09	Meets QC Criteria
Total Dissolved Solids	mg/l	462	462	Yes
pH	mg/l	8.23 J	7.17 J	Yes
Chloride	mg/l	8.82	8.96	Yes
Fluoride	mg/l	0.230	0.229	Yes
Sulfate	mg/l	86.3	87.2	Yes
Barium, Total	mg/l	0.110	0.107	Yes
Calcium, Total	mg/l	127	127	Yes
Lithium, Total	mg/l	0.0204	0.0202	Yes

Parameter	Unit	MW-2A L1115755-01	Dup-1 L1115755-09	Meets QC Criteria
Radium-226 (Uncertainty)	pCi/l	0.178 (+/- 0.213)	0.127 (+/- 0.251)	Yes
Radium-228 (Uncertainty)	pCi/l	0.140 (+/- 0.464)	0.269 (+/- 0.448)	Yes
Radium-226 + 228 (Calc)	pCi/l	0.318 J	0.396 J	Yes

J - qualified as estimated  
mg/l = milligrams per liter  
pCi/l = picoCuries/liter  
QC = quality control

July 22, 2019

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Kansas City Board of Public Utilities

Sample Delivery Group: L1115520  
Samples Received: 07/03/2019  
Project Number: KCBPU Nearman  
Description: GW-Creek Bottom Ash Pond

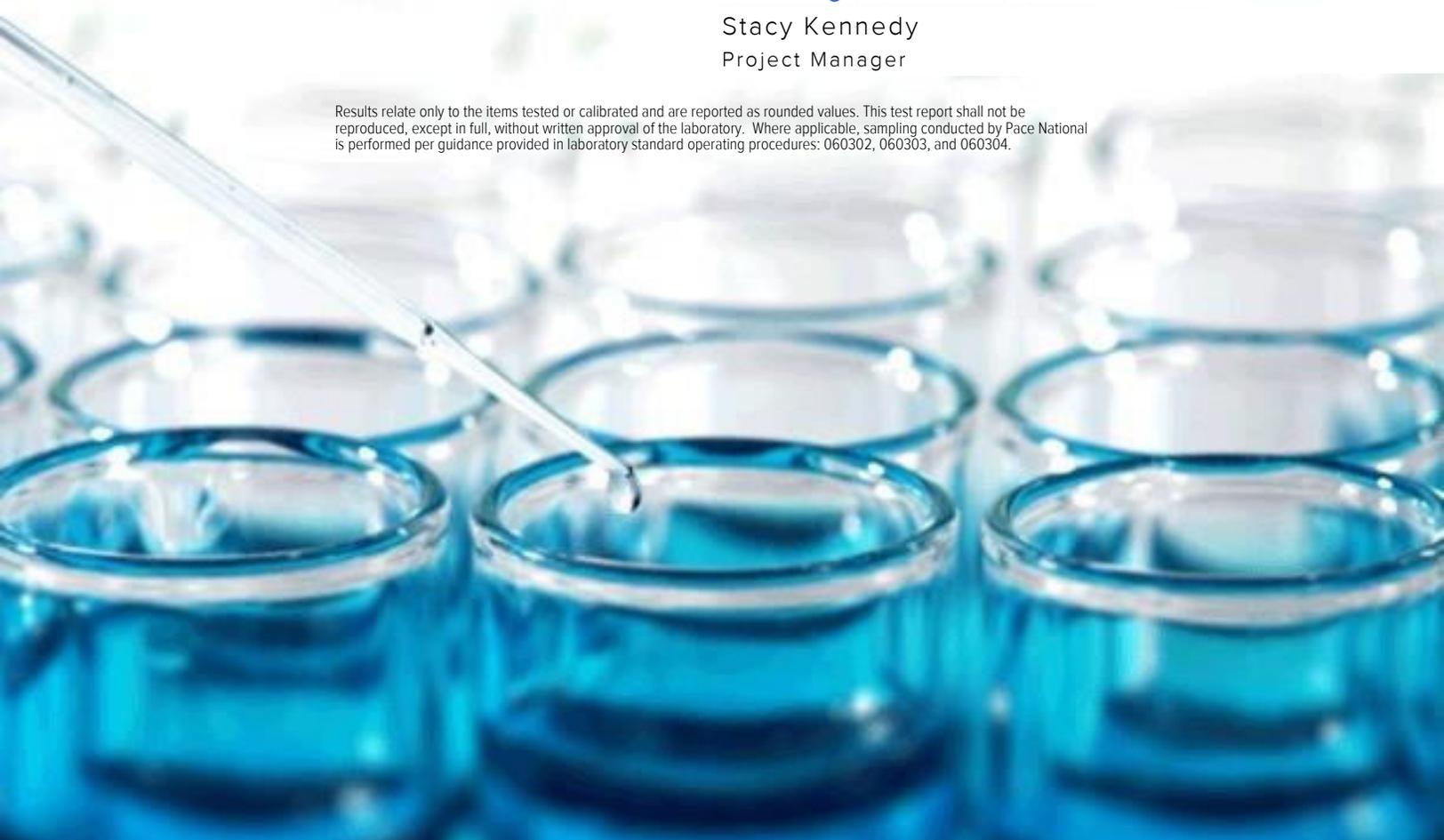
Report To: Ingrid Setzler  
300 N 65th Street  
Kansas City, KS 66102

Entire Report Reviewed By:



Stacy Kennedy  
Project Manager

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





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# SAMPLE SUMMARY

## MW-2A/GW01 L1115520-01 GW

Collected by: Jonathan Hermanson  
 Collected date/time: 07/01/19 15:25  
 Received date/time: 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1306964	1	07/08/19 07:28	07/08/19 09:40	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1306715	1	07/06/19 11:52	07/06/19 11:52	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 17:45	07/09/19 17:45	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1313705	1	07/18/19 14:00	07/18/19 21:51	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313685	1	07/18/19 14:56	07/19/19 12:08	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313694	1	07/18/19 14:34	07/18/19 18:31	LD	Mt. Juliet, TN

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc

## MW-3/GW01 L1115520-02 GW

Collected by: Jonathan Hermanson  
 Collected date/time: 07/01/19 16:45  
 Received date/time: 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1306964	1	07/08/19 07:28	07/08/19 09:40	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1306715	1	07/06/19 11:52	07/06/19 11:52	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 18:45	07/09/19 18:45	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:03	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:16	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:12	JPD	Mt. Juliet, TN

## MW-4/GW01 L1115520-03 GW

Collected by: Jonathan Hermanson  
 Collected date/time: 07/02/19 09:45  
 Received date/time: 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1307665	1	07/09/19 12:12	07/09/19 12:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1307144	1	07/08/19 10:11	07/08/19 10:11	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 19:44	07/09/19 19:44	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:05	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:19	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:16	JPD	Mt. Juliet, TN

## MW-8A/GW01 L1115520-04 GW

Collected by: Jonathan Hermanson  
 Collected date/time: 07/01/19 14:05  
 Received date/time: 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1306964	1	07/08/19 07:28	07/08/19 09:40	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1306715	1	07/06/19 11:52	07/06/19 11:52	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 20:03	07/09/19 20:03	LDC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	5	07/10/19 08:20	07/10/19 08:20	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:08	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:21	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:30	JPD	Mt. Juliet, TN

## MW-13/GW01 L1115520-05 GW

Collected by: Jonathan Hermanson  
 Collected date/time: 07/02/19 12:20  
 Received date/time: 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1307665	1	07/09/19 12:12	07/09/19 12:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1306715	1	07/06/19 11:52	07/06/19 11:52	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 20:23	07/09/19 20:23	LDC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	5	07/10/19 08:40	07/10/19 08:40	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:10	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:24	TRB	Mt. Juliet, TN

# SAMPLE SUMMARY



	Collected by Jonathan Hermanson	Collected date/time 07/02/19 12:20	Received date/time 07/03/19 08:00
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## MW-13/GW01 L1115520-05 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:35	JPD	Mt. Juliet, TN

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

	Collected by Jonathan Hermanson	Collected date/time 07/02/19 08:10	Received date/time 07/03/19 08:00
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## MW-14GW01 L1115520-06 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1307665	1	07/09/19 12:12	07/09/19 12:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1307144	1	07/08/19 10:11	07/08/19 10:11	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 20:43	07/09/19 20:43	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:12	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:26	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:39	JPD	Mt. Juliet, TN

	Collected by Jonathan Hermanson	Collected date/time 07/01/19 12:15	Received date/time 07/03/19 08:00
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## MW-15/GW01 L1115520-07 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1306964	1	07/08/19 07:28	07/08/19 09:40	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1307144	1	07/08/19 10:11	07/08/19 10:11	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 21:01	07/09/19 21:01	LDC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	5	07/10/19 09:00	07/10/19 09:00	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:15	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:34	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:44	JPD	Mt. Juliet, TN

	Collected by Jonathan Hermanson	Collected date/time 07/01/19 09:00	Received date/time 07/03/19 08:00
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## MW-16/GW01 L1115520-08 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1306964	1	07/08/19 07:28	07/08/19 09:40	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1307144	1	07/08/19 10:11	07/08/19 10:11	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 21:21	07/09/19 21:21	LDC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	5	07/10/19 09:20	07/10/19 09:20	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:21	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:37	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:48	JPD	Mt. Juliet, TN

	Collected by Jonathan Hermanson	Collected date/time 07/01/19 00:00	Received date/time 07/03/19 08:00
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## DUP-1/GW01 L1115520-09 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1306964	1	07/08/19 07:28	07/08/19 09:40	TH	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1307144	1	07/08/19 10:11	07/08/19 10:11	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1308403	1	07/09/19 21:40	07/09/19 21:40	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1306165	1	07/03/19 20:00	07/05/19 12:24	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1306330	1	07/05/19 10:42	07/08/19 21:39	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1306331	1	07/05/19 19:47	07/08/19 02:53	JPD	Mt. Juliet, TN



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

Stacy Kennedy  
Project Manager

Project Narrative

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Per attached nonconformance form, MS/MSD containers were initially labeled as MW-2A (as indicated by the chain of custody). Upon receiving updated sample collection information, MS/MSD sample containers were relabeled correctly as MW-8A. MS/MSD analyses were performed on correct corresponding sample containers of MW-2A. SK 7/19/19

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	462		10.0	1	07/08/2019 09:40	<a href="#">WG1306964</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.23	<u>T8</u>	1	07/06/2019 11:52	<a href="#">WG1306715</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-01 WG1306715: 8.23 at 21.9C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	8.82		1.00	1	07/09/2019 17:45	<a href="#">WG1308403</a>
Fluoride	0.230		0.100	1	07/09/2019 17:45	<a href="#">WG1308403</a>
Sulfate	86.3		5.00	1	07/09/2019 17:45	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/18/2019 21:51	<a href="#">WG1313705</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.110		0.00500	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Beryllium	ND		0.00200	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Boron	ND		0.200	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Cadmium	ND		0.00200	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Calcium	127	<u>V</u>	1.00	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Chromium	ND		0.0100	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Cobalt	ND		0.0100	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Lithium	0.0204		0.0150	1	07/19/2019 12:08	<a href="#">WG1313685</a>
Molybdenum	ND		0.00500	1	07/19/2019 12:08	<a href="#">WG1313685</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/18/2019 18:31	<a href="#">WG1313694</a>
Arsenic	ND		0.00200	1	07/18/2019 18:31	<a href="#">WG1313694</a>
Lead	ND		0.00200	1	07/18/2019 18:31	<a href="#">WG1313694</a>
Selenium	ND		0.00200	1	07/18/2019 18:31	<a href="#">WG1313694</a>
Thallium	ND		0.00200	1	07/18/2019 18:31	<a href="#">WG1313694</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	506		10.0	1	07/08/2019 09:40	<a href="#">WG1306964</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.23	<u>T8</u>	1	07/06/2019 11:52	<a href="#">WG1306715</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-02 WG1306715: 7.23 at 21.9C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	7.37		1.00	1	07/09/2019 18:45	<a href="#">WG1308403</a>
Fluoride	0.218		0.100	1	07/09/2019 18:45	<a href="#">WG1308403</a>
Sulfate	66.9		5.00	1	07/09/2019 18:45	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:03	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.162		0.00500	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Boron	ND		0.200	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Calcium	136		1.00	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Lithium	0.0239		0.0150	1	07/08/2019 21:16	<a href="#">WG1306330</a>
Molybdenum	ND		0.00500	1	07/08/2019 21:16	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:12	<a href="#">WG1306331</a>
Arsenic	0.00216		0.00200	1	07/08/2019 02:12	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:12	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:12	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:12	<a href="#">WG1306331</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	358		10.0	1	07/09/2019 12:49	<a href="#">WG1307665</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.56	T8	1	07/08/2019 10:11	<a href="#">WG1307144</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-03 WG1307144: 7.56 at 13.3C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	8.22		1.00	1	07/09/2019 19:44	<a href="#">WG1308403</a>
Fluoride	0.314		0.100	1	07/09/2019 19:44	<a href="#">WG1308403</a>
Sulfate	64.1		5.00	1	07/09/2019 19:44	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:05	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.112		0.00500	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Boron	ND		0.200	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Calcium	89.9		1.00	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Lithium	0.0177		0.0150	1	07/08/2019 21:19	<a href="#">WG1306330</a>
Molybdenum	ND		0.00500	1	07/08/2019 21:19	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:16	<a href="#">WG1306331</a>
Arsenic	ND		0.00200	1	07/08/2019 02:16	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:16	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:16	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:16	<a href="#">WG1306331</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	636		10.0	1	07/08/2019 09:40	<a href="#">WG1306964</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.25	<u>T8</u>	1	07/06/2019 11:52	<a href="#">WG1306715</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-04 WG1306715: 7.25 at 22.2C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	21.0		1.00	1	07/09/2019 20:03	<a href="#">WG1308403</a>
Fluoride	0.251		0.100	1	07/09/2019 20:03	<a href="#">WG1308403</a>
Sulfate	223		25.0	5	07/10/2019 08:20	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:08	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.201		0.00500	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Boron	1.06		0.200	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Calcium	105		1.00	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Lithium	0.0277		0.0150	1	07/08/2019 21:21	<a href="#">WG1306330</a>
Molybdenum	0.00524		0.00500	1	07/08/2019 21:21	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:30	<a href="#">WG1306331</a>
Arsenic	0.0128		0.00200	1	07/08/2019 02:30	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:30	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:30	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:30	<a href="#">WG1306331</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	520		10.0	1	07/09/2019 12:49	<a href="#">WG1307665</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.08	<u>T8</u>	1	07/06/2019 11:52	<a href="#">WG1306715</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-05 WG1306715: 7.08 at 22.1C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	22.1		1.00	1	07/09/2019 20:23	<a href="#">WG1308403</a>
Fluoride	0.317		0.100	1	07/09/2019 20:23	<a href="#">WG1308403</a>
Sulfate	154		25.0	5	07/10/2019 08:40	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:10	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.235		0.00500	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Boron	ND		0.200	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Calcium	90.9		1.00	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Lithium	0.0314		0.0150	1	07/08/2019 21:24	<a href="#">WG1306330</a>
Molybdenum	ND		0.00500	1	07/08/2019 21:24	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:35	<a href="#">WG1306331</a>
Arsenic	0.00957		0.00200	1	07/08/2019 02:35	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:35	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:35	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:35	<a href="#">WG1306331</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	490		10.0	1	07/09/2019 12:49	<a href="#">WG1307665</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.21	<u>T8</u>	1	07/08/2019 10:11	<a href="#">WG1307144</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-06 WG1307144: 7.21 at 16.3C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	10.5		1.00	1	07/09/2019 20:43	<a href="#">WG1308403</a>
Fluoride	0.231		0.100	1	07/09/2019 20:43	<a href="#">WG1308403</a>
Sulfate	82.0		5.00	1	07/09/2019 20:43	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:12	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.0740		0.00500	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Boron	ND		0.200	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Calcium	114		1.00	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Lithium	ND		0.0150	1	07/08/2019 21:26	<a href="#">WG1306330</a>
Molybdenum	ND		0.00500	1	07/08/2019 21:26	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:39	<a href="#">WG1306331</a>
Arsenic	ND		0.00200	1	07/08/2019 02:39	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:39	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:39	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:39	<a href="#">WG1306331</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	496		10.0	1	07/08/2019 09:40	<a href="#">WG1306964</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.71	<u>T8</u>	1	07/08/2019 10:11	<a href="#">WG1307144</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-07 WG1307144: 7.71 at 16.2C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	17.4		1.00	1	07/09/2019 21:01	<a href="#">WG1308403</a>
Fluoride	0.282		0.100	1	07/09/2019 21:01	<a href="#">WG1308403</a>
Sulfate	164		25.0	5	07/10/2019 09:00	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:15	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.0970		0.00500	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Boron	ND		0.200	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Calcium	88.0		1.00	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Lithium	0.0295		0.0150	1	07/08/2019 21:34	<a href="#">WG1306330</a>
Molybdenum	ND		0.00500	1	07/08/2019 21:34	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:44	<a href="#">WG1306331</a>
Arsenic	0.00324		0.00200	1	07/08/2019 02:44	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:44	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:44	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:44	<a href="#">WG1306331</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	942		20.0	1	07/08/2019 09:40	<a href="#">WG1306964</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	6.76	<u>T8</u>	1	07/08/2019 10:11	<a href="#">WG1307144</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-08 WG1307144: 6.76 at 15.4C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	2.54		1.00	1	07/09/2019 21:21	<a href="#">WG1308403</a>
Fluoride	0.155		0.100	1	07/09/2019 21:21	<a href="#">WG1308403</a>
Sulfate	172		25.0	5	07/10/2019 09:20	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:21	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.259		0.00500	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Boron	0.217		0.200	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Calcium	246		1.00	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Lithium	0.0635		0.0150	1	07/08/2019 21:37	<a href="#">WG1306330</a>
Molybdenum	ND		0.00500	1	07/08/2019 21:37	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:48	<a href="#">WG1306331</a>
Arsenic	0.0341		0.00200	1	07/08/2019 02:48	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:48	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:48	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:48	<a href="#">WG1306331</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	462		10.0	1	07/08/2019 09:40	<a href="#">WG1306964</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.17	<u>T8</u>	1	07/08/2019 10:11	<a href="#">WG1307144</a>

3 Ss

4 Cn

Sample Narrative:

L1115520-09 WG1307144: 7.17 at 17C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	8.96		1.00	1	07/09/2019 21:40	<a href="#">WG1308403</a>
Fluoride	0.229		0.100	1	07/09/2019 21:40	<a href="#">WG1308403</a>
Sulfate	87.2		5.00	1	07/09/2019 21:40	<a href="#">WG1308403</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/05/2019 12:24	<a href="#">WG1306165</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.107		0.00500	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Beryllium	ND		0.00200	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Boron	ND		0.200	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Cadmium	ND		0.00200	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Calcium	127		1.00	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Chromium	ND		0.0100	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Cobalt	ND		0.0100	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Lithium	0.0202		0.0150	1	07/08/2019 21:39	<a href="#">WG1306330</a>
Molybdenum	ND		0.00500	1	07/08/2019 21:39	<a href="#">WG1306330</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 02:53	<a href="#">WG1306331</a>
Arsenic	ND		0.00200	1	07/08/2019 02:53	<a href="#">WG1306331</a>
Lead	ND		0.00200	1	07/08/2019 02:53	<a href="#">WG1306331</a>
Selenium	ND		0.00200	1	07/08/2019 02:53	<a href="#">WG1306331</a>
Thallium	ND		0.00200	1	07/08/2019 02:53	<a href="#">WG1306331</a>



Method Blank (MB)

(MB) R3429526-1 07/08/19 09:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		2.82	10.0

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

L1115520-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1115520-08 07/08/19 09:40 • (DUP) R3429526-3 07/08/19 09:40

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	942	944	1	0.212		5

Laboratory Control Sample (LCS)

(LCS) R3429526-2 07/08/19 09:40

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8840	100	85.0-115	

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



Method Blank (MB)

(MB) R3429714-1 07/09/19 12:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		2.82	10.0

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

L1115281-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1115281-01 07/09/19 12:49 • (DUP) R3429714-3 07/09/19 12:49

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	728	731	1	0.366		5

<sup>4</sup>Cn

<sup>5</sup>Sr

Laboratory Control Sample (LCS)

(LCS) R3429714-2 07/09/19 12:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8970	102	85.0-115	

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



L1115171-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1115171-03 07/06/19 11:52 • (DUP) R3428109-2 07/06/19 11:52

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	8.29	8.30	1	0.121		1

Sample Narrative:

OS: 8.29 at 22.2C

DUP: 8.3 at 22.3C

L1115520-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1115520-05 07/06/19 11:52 • (DUP) R3428109-3 07/06/19 11:52

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.08	7.06	1	0.283		1

Sample Narrative:

OS: 7.08 at 22.1C

DUP: 7.06 at 22.2C

Laboratory Control Sample (LCS)

(LCS) R3428109-1 07/06/19 11:52

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
su	su		%	%	
pH	10.0	9.95	99.5	99.0-101	

Sample Narrative:

LCS: 9.95 at 22.8C

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



L1115844-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1115844-01 07/08/19 10:11 • (DUP) R3428336-3 07/08/19 10:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
pH	8.82	8.83	1	0.113		1

Sample Narrative:

OS: 8.82 at 19.6C  
DUP: 8.83 at 19.6C

Laboratory Control Sample (LCS)

(LCS) R3428336-1 07/08/19 10:11

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
pH	10.0	9.99	99.9	99.0-101	

Sample Narrative:

LCS: 9.99 at 22C

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



Method Blank (MB)

(MB) R3429185-1 07/09/19 13:24

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

L1115338-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1115338-08 07/09/19 16:25 • (DUP) R3429185-3 07/09/19 16:45

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	ND	0.775	1	0.000		15
Fluoride	ND	0.0963	1	0.000		15
Sulfate	ND	1.37	1	0.000		15

L1115712-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1115712-01 07/09/19 22:20 • (DUP) R3429185-6 07/09/19 22:39

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	1.21	1.24	1	2.52		15
Fluoride	0.299	0.299	1	0.167		15
Sulfate	ND	1.97	1	0.000		15

Laboratory Control Sample (LCS)

(LCS) R3429185-2 07/09/19 13:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	38.9	97.2	80.0-120	
Fluoride	8.00	8.11	101	80.0-120	
Sulfate	40.0	39.5	98.7	80.0-120	

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



L1115520-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115520-01 07/09/19 17:45 • (MS) R3429185-4 07/09/19 18:05 • (MSD) R3429185-5 07/09/19 18:25

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	8.82	59.6	59.5	102	101	1	80.0-120			0.191	15
Fluoride	5.00	0.230	5.24	5.24	100	100	1	80.0-120			0.0401	15
Sulfate	50.0	86.3	135	135	98.0	97.8	1	80.0-120	E	E	0.0886	15

L1115712-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1115712-01 07/09/19 22:20 • (MS) R3429185-7 07/09/19 23:39

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	1.21	51.4	100	1	80.0-120	
Fluoride	5.00	0.299	5.30	100	1	80.0-120	
Sulfate	50.0	ND	51.8	99.7	1	80.0-120	

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



Method Blank (MB)

(MB) R3427870-1 07/05/19 11:31

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

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

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

(LCS) R3427870-2 07/05/19 11:33 • (LCSD) R3427870-3 07/05/19 11:36

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Mercury	0.00300	0.00313	0.00312	104	104	80.0-120			0.231	20

L1115434-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115434-02 07/05/19 11:38 • (MS) R3427870-4 07/05/19 11:40 • (MSD) R3427870-5 07/05/19 11:43

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.00300	U	0.00301	0.00313	100	104	1	75.0-125			4.11	20

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3432121-1 07/18/19 21:43

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

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

(LCS) R3432121-2 07/18/19 21:46 • (LCSD) R3432121-3 07/18/19 21:48

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Mercury	0.00300	0.00313	0.00302	104	101	80.0-120			3.67	20

7 Gl

8 Al

L1115520-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115520-01 07/18/19 21:51 • (MS) R3432121-4 07/18/19 22:00 • (MSD) R3432121-5 07/18/19 22:02

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.00300	ND	0.00304	0.00309	101	103	1	75.0-125			1.79	20

9 Sc



Method Blank (MB)

(MB) R3428677-1 07/08/19 20:34

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Beryllium	U		0.000700	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.000700	0.00200
Calcium	U		0.0463	1.00
Chromium	U		0.00140	0.0100
Cobalt	U		0.00230	0.0100
Lithium	U		0.00530	0.0150
Molybdenum	U		0.00160	0.00500

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

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

(LCS) R3428677-2 07/08/19 20:36 • (LCSD) R3428677-3 07/08/19 20:38

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Barium	1.00	0.994	0.998	99.4	99.8	80.0-120			0.436	20
Beryllium	1.00	0.971	0.973	97.1	97.3	80.0-120			0.253	20
Boron	1.00	0.950	0.947	95.0	94.7	80.0-120			0.355	20
Cadmium	1.00	0.977	0.981	97.7	98.1	80.0-120			0.392	20
Calcium	10.0	9.58	9.70	95.8	97.0	80.0-120			1.27	20
Chromium	1.00	0.955	0.962	95.5	96.2	80.0-120			0.748	20
Cobalt	1.00	0.981	0.985	98.1	98.5	80.0-120			0.363	20
Lithium	1.00	0.960	0.962	96.0	96.2	80.0-120			0.196	20
Molybdenum	1.00	0.988	1.00	98.8	100	80.0-120			1.15	20

L1115620-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115620-12 07/08/19 20:41 • (MS) R3428677-5 07/08/19 20:46 • (MSD) R3428677-6 07/08/19 20:48

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Barium	1.00	0.860	1.85	1.84	99.4	98.0	1	75.0-125			0.743	20
Beryllium	1.00	ND	1.00	0.988	100	98.8	1	75.0-125			1.39	20
Boron	1.00	ND	1.07	1.08	98.7	100	1	75.0-125			1.33	20
Cadmium	1.00	ND	1.00	0.994	100	99.4	1	75.0-125			1.08	20
Calcium	10.0	92.9	102	101	86.3	80.6	1	75.0-125			0.567	20
Chromium	1.00	ND	0.973	0.959	97.3	95.9	1	75.0-125			1.47	20
Cobalt	1.00	ND	0.990	0.980	98.4	97.5	1	75.0-125			0.936	20
Lithium	1.00	ND	0.984	0.977	97.8	97.1	1	75.0-125			0.718	20
Molybdenum	1.00	ND	1.02	1.01	102	101	1	75.0-125			1.16	20



Method Blank (MB)

(MB) R3432407-1 07/19/19 12:00

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Beryllium	U		0.000700	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.000700	0.00200
Calcium	0.0468	↓	0.0463	1.00
Chromium	U		0.00140	0.0100
Cobalt	U		0.00230	0.0100
Lithium	U		0.00530	0.0150
Molybdenum	U		0.00160	0.00500

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

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

(LCS) R3432407-2 07/19/19 12:03 • (LCSD) R3432407-3 07/19/19 12:05

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Barium	1.00	1.03	1.04	103	104	80.0-120			0.663	20
Beryllium	1.00	0.997	0.998	99.7	99.8	80.0-120			0.138	20
Boron	1.00	1.01	1.01	101	101	80.0-120			0.399	20
Cadmium	1.00	0.995	1.00	99.5	100	80.0-120			0.845	20
Calcium	10.0	10.0	10.1	100	101	80.0-120			0.721	20
Chromium	1.00	0.992	1.00	99.2	100	80.0-120			0.793	20
Cobalt	1.00	1.02	1.03	102	103	80.0-120			0.842	20
Lithium	1.00	1.01	1.01	101	101	80.0-120			0.0413	20
Molybdenum	1.00	0.983	0.987	98.3	98.7	80.0-120			0.380	20

L1115520-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115520-01 07/19/19 12:08 • (MS) R3432407-5 07/19/19 12:14 • (MSD) R3432407-6 07/19/19 12:16

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Barium	1.00	0.110	1.14	1.15	103	104	1	75.0-125			0.536	20
Beryllium	1.00	ND	1.01	1.01	101	101	1	75.0-125			0.168	20
Boron	1.00	ND	1.13	1.14	104	105	1	75.0-125			0.870	20
Cadmium	1.00	ND	1.02	1.03	102	103	1	75.0-125			0.613	20
Calcium	10.0	127	135	134	71.7	70.1	1	75.0-125	↓	↓	0.122	20
Chromium	1.00	ND	0.996	1.01	99.6	101	1	75.0-125			1.28	20
Cobalt	1.00	ND	1.04	1.05	104	104	1	75.0-125			0.498	20
Lithium	1.00	0.0204	1.06	1.05	104	103	1	75.0-125			0.325	20
Molybdenum	1.00	ND	0.997	1.00	99.7	100	1	75.0-125			0.795	20



Method Blank (MB)

(MB) R3428291-1 07/08/19 00:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Lead	U		0.000240	0.00200
Selenium	U		0.000380	0.00200
Thallium	U		0.000190	0.00200

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

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

(LCS) R3428291-2 07/08/19 00:45 • (LCSD) R3428291-3 07/08/19 00:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	0.0550	0.0552	110	110	80.0-120			0.398	20
Arsenic	0.0500	0.0493	0.0502	98.6	100	80.0-120			1.78	20
Lead	0.0500	0.0476	0.0471	95.2	94.2	80.0-120			1.11	20
Selenium	0.0500	0.0514	0.0504	103	101	80.0-120			1.90	20
Thallium	0.0500	0.0467	0.0466	93.5	93.2	80.0-120			0.268	20

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

L1115292-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115292-01 07/08/19 00:54 • (MS) R3428291-5 07/08/19 01:03 • (MSD) R3428291-6 07/08/19 01:08

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	U	0.0553	0.0549	111	110	1	75.0-125			0.822	20
Arsenic	0.0500	0.00466	0.0513	0.0514	93.3	93.5	1	75.0-125			0.151	20
Lead	0.0500	0.000265	0.0476	0.0478	94.7	95.1	1	75.0-125			0.375	20
Selenium	0.0500	0.00390	0.0547	0.0523	102	96.9	1	75.0-125			4.42	20
Thallium	0.0500	U	0.0469	0.0474	93.9	94.9	1	75.0-125			1.09	20



Method Blank (MB)

(MB) R3432106-1 07/18/19 18:17

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Lead	U		0.000240	0.00200
Selenium	U		0.000380	0.00200
Thallium	U		0.000190	0.00200

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

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

(LCS) R3432106-2 07/18/19 18:22 • (LCSD) R3432106-3 07/18/19 18:26

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	0.0510	0.0513	102	103	80.0-120			0.488	20
Arsenic	0.0500	0.0515	0.0521	103	104	80.0-120			1.17	20
Lead	0.0500	0.0494	0.0519	98.8	104	80.0-120			4.97	20
Selenium	0.0500	0.0522	0.0507	104	101	80.0-120			2.98	20
Thallium	0.0500	0.0483	0.0510	96.6	102	80.0-120			5.44	20

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

L1115520-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115520-01 07/18/19 18:31 • (MS) R3432106-5 07/18/19 18:40 • (MSD) R3432106-6 07/18/19 18:44

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	ND	0.0519	0.0512	104	102	1	75.0-125			1.36	20
Arsenic	0.0500	ND	0.0522	0.0529	102	103	1	75.0-125			1.31	20
Lead	0.0500	ND	0.0503	0.0522	100	104	1	75.0-125			3.77	20
Selenium	0.0500	ND	0.0511	0.0505	102	101	1	75.0-125			1.26	20
Thallium	0.0500	ND	0.0495	0.0506	98.6	101	1	75.0-125			2.16	20



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.  
 \* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

## State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1,6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

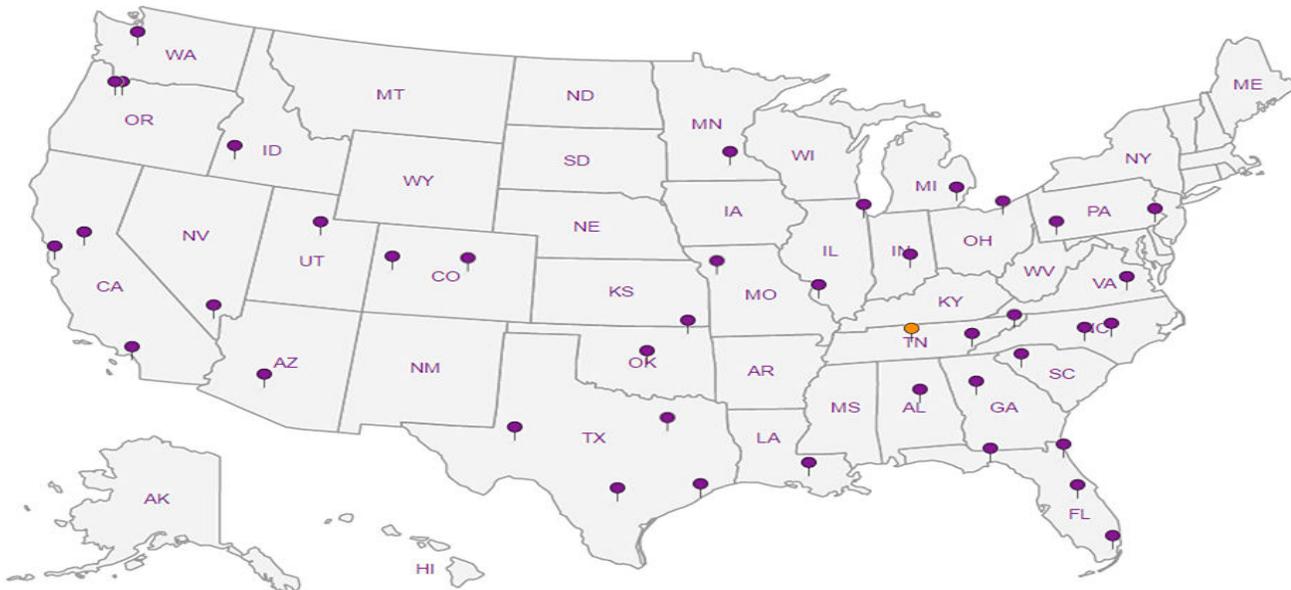
## Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

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

## Our Locations

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



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

# Kansas City Board of Public Utilities

300 N 65th Street  
Kansas City, KS 66102

Report to:  
**Ingrid Setzler**

Project  
Description: **GW-Creek Bottom Ash Pond**

Phone: **913-573-9806**  
Fax: **913-573-9838**

Client Project #  
**KCBPU Nearman**

City/State Collected:  
Lab Project #  
**KCKAN02-MW NEARMAN2**

Collected by (print):  
**Jonathan Thompson Nearman - BPU**

Site/Facility ID #

P.O. #

Collected by (signature):  
*Jonathan Thompson*

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

Quote #  
Date Results Needed

Immediately  
Packed on Ice N  Y

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres
MW-2A / 6W01	Grab	GW	-	7-1-19	1525	3	X	X	X
MW-3 / 6W01	Grab	GW	-	7-1-19	1645	3	X	X	X
MW-4 / 6W01	Grab	GW	-	7-2-19	0945	3	X	X	X
MW-8A / 6W01	Grab	GW	-	7-1-19	1405	3	X	X	X
<del>MW-10 / 6W01</del>	<del>Grab</del>	<del>GW</del>	<del>-</del>	<del>7-1-19</del>	<del>1405</del>	<del>3</del>	<del>X</del>	<del>X</del>	<del>X</del>
MW-13 / 6W01	Grab	GW	-	7-2-19	1220	3	X	X	X
MW-14 / 6W01	Grab	GW	-	7-2-19	0810	3	X	X	X
MW-15 / 6W01	Grab	GW	-	7-1-19	1215	3	X	X	X
MW-16 / 6W01	Grab	GW	-	7-1-19	0900	3	X	X	X
DUP-1 / 6W01	Grab	GW	-	7-1-19	-	3	X	X	X

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

Remarks: **Appendix III + IV**

**RAD SCREEN: <0.5 mR/hr**

pH \_\_\_\_\_ Temp \_\_\_\_\_

Flow \_\_\_\_\_ Other \_\_\_\_\_

Samples returned via:  
 UPS  FedEx  Courier **XSWA**

Tracking #

Relinquished by: (Signature)

Date: **7-2-19**  
Time: **1630**

Received by: (Signature)

Trip Blank Received: Yes/No  
 HCL / MeOH  
 TBR

Relinquished by: (Signature)

Date: **7-2-19**  
Time: **1830**

Received by: (Signature)

Temp: **43.8F** °C  
**4.3 + 3 = 9.6**  
 Bottles Received: **42**

Relinquished by: (Signature)

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received for lab by: (Signature)

Date: **7/3/19** Time: **0800**

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

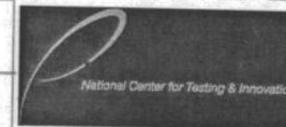
If preservation required by Login: Date/Time

Hold:

Condition:  NCF  DW

Analysis / Container / Preservative

Chain of Custody Page \_\_\_ of \_\_\_



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



L# **1115520**

Table # **F252**

Acctnum: **KCKAN02**

Template: **T109043**

Prelogin: **P708151**

TSR: **650 - Linda Cashman**

PB:

Shipped Via: **FedEX Ground**

Remarks Sample # (lab only)

-01  
-02  
-03  
-04  
-05  
-06  
-07  
-08  
-09

# Kansas City Board of Public Utilities

300 N 65th Street  
Kansas City, KS 66102

Billing Information:  
300 N 65th St  
Kansas City, KS 66102

Report to:  
**Ingrid Setzler**

Email To:  
isetzler@bpu.com; kbrown@bpu.com; bhoye@burn

Project  
Description: **GW-Creek Bottom Ash Pond**

City/State  
Collected:

Phone: **913-573-9806**  
Fax: **913-573-9838**

Client Project #  
**KCBPU Nearman**

Lab Project #  
**KCKAN02-MW NEARMAN2**

Collected by (print):  
*Jonathan Harmon*

Site/Facility ID #  
*Newman-BPU*

P.O. #

Collected by (signature):  
*Justin Harmon*

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

Quote #  
Date Results Needed

Immediately  
Packed on Ice N  Y

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres						
DUP-2/6W01	Grab	GW	-	7-2-19	-	3	X	X	X						
MS- MW-2A/6worms	Grab	GW	-	7-1-19	1405	3	X	X	X						
MS-D- MW-2A/6worms	Grab	GW	-	7-1-19	1405	3	X	X	X						
<del>MO RIVER</del>		GW				3	X	X	X						
Floodwater 1	Grab	GW	-	7-2-19	0825	3	X	X	X						
Floodwater 2	Grab	GW	-	7-2-19	0920	3	X	X	X						
<i>Justin Harmon</i>															

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

Remarks: **Appendix III + IV**

Samples returned via:  
 UPS  FedEx  Courier **X SWA**

**RAD SCREEN: <0.5 mR/hr**

pH \_\_\_\_\_ Temp \_\_\_\_\_  
 Flow \_\_\_\_\_ Other \_\_\_\_\_

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

Relinquished by: (Signature) *Justin Harmon* Date: **7-2-19** Time: **1630**  
 Relinquished by: (Signature) *Sam Hill* Date: **7-2-19** Time: **1830**  
 Relinquished by: (Signature) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received by: (Signature) *Sam Hill* Trip Blank Received: Yes  No   
 Received by: (Signature) \_\_\_\_\_ HCL / MeOH TBR  
 Temp: **4.3 to 4.6** °C Bottles Received: **42**  
 Received for lab by: (Signature) *Mc Farris* Date: **7/3/19** Time: **0800**

If preservation required by Login: Date/Time  
 Hold: \_\_\_\_\_ Condition:  NCF  OK

Analysis / Container / Preservative										Chain of Custody Page ___ of ___	
										 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859	
										L # <b>1115520</b>	
										Table #	
										Acctnum: <b>KCKAN02</b>	
										Template: <b>T109043</b>	
										Prelogin: <b>P708151</b>	
										TSR: <b>650 - Linda Cashman</b>	
										PB:	
										Shipped Via: <b>FedEX Ground</b>	
										Remarks	Sample # (lab only)
										<b>HOLD</b>	
											<b>-04</b>
											<b>-04</b>
											<b>Jan</b>
										<b>HOLD</b>	
										<b>HOLD</b>	

Alexandra S. Murtaugh



Login #:L1115520	Client:KCKAN02	Date:07/03/19	Evaluated by:AM
------------------	----------------	---------------	-----------------

**Non-Conformance (check applicable items)**

Sample Integrity	Chain of Custody Clarification	If Broken Container:
Parameter(s) past holding time	x Login Clarification Needed	Insufficient packing material around container
Temperature not in range	Chain of custody is incomplete	Insufficient packing material inside cooler
Improper container type	Please specify Metals requested.	Improper handling by carrier (FedEx / UPS / Courier)
pH not in range.	Please specify TCLP requested.	Sample was frozen
Insufficient sample volume.	Received additional samples not listed on coc.	Container lid not intact
Sample is biphasic.	Sample ids on containers do not match ids on coc	<b>If no Chain of Custody:</b>
Vials received with headspace.	Trip Blank not received.	Received by:
Broken container	Client did not "X" analysis.	Date/Time:
Broken container:	Chain of Custody is missing	Temp./Cont Rec./pH:
Sufficient sample remains		Carrier:
		Tracking#

**Login Comments: MS/MSD samples are labeled as MW-8A 07/01/19 @1405, but on COC MS/MSD samples are MW-2A with date and time of MW-8A**

Client informed by:	Call	X	Email	Voice Mail	Date: 7/3/19	Time: 20:05
TSR Initials: SK	Client Contact: Jonathan Hermanson					

**Login Instructions:**

The MS/MSD samples are MW-2A, collected 7/1/19 @ 1405, as noted on the CoC. Please follow the CoC for labeling.

## Kansas City Board of Public Utilities

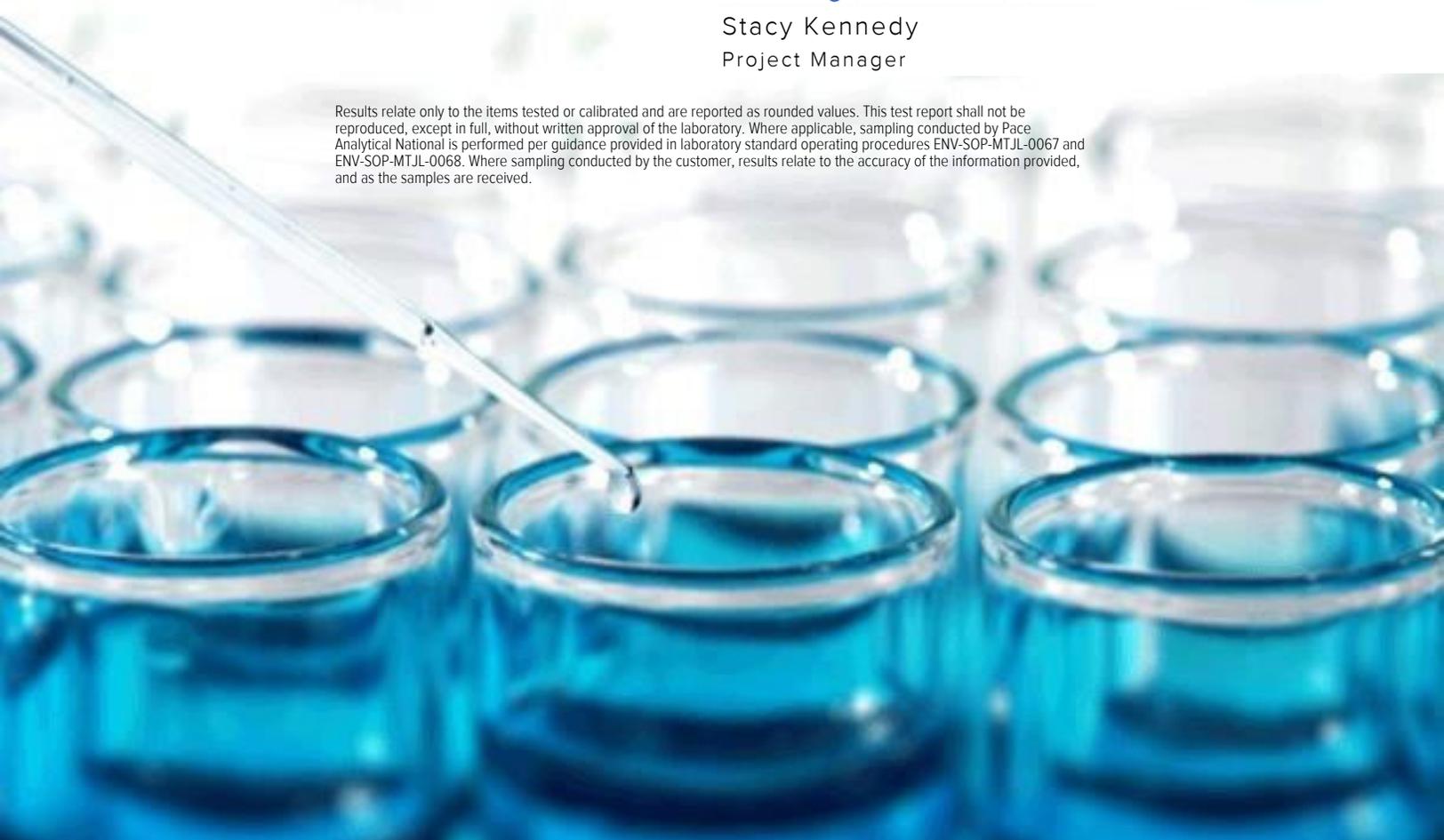
Sample Delivery Group: L1115755  
Samples Received: 07/03/2019  
Project Number: 62801 BPU Nearman  
Description: groundwater  
Site: NEARMAN-BP9  
Report To: Ingrid Setzler  
300 N 65th Street  
Kansas City, KS 66102

Entire Report Reviewed By:



Stacy Kennedy  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.





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<b>Ss: Sample Summary</b>	<b>3</b>	
<b>Cn: Case Narrative</b>	<b>5</b>	
<b>Sr: Sample Results</b>	<b>6</b>	
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MW-8A/GW01 L1115755-04	9	
MW-13/GW01 L1115755-05	10	
MW-14/GW01 L1115755-06	11	
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<b>Al: Accreditations &amp; Locations</b>	<b>18</b>	
<b>Sc: Sample Chain of Custody</b>	<b>19</b>	

# SAMPLE SUMMARY



## MW-2A/GW01 L1115755-01 Non-Potable Water

Collected by Jonathan Hermanson  
 Collected date/time 07/01/19 15:25  
 Received date/time 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/21/19 17:11	RGT	Mt. Juliet, TN

1 Cp

2 Tc

3 Ss

## MW-3/GW01 L1115755-02 Non-Potable Water

Collected by Jonathan Hermanson  
 Collected date/time 07/01/19 16:45  
 Received date/time 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/21/19 17:11	RGT	Mt. Juliet, TN

4 Cn

5 Sr

6 Qc

## MW-4/GW01 L1115755-03 Non-Potable Water

Collected by Jonathan Hermanson  
 Collected date/time 07/02/19 09:45  
 Received date/time 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/21/19 17:11	RGT	Mt. Juliet, TN

7 Gl

8 Al

9 Sc

## MW-8A/GW01 L1115755-04 Non-Potable Water

Collected by Jonathan Hermanson  
 Collected date/time 07/01/19 14:05  
 Received date/time 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/21/19 17:11	RGT	Mt. Juliet, TN

## MW-13/GW01 L1115755-05 Non-Potable Water

Collected by Jonathan Hermanson  
 Collected date/time 07/02/19 12:20  
 Received date/time 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/23/19 11:00	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/20/19 11:38	RGT	Mt. Juliet, TN

## MW-14/GW01 L1115755-06 Non-Potable Water

Collected by Jonathan Hermanson  
 Collected date/time 07/02/19 08:10  
 Received date/time 07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/19/19 12:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/20/19 11:38	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/20/19 11:38	RGT	Mt. Juliet, TN

# SAMPLE SUMMARY

## MW-15/GW01 L1115755-07 Non-Potable Water

Collected by  
Jonathan  
Hermanson  
Collected date/time  
07/01/19 12:15  
Received date/time  
07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/19/19 12:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/20/19 11:38	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/20/19 11:38	RGT	Mt. Juliet, TN

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc

## MW-16/GW01 L1115755-08 Non-Potable Water

Collected by  
Jonathan  
Hermanson  
Collected date/time  
07/01/19 09:00  
Received date/time  
07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/19/19 12:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/20/19 11:38	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/20/19 11:38	RGT	Mt. Juliet, TN

## DUP-1/GW01 L1115755-09 Non-Potable Water

Collected by  
Jonathan  
Hermanson  
Collected date/time  
07/01/19 00:00  
Received date/time  
07/03/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1311371	1	07/15/19 09:22	07/19/19 12:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1313506	1	07/18/19 15:13	07/20/19 11:38	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1313506	1	07/18/19 15:13	07/20/19 11:38	RGT	Mt. Juliet, TN



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Stacy Kennedy  
Project Manager

Project Narrative

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Per attached nonconformance form, MS/MSD containers were initially labeled as MW-2A (as indicated by the chain of custody). Upon receiving updated sample collection information, MS/MSD sample containers were relabeled correctly as MW-8A. MS/MSD analyses were performed on corrected corresponding sample containers of MW-8A. SK 7/19/19

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



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.140		0.464	0.948	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Barium	85.4			62.0-143	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Yttrium	87.3			79.0-136	07/23/2019 11:00	<a href="#">WG1311371</a>

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.318		0.677	1.24	07/23/2019 11:00	<a href="#">WG1313506</a>

<sup>6</sup> Qc

<sup>7</sup> Gl

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.178		0.213	0.293	07/21/2019 17:11	<a href="#">WG1313506</a>
(T) Barium-133	86.3			30.0-143	07/21/2019 17:11	<a href="#">WG1313506</a>

<sup>8</sup> Al

<sup>9</sup> Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	1.89		0.563	0.964	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Barium	99.5			62.0-143	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Yttrium	90.6			79.0-136	07/23/2019 11:00	<a href="#">WG1311371</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	2.07		0.786	1.28	07/23/2019 11:00	<a href="#">WG1313506</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.182		0.223	0.312	07/21/2019 17:11	<a href="#">WG1313506</a>
(T) Barium-133	82.9			30.0-143	07/21/2019 17:11	<a href="#">WG1313506</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	1.52		0.404	0.778	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Barium	86.4			62.0-143	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Yttrium	90.7			79.0-136	07/23/2019 11:00	<a href="#">WG1311371</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.66		0.574	1.01	07/23/2019 11:00	<a href="#">WG1313506</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.142		0.170	0.234	07/21/2019 17:11	<a href="#">WG1313506</a>
(T) Barium-133	98.1			30.0-143	07/21/2019 17:11	<a href="#">WG1313506</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.0157		0.437	0.752	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Barium	95.2			62.0-143	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Yttrium	93.8			79.0-136	07/23/2019 11:00	<a href="#">WG1311371</a>

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.107		0.564	0.938	07/23/2019 11:00	<a href="#">WG1313506</a>

<sup>4</sup> Cn

<sup>5</sup> Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.0916		0.127	0.186	07/21/2019 17:11	<a href="#">WG1313506</a>
(T) Barium-133	90.1			30.0-143	07/21/2019 17:11	<a href="#">WG1313506</a>

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	1.08		0.423	0.705	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Barium	97.8			62.0-143	07/23/2019 11:00	<a href="#">WG1311371</a>
(T) Yttrium	102			79.0-136	07/23/2019 11:00	<a href="#">WG1311371</a>

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.18		0.567	0.93	07/23/2019 11:00	<a href="#">WG1313506</a>

<sup>6</sup> Qc

<sup>7</sup> Gl

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.0931		0.144	0.225	07/20/2019 11:38	<a href="#">WG1313506</a>
(T) Barium-133	90.7			30.0-143	07/20/2019 11:38	<a href="#">WG1313506</a>

<sup>8</sup> Al

<sup>9</sup> Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.579		0.395	0.669	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Barium	91.5			62.0-143	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Yttrium	99.2			79.0-136	07/19/2019 12:35	<a href="#">WG1311371</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.690		0.549	0.894	07/20/2019 11:38	<a href="#">WG1313506</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.112		0.154	0.225	07/20/2019 11:38	<a href="#">WG1313506</a>
(T) Barium-133	92.0			30.0-143	07/20/2019 11:38	<a href="#">WG1313506</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.173		0.371	0.642	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Barium	88.6			62.0-143	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Yttrium	100			79.0-136	07/19/2019 12:35	<a href="#">WG1311371</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.219		0.602	1.03	07/20/2019 11:38	<a href="#">WG1313506</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.0466		0.231	0.383	07/20/2019 11:38	<a href="#">WG1313506</a>
(T) Barium-133	80.5			30.0-143	07/20/2019 11:38	<a href="#">WG1313506</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	1.37		0.392	0.639	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Barium	87.9			62.0-143	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Yttrium	95.5			79.0-136	07/19/2019 12:35	<a href="#">WG1311371</a>

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.69		0.628	0.864	07/20/2019 11:38	<a href="#">WG1313506</a>

<sup>4</sup> Cn

<sup>5</sup> Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.326		0.236	0.225	07/20/2019 11:38	<a href="#">WG1313506</a>
(T) Barium-133	88.7			30.0-143	07/20/2019 11:38	<a href="#">WG1313506</a>

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.269		0.448	0.668	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Barium	97.4			62.0-143	07/19/2019 12:35	<a href="#">WG1311371</a>
(T) Yttrium	93.1			79.0-136	07/19/2019 12:35	<a href="#">WG1311371</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.396		0.699	1.04	07/20/2019 11:38	<a href="#">WG1313506</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.127		0.251	0.374	07/20/2019 11:38	<a href="#">WG1313506</a>
(T) Barium-133	87.8			30.0-143	07/20/2019 11:38	<a href="#">WG1313506</a>

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3434556-1 07/23/19 11:00

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	0.296		0.504
(T) Barium	88.5		
(T) Yttrium	88.6		

L1115755-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1115755-02 07/23/19 11:00 • (DUP) R3434556-5 07/23/19 11:00

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	1.89	1.25	1	40.3	0.771		20	3
(T) Barium	99.5	93.8						
(T) Yttrium	90.6	91.4						

Laboratory Control Sample (LCS)

(LCS) R3434556-2 07/23/19 11:00

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	4.97	99.5	80.0-120	
(T) Barium			89.7		
(T) Yttrium			86.4		

L1115755-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115755-04 07/23/19 11:00 • (MS) R3434556-3 07/23/19 11:00 • (MSD) R3434556-4 07/23/19 11:00

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	10.0	0.0157	10.8	11.0	108	110	1	70.0-130			1.65		20
(T) Barium		95.2			101	103							
(T) Yttrium		93.8			84.9	91.2							

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3432866-1 07/21/19 17:11

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	0.0483		0.0716
(T) Barium-133	80.0		

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1119502-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1119502-01 07/20/19 11:38 • (DUP) R3432866-5 07/21/19 17:11

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
Radium-226	1.02	1.15	1	11.6	0.209		20	3
(T) Barium-133	96.4	90.7						

Laboratory Control Sample (LCS)

(LCS) R3432866-2 07/21/19 17:11

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	5.67	113	80.0-120	
(T) Barium-133			90.8		

L1115755-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115755-04 07/21/19 17:11 • (MS) R3432866-3 07/21/19 17:11 • (MSD) R3432866-4 07/21/19 17:11

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.1	0.0916	19.5	21.3	96.7	105	1	75.0-125			8.67		20
(T) Barium-133		90.1			91.4	86.0							



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

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

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Qualifier Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.  
 \* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

## State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1,6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

## Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

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

## Our Locations

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



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



115755

# Kansas City Board of Public Utilities

300 N 5th Street  
Kansas City, KS 66102

Billing Information:  
Attn: Ellen Bouse  
300 N 65th Street  
Kansas City, KS 66102

Report to:  
Ingrid Setzler

Email To:  
isetzler@bpu.com; kbrown@bpu.com; bhoeye@burn

Project Description: groundwater

City/State Collected:

Phone: 913-573-9806  
Fax:

Client Project #  
62801 BPU Nearman

Lab Project #  
KCKAN02-MW NEARMAN

Collected by (print):  
Jonathan Hermanson

Site/Facility ID #  
Nearman-BPU

P.O. #

Collected by (signature):  
Jonathan Hermanson

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

Quote #  
Date Results Needed

Immediately Packed on Ice N Y

No. of Cntrs

Total Rad, RA226, RA228 1L-HDPE-Add HNO3

Analysis / Container / Preservative

Chain of Custody Page \_\_\_ of \_\_\_



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



L# 1110922

Table #

Acctnum: KCKAN02  
Template: T150051  
Prelogin: P708150  
TSR: 650 - Linda Cashman  
PB:

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs		Remarks	Sample # (lab only)
DUP-2 / bwo1	Grab	NPW	-	7-2-19	-	3	X		10
MW-2A / bwo1MS	Grab	NPW	-	7-1-19	1405	3	X		01
MW-2A / bwo1MSD	Grab	NPW	-	7-1-19	1405	3	X		01
Floodwater 1	Grab	NPW	-	7-2-19	0825	3	X		11
Floodwater 2	Grab	NPW	-	7-2-19	0920	3	X		12

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

Remarks:

Samples returned via:  
UPS FedEx Courier SVA

RAD SCREEN: <0.5 mR/hr

pH Temp  
Flow Other

Sample Receipt Checklist

COC Seal Present/Intact:  NP  Y  N

COC Signed/Accurate:  Y  N

Bottles arrive intact:  Y  N

Correct bottles used:  Y  N

Sufficient volume sent:  Y  N

If Applicable

VOA Zero Headpace:  Y  N

Preservation Correct/Checked:  Y  N

Relinquished by: (Signature) Jonathan Hermanson	Date: 7-2-19	Time: 1630	Received by: (Signature) [Signature]	Trip Blank Received: Yes (No) HCL / MeOH TBR
Relinquished by: (Signature) [Signature]	Date: 7-2-19	Time: 1830	Received by: (Signature) [Signature]	Temp: °C Bottles Received: 42
Relinquished by: (Signature) [Signature]	Date:	Time:	Received for lab by: (Signature) [Signature]	Date: 7/3/19 Time: 0800

If preservation required by Login: Date/Time

Hold: Condition: NCF 16K

**Kelsey Stephenson**



Login #:L1115755	Client:KCKANE02	Date:07/03	Evaluated by:Kelsey S
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**Non-Conformance (check applicable items)**

Sample Integrity	Chain of Custody Clarification	If Broken Container:
Parameter(s) past holding time	Login Clarification Needed	Insufficient packing material around container
Temperature not in range	Chain of custody is incomplete	Insufficient packing material inside cooler
Improper container type	Please specify Metals requested.	Improper handling by carrier (FedEx / UPS / Courier)
pH not in range.	Please specify TCLP requested.	Sample was frozen
Insufficient sample volume.	Received additional samples not listed on coc.	Container lid not intact
Sample is biphasic.	Sample ids on containers do not match ids on coc	<b>If no Chain of Custody:</b>
Vials received with headspace.	Trip Blank not received.	Received by:
Broken container	Client did not "X" analysis.	Date/Time:
Broken container:	Chain of Custody is missing	Temp./Cont. Rec./pH:
Sufficient sample remains		Carrier:
		Tracking#

**Login Comments: The only MW-8A samples we received have MW-8A/GW01MS on the container. We also received the MW-2A/GW01 MS/MSD and the parent containers as well**

Client informed by:	Call	X	Email	Voice Mail	Date: 7/3/19	Time: 20:16
TSR Initials: SK	Client Contact: Jonathan Hermanson					

**Login Instructions:**

Please disregard the "MS" label on the MW-8A bottles. Only MW-2A should have MS bottles. Please follow the CoC for correct labeling.

## Kansas City Board of Public Utilities

Sample Delivery Group: L1116030  
Samples Received: 07/06/2019  
Project Number: KCBPU Nearman  
Description: GW-Creek Bottom Ash Pond

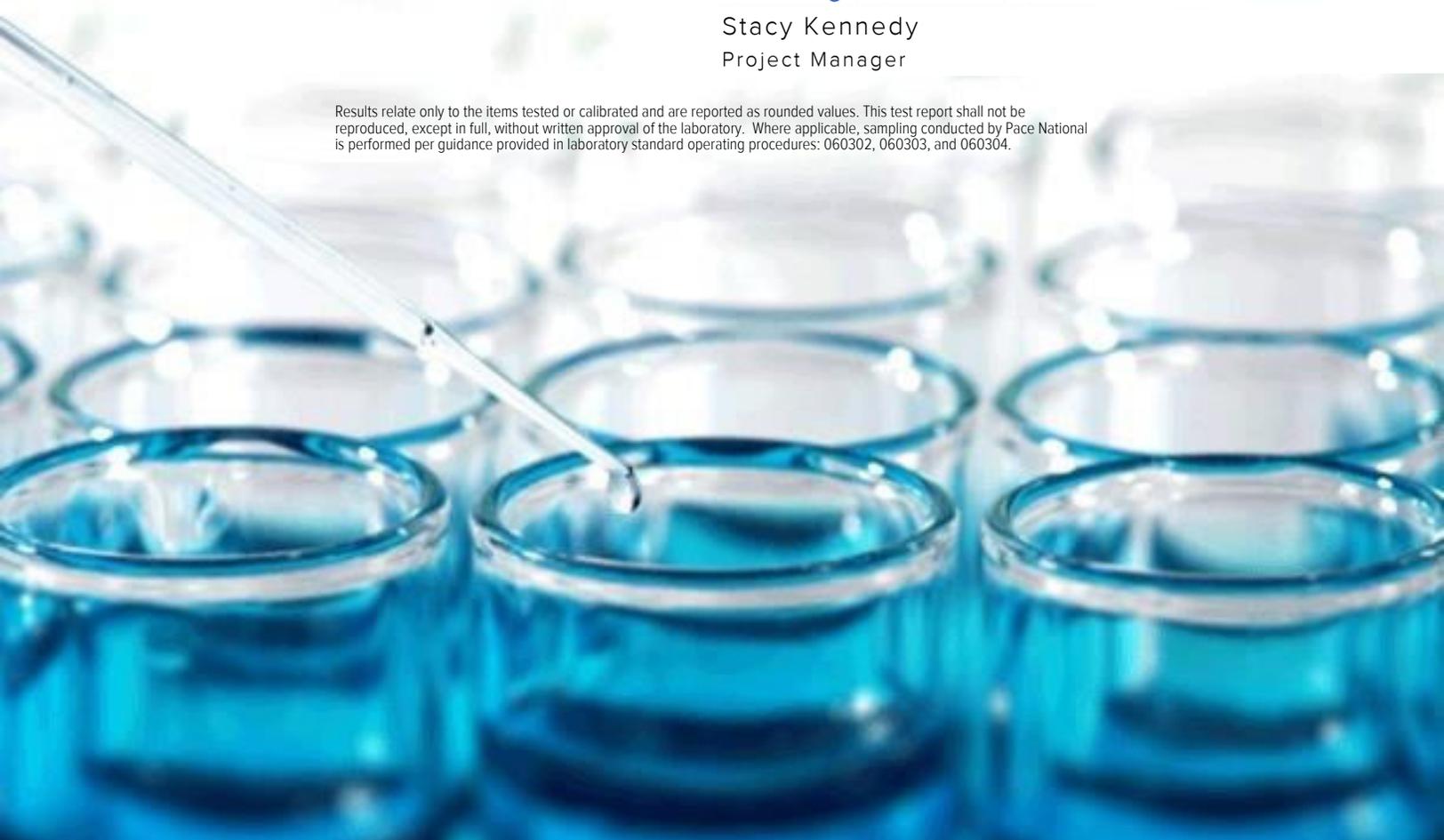
Report To: Ingrid Setzler  
300 N 65th Street  
Kansas City, KS 66102

Entire Report Reviewed By:



Stacy Kennedy  
Project Manager

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





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# SAMPLE SUMMARY



MW-10/GW01 L1116030-01 GW

Collected by: Jonathan Hermanson  
 Collected date/time: 07/03/19 10:05  
 Received date/time: 07/06/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1308068	1	07/09/19 12:05	07/09/19 13:34	AEC	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1307663	1	07/08/19 11:48	07/08/19 11:48	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1310272	1	07/12/19 16:44	07/12/19 16:44	LDC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1310272	5	07/13/19 08:47	07/13/19 08:47	LDC	Mt. Juliet, TN
Mercury by Method 7470A	WG1307472	1	07/08/19 11:39	07/08/19 21:54	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1308004	1	07/09/19 09:38	07/10/19 00:37	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1307618	1	07/07/19 22:44	07/08/19 14:18	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1307618	1	07/07/19 22:44	07/08/19 15:16	JPD	Mt. Juliet, TN

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



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

Stacy Kennedy  
Project Manager

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	441		10.0	1	07/09/2019 13:34	<a href="#">WG1308068</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.47	<u>T8</u>	1	07/08/2019 11:48	<a href="#">WG1307663</a>

3 Ss

4 Cn

Sample Narrative:

L1116030-01 WG1307663: 7.47 at 16.7C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	11.3		1.00	1	07/12/2019 16:44	<a href="#">WG1310272</a>
Fluoride	0.260		0.100	1	07/12/2019 16:44	<a href="#">WG1310272</a>
Sulfate	104		25.0	5	07/13/2019 08:47	<a href="#">WG1310272</a>

6 Qc

7 Gl

8 Al

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	07/08/2019 21:54	<a href="#">WG1307472</a>

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.0725		0.00500	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Beryllium	ND		0.00200	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Boron	ND		0.200	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Cadmium	ND		0.00200	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Calcium	101		1.00	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Chromium	ND		0.0100	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Cobalt	ND		0.0100	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Lithium	0.0165		0.0150	1	07/10/2019 00:37	<a href="#">WG1308004</a>
Molybdenum	ND		0.00500	1	07/10/2019 00:37	<a href="#">WG1308004</a>

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	07/08/2019 15:16	<a href="#">WG1307618</a>
Arsenic	0.00228		0.00200	1	07/08/2019 14:18	<a href="#">WG1307618</a>
Lead	ND		0.00200	1	07/08/2019 14:18	<a href="#">WG1307618</a>
Selenium	0.00922		0.00200	1	07/08/2019 14:18	<a href="#">WG1307618</a>
Thallium	ND		0.00200	1	07/08/2019 14:18	<a href="#">WG1307618</a>



Method Blank (MB)

(MB) R3429495-1 07/09/19 13:34

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Dissolved Solids	U		2.82	10.0

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

L1114054-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1114054-10 07/09/19 13:34 • (DUP) R3429495-3 07/09/19 13:34

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	988	993	1	0.505		5

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS)

(LCS) R3429495-2 07/09/19 13:34

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Dissolved Solids	8800	8910	101	85.0-115	



L1115954-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1115954-01 07/08/19 11:48 • (DUP) R3428422-2 07/08/19 11:48

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.24	8.25	1	0.121		1

Sample Narrative:

OS: 8.24 at 16.1C  
DUP: 8.25 at 15.5C

L1116134-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1116134-02 07/08/19 11:48 • (DUP) R3428422-3 07/08/19 11:48

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	9.39	9.37	1	0.213		1

Sample Narrative:

OS: 9.39 at 13C  
DUP: 9.37 at 14.9C

Laboratory Control Sample (LCS)

(LCS) R3428422-1 07/08/19 11:48

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	9.99	99.9	99.0-101	

Sample Narrative:

LCS: 9.99 at 22.4C

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3430294-1 07/12/19 09:34

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	0.178	↓	0.0774	5.00

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

L1116030-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1116030-01 07/12/19 16:44 • (DUP) R3430294-3 07/12/19 16:59

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	11.3	11.4	1	0.980		15
Fluoride	0.260	0.259	1	0.386		15

L1117644-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1117644-07 07/12/19 20:57 • (DUP) R3430294-6 07/12/19 21:12

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	2.10	2.12	1	0.830		15
Fluoride	0.138	0.138	1	0.145		15
Sulfate	49.2	49.0	1	0.350		15

L1116030-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1116030-01 07/13/19 08:47 • (DUP) R3430294-8 07/13/19 09:02

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	104	105	5	0.479		15

Laboratory Control Sample (LCS)

(LCS) R3430294-2 07/12/19 09:49

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Chloride	40.0	39.2	98.0	80.0-120	
Fluoride	8.00	8.19	102	80.0-120	
Sulfate	40.0	41.2	103	80.0-120	



L1116030-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1116030-01 07/12/19 16:44 • (MS) R3430294-4 07/12/19 17:14 • (MSD) R3430294-5 07/12/19 17:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	11.3	61.6	61.6	101	100	1	80.0-120			0.0690	15
Fluoride	5.00	0.260	5.29	5.30	101	101	1	80.0-120			0.0548	15

L1117644-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L1117644-07 07/12/19 20:57 • (MS) R3430294-7 07/12/19 21:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	2.10	52.6	101	1	80.0-120	
Fluoride	5.00	0.138	5.16	101	1	80.0-120	

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



Method Blank (MB)

(MB) R3428657-1 07/08/19 21:27

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

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

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

(LCS) R3428657-2 07/08/19 21:29 • (LCSD) R3428657-3 07/08/19 21:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.00296	0.00290	98.8	96.6	80.0-120			2.28	20

L1115982-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115982-02 07/08/19 21:38 • (MS) R3428657-4 07/08/19 21:40 • (MSD) R3428657-5 07/08/19 21:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00223	0.00186	74.3	61.9	1	75.0-125	<u>J6</u>	<u>J6</u>	18.2	20

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



Method Blank (MB)

(MB) R3429131-1 07/10/19 03:00

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Beryllium	U		0.000700	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.000700	0.00200
Calcium	U		0.0463	1.00
Chromium	U		0.00140	0.0100
Cobalt	U		0.00230	0.0100
Lithium	U		0.00530	0.0150
Molybdenum	U		0.00160	0.00500

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

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

(LCS) R3429131-2 07/10/19 03:03 • (LCSD) R3429131-3 07/10/19 03:06

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Barium	1.00	1.02	1.01	102	101	80.0-120			0.834	20
Beryllium	1.00	0.969	0.964	96.9	96.4	80.0-120			0.520	20
Boron	1.00	0.991	0.975	99.1	97.5	80.0-120			1.59	20
Cadmium	1.00	0.978	0.969	97.8	96.9	80.0-120			0.855	20
Calcium	10.0	9.51	9.32	95.1	93.2	80.0-120			1.95	20
Chromium	1.00	0.937	0.926	93.7	92.6	80.0-120			1.20	20
Cobalt	1.00	0.988	0.979	98.8	97.9	80.0-120			0.874	20
Lithium	1.00	0.949	0.937	94.9	93.7	80.0-120			1.28	20
Molybdenum	1.00	0.982	0.983	98.2	98.3	80.0-120			0.0590	20

L1115918-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115918-01 07/10/19 03:09 • (MS) R3429131-5 07/10/19 03:14 • (MSD) R3429131-6 07/10/19 03:17

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Barium	1.00	0.637	1.60	1.60	96.6	96.7	1	75.0-125			0.0601	20
Beryllium	1.00	ND	0.972	0.975	97.2	97.5	1	75.0-125			0.365	20
Boron	1.00	ND	1.06	1.07	99.1	100	1	75.0-125			1.16	20
Cadmium	1.00	ND	1.01	1.01	101	101	1	75.0-125			0.257	20
Calcium	10.0	612	605	607	0.000	0.000	1	75.0-125	V	V	0.238	20
Chromium	1.00	0.0139	0.923	0.935	90.9	92.2	1	75.0-125			1.37	20
Cobalt	1.00	0.0160	1.03	1.03	101	102	1	75.0-125			0.593	20
Lithium	1.00	ND	0.975	0.981	96.2	96.8	1	75.0-125			0.559	20
Molybdenum	1.00	ND	0.979	0.976	97.8	97.4	1	75.0-125			0.352	20



Method Blank (MB)

(MB) R3428560-1 07/08/19 13:51

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Antimony	U		0.000754	0.00200

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

Method Blank (MB)

(MB) R3428572-1 07/08/19 11:04

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Arsenic	U		0.000250	0.00200
Lead	U		0.000240	0.00200
Selenium	U		0.000380	0.00200
Thallium	U		0.000190	0.00200

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

(LCS) R3428560-2 07/08/19 13:56 • (LCSD) R3428560-3 07/08/19 14:01

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Antimony	0.0500	0.0484	0.0492	96.9	98.4	80.0-120			1.51	20

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

(LCS) R3428572-2 07/08/19 11:09 • (LCSD) R3428572-3 07/08/19 11:15

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Arsenic	0.0500	0.0501	0.0504	100	101	80.0-120			0.665	20
Lead	0.0500	0.0515	0.0494	103	98.8	80.0-120			4.24	20
Selenium	0.0500	0.0504	0.0510	101	102	80.0-120			1.09	20
Thallium	0.0500	0.0501	0.0500	100	100	80.0-120			0.244	20

L1115109-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115109-05 07/08/19 14:05 • (MS) R3428560-5 07/08/19 14:14 • (MSD) R3428560-6 07/08/19 14:19

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Antimony	0.0500	U	0.0519	0.0503	104	101	1	75.0-125			3.32	20



L1115109-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1115109-05 07/08/19 11:20 • (MS) R3428572-5 07/08/19 11:31 • (MSD) R3428572-6 07/08/19 11:36

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.000331	0.0515	0.0504	102	100	1	75.0-125			2.23	20
Lead	0.0500	0.000266	0.0498	0.0499	99.1	99.2	1	75.0-125			0.176	20
Selenium	0.0500	U	0.0504	0.0496	101	99.2	1	75.0-125			1.63	20
Thallium	0.0500	U	0.0503	0.0497	101	99.4	1	75.0-125			1.12	20

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.  
 \* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

## State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1,6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

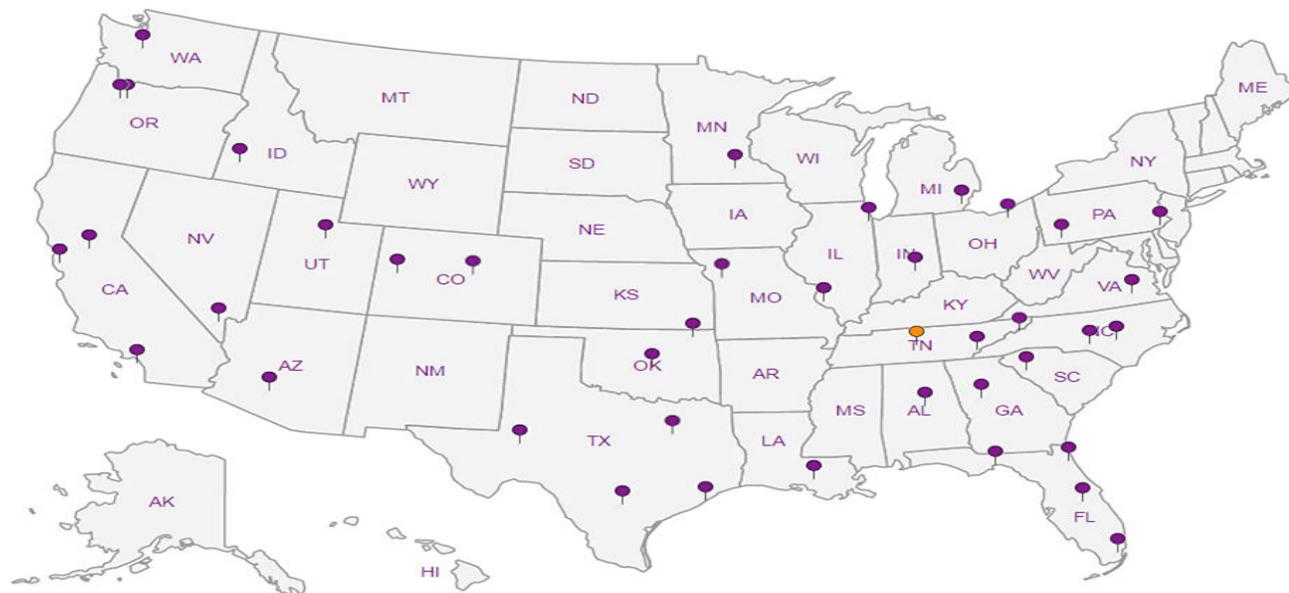
## Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

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

## Our Locations

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



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

# Kansas City Board of Public Utilities

300 N 65th Street  
Kansas City, KS 66102

### Billing Information:

300 N 65th St  
Kansas City, KS 66102

Report to:  
**Ingrid Setzler**

Email To:  
isetzler@bpu.com; kbrown@bpu.com; bhoye@burn

Project  
Description: **GW-Creek Bottom Ash Pond**

City/State  
Collected:

Phone: **913-573-9806**  
Fax: **913-573-9838**

Client Project #  
**KCBPU Nearman**

Lab Project #  
**KCKAN02-MW NEARMAN2**

Collected by (print):  
*Jonathan Hanson*

Site/Facility ID #  
*Nearman-BA*

P.O. #

Collected by (signature):  
*Jonathan Hanson*

**Rush?** (Lab MUST Be Notified)

Quote #

Immediately Packed on Ice N    Y X

Same Day  Five Day  
 Next Day  5 Day (Rad Only)  
 Two Day  10 Day (Rad Only)  
 Three Day

Date Results Needed

No. of Cntrs

### Analysis / Container / Preservative

Cl, Fl, Sulfate 125ml HDPE-NoPres

Metals 250ml HDPE-HNO3

TDS, pH 250ml HDPE-NoPres

Chain of Custody Page    of   



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



L# **11160.30**

**H027**

Acctnum: **KCKAN02**

Template: **T151594**

Prelogin: **P714607**

TSR: **650 - Linda Cashman**

PB:

Shipped Via: **FedEX Ground**

Remarks Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125ml HDPE-NoPres	Metals 250ml HDPE-HNO3	TDS, pH 250ml HDPE-NoPres
<i>MW-10/6201</i>	<i>Grab</i>	<i>GW</i>	<i>—</i>	<i>7-3-19</i>	<i>1005</i>	<i>3</i>	<i>X</i>	<i>X</i>	<i>X</i>
		<i>GW</i>				<i>3</i>	<i>X</i>	<i>X</i>	<i>X</i>
		<i>GW</i>				<i>3</i>	<i>X</i>	<i>X</i>	<i>X</i>
		<i>GW</i>				<i>3</i>	<i>X</i>	<i>X</i>	<i>X</i>
		<i>GW</i>				<i>3</i>	<i>X</i>	<i>X</i>	<i>X</i>

*Jonathan Hanson*  
*7-3-19*

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

### Remarks:

Samples returned via:  
 UPS  FedEx  Courier

pH \_\_\_\_\_ Temp \_\_\_\_\_  
Flow \_\_\_\_\_ Other \_\_\_\_\_

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

Relinquished by: (Signature) <i>Jonathan Hanson</i>	Date: <i>7-3-19</i>	Time: <i>1100</i>	Received by: (Signature) <i>Alan Keaton</i>	7-3-19 <i>1101</i>	Trip Blank Received: Yes/No HCL / MeOH TBR
Relinquished by: (Signature)	Date: <i>7-5-19</i>	Time: <i>1800</i>	Received by: (Signature)		Temp: °C <i>5.7-1=5.65</i>
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>PK Fair</i>		Bottles Received: <i>3</i>
	Date: <i>7/6/19</i>	Time: <i>0845</i>			If preservation required by Login: Date/Time
					Hold: Condition: NCF <i>OK</i>



## Kansas City Board of Public Utilities

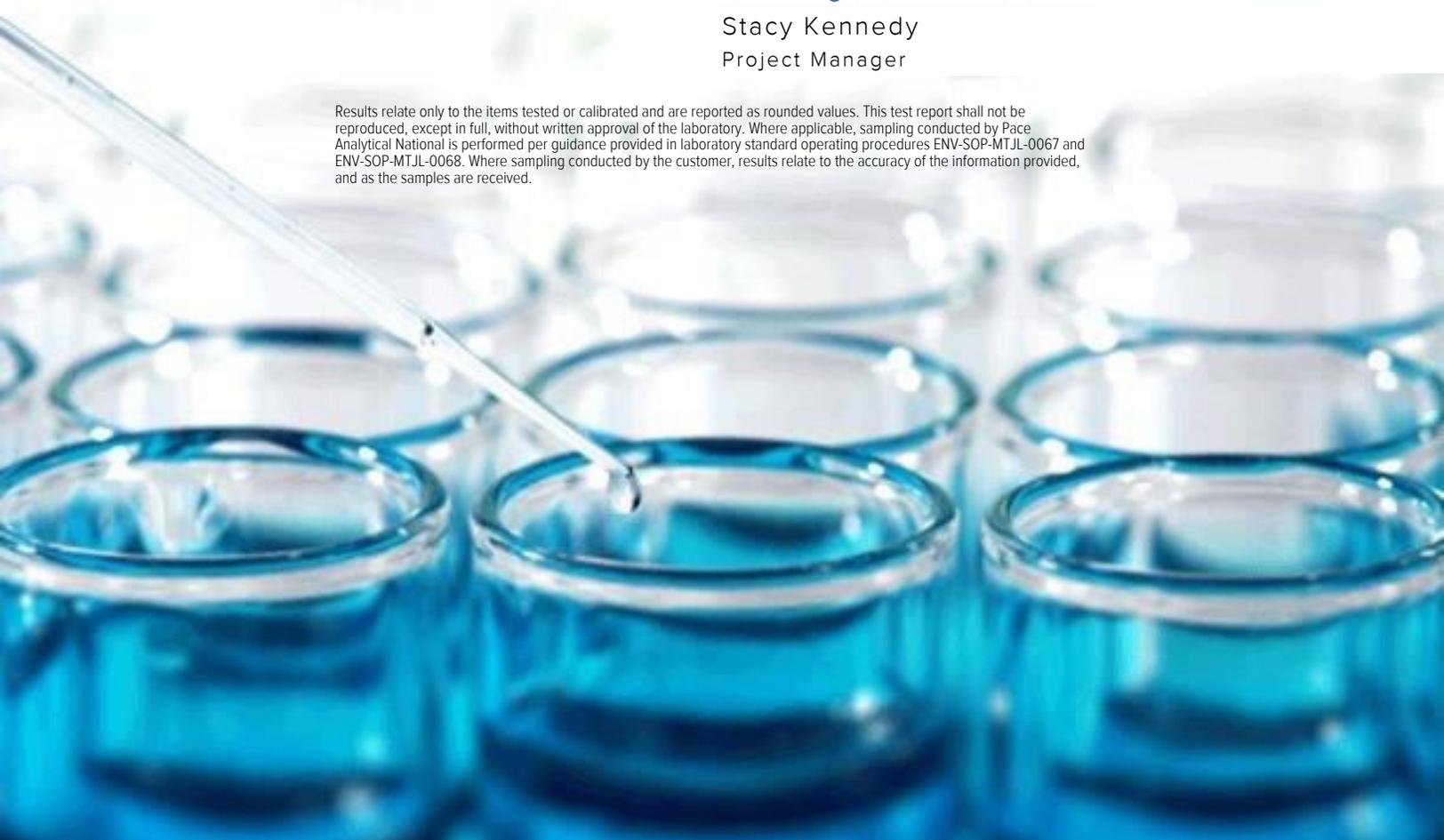
Sample Delivery Group: L1116033  
Samples Received: 07/06/2019  
Project Number: 62801 BPU Nearman  
Description: groundwater

Report To: Ingrid Setzler  
300 N 65th Street  
Kansas City, KS 66102

Entire Report Reviewed By:

Stacy Kennedy  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.





<b>Cp: Cover Page</b>	<b>1</b>	<b><sup>1</sup>Cp</b>
<b>Tc: Table of Contents</b>	<b>2</b>	
<b>Ss: Sample Summary</b>	<b>3</b>	<b><sup>2</sup>Tc</b>
<b>Cn: Case Narrative</b>	<b>4</b>	
<b>Sr: Sample Results</b>	<b>5</b>	<b><sup>3</sup>Ss</b>
<b>MW-10/GW01 L1116033-01</b>	<b>5</b>	
<b>Qc: Quality Control Summary</b>	<b>6</b>	<b><sup>4</sup>Cn</b>
<b>Radiochemistry by Method 904</b>	<b>6</b>	<b><sup>5</sup>Sr</b>
<b>Radiochemistry by Method SM7500Ra B M</b>	<b>7</b>	
<b>Gl: Glossary of Terms</b>	<b>8</b>	<b><sup>6</sup>Qc</b>
<b>Al: Accreditations &amp; Locations</b>	<b>9</b>	<b><sup>7</sup>Gl</b>
<b>Sc: Sample Chain of Custody</b>	<b>10</b>	<b><sup>8</sup>Al</b>
		<b><sup>9</sup>Sc</b>

# SAMPLE SUMMARY



MW-10/GW01 L1116033-01 Non-Potable Water

Collected by: Jonathan Hermanson  
 Collected date/time: 07/03/19 10:05  
 Received date/time: 07/06/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1312590	1	07/17/19 08:59	07/22/19 11:30	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1319160	1	07/29/19 14:22	07/30/19 17:15	RGT	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1319160	1	07/29/19 14:22	07/30/19 17:15	RGT	Mt. Juliet, TN

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



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Stacy Kennedy  
Project Manager

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



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.127		0.482	0.943	07/22/2019 11:30	<a href="#">WG1312590</a>
(T) Barium	93.2			62.0-143	07/22/2019 11:30	<a href="#">WG1312590</a>
(T) Yttrium	84.4			79.0-136	07/22/2019 11:30	<a href="#">WG1312590</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.414		0.690	1.14	07/30/2019 17:15	<a href="#">WG1319160</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.288		0.208	0.198	07/30/2019 17:15	<a href="#">WG1319160</a>
(T) Barium-133	93.5			30.0-143	07/30/2019 17:15	<a href="#">WG1319160</a>

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3433172-1 07/22/19 11:30

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	0.0106		0.484
(T) Barium	89.9		
(T) Yttrium	92.6		

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1118931-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1118931-01 07/22/19 14:35 • (DUP) R3433172-5 07/22/19 11:30

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	1.87	0.984	1	62.1	0.987		20	3
(T) Barium	99.4	94.6						
(T) Yttrium	97.0	83.0						

Laboratory Control Sample (LCS)

(LCS) R3433172-2 07/22/19 11:30

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.22	104	80.0-120	
(T) Barium			96.8		
(T) Yttrium			88.1		

L1116037-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1116037-01 07/22/19 11:30 • (MS) R3433172-3 07/22/19 11:30 • (MSD) R3433172-4 07/22/19 11:30

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	7.14	1.38	8.64	8.52	102	100	1	70.0-130			1.36		20
(T) Barium		102			101	94.3							
(T) Yttrium		80.8			91.8	88.7							



Method Blank (MB)

(MB) R3436250-5 07/31/19 19:57

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	0.0326		0.0442
(T) Barium-133	98.3		

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

L1123252-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1123252-02 07/31/19 06:45 • (DUP) R3436250-4 07/30/19 17:15

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
Radium-226	0.584	0.464	1	22.9	0.295		20	3
(T) Barium-133	101	95.2						

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

Laboratory Control Sample (LCS)

(LCS) R3436250-1 07/30/19 17:15

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	4.98	99.3	80.0-120	
(T) Barium-133			95.5		

<sup>8</sup>Al

<sup>9</sup>Sc

L1123252-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1123252-01 07/31/19 10:45 • (MS) R3436250-2 07/30/19 17:15 • (MSD) R3436250-3 07/30/19 17:15

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.1	0.633	17.8	19.2	85.3	92.4	1	75.0-125			7.74		20
(T) Barium-133		105			98.0	93.8							



## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

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

### Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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

Qualifier	Description
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The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.  
 \* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1,6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

## Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

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

## Our Locations

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



# Kansas City Board of Public Utilities

300 N 65th Street  
Kansas City, KS 66102

Report to:  
**Ingrid Setzler**

Project  
Description: **groundwater**

Phone: **913-573-9806**  
Fax:

Client Project #  
**62801 BPU Nearman**

City/State  
Collected:

Lab Project #  
**KCKAN02-MW NEARMAN**

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

**Rush?** (Lab MUST Be Notified)

Quote #

Immediately  
Packed on Ice N  Y

Same Day  Five Day  
 Next Day  5 Day (Rad Only)  
 Two Day  10 Day (Rad Only)  
 Three Day

Date Results Needed

No.  
of  
Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	
MW-10/62001	Grab	NPW	-	7-3-19	1005	3	X
		NPW				3	X
		NPW				3	X
		NPW				3	X
		NPW				3	X
		NPW				3	X
		NPW				3	X

Total Rad, RA2226, RA2228 1L-HDPE-Add HNO3

Analysis / Container / Preservative

Chain of Custody Page \_\_\_ of \_\_\_



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



L# **1116033**  
**H026**

Acctnum: **KCKAN02**  
Template: **T151595**  
Prelogin: **P714606**  
TSR: **650 - Linda Cashman**  
PB:  
Shipped Via: **FedEX Ground**

Remarks Sample # (lab only)

Remarks	Sample # (lab only)
	-01

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

Remarks:

Samples returned via:  
 UPS  FedEx  Courier

pH \_\_\_\_\_ Temp \_\_\_\_\_  
Flow \_\_\_\_\_ Other \_\_\_\_\_

Sample Receipt Checklist

COC Seal Present/Intact:  NP  Y  N  
COC Signed/Accurate:  Y  N  
Bottles arrive intact:  Y  N  
Correct bottles used:  Y  N  
Sufficient volume sent:  Y  N

If Applicable

VOA Zero Headpace:  Y  N  
Preservation Correct/Checked:  Y  N

**RAD SCREEN: <0.5 mR/hr**

Relinquished by: (Signature)

Date: **7-3-19** Time: **1100**

Received by: (Signature)

**7-3-19**  
**1101**

Trip Blank Received: Yes/No  
HCL/MeOH  
TBR

Relinquished by: (Signature)

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received by: (Signature)

Temp: \_\_\_\_\_ °C  
Bottles Received: **5-7-1/2 = 5.852 3**

If preservation required by Login: Date/Time

Relinquished by: (Signature)

Date: **7-5-19** Time: **1800**

Received for lab by: (Signature)

Date: **7/6/19** Time: **0845**

Hold:

Condition:  
NCF /  OK

# Memorandum



Date: January 3, 2020  
To: Brian Hoye  
From: Shauna Lawrence  
Re: Quality Assurance/Quality Control (QA/QC) Review of Analytical Data  
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas  
Nearman Creek Power Station Bottom Ash Pond – November 2019  
Project No. 88777

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Groundwater samples were collected for analysis of assessment monitoring parameters at the Nearman Creek Power Station Bottom Ash Pond at the Kansas City Board of Public Utilities (BPU) site in Kansas City, Kansas. These samples were collected November 26, 2019. All noted samples were submitted to Pace Analytical National Center for Testing & Innovation of Mount Juliet, Tennessee (Pace) (formerly known as ESC Lab Sciences) for analysis by one or more of the following methods:

<u>Parameters</u>	<u>Analytical Method</u>
Total and/or Dissolved Metals	SW-846 6010B/6020
Chloride, Fluoride, Sulfate	SW-846 9056A
Dissolved Solids	SM 2540 C-2011
pH	SW-846 9040C
Radium 226 and 228 <sup>2</sup> (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0 (radium-228)

Notes:

<sup>1</sup>Metals performed by SW-846 6010B include total barium, boron, calcium, lithium, molybdenum, and selenium. Metals performed by SW-846 6020 include total arsenic.

<sup>2</sup>Project reporting requirements per the Sampling and Analysis Plan are for a combined radium-226/radium-228 concentration. These were measured separately, and the combined result was calculated and reported by the laboratory.

A Stage I data review was performed for Quality Assurance (QA)/Quality Control (QC) results in association with the samples collected to evaluate the results for any method-specific requirements. Data qualifiers, when appropriate, were added to the data as recommended in the guidelines presented in *National Functional Guidelines for Inorganic Superfund Methods Data Review* (NFGI) (USEPA, 2017). Any data qualifiers added during the course of this review are presented on Table 1.

1. Chain-of-Custody (COC) – The relinquished and received signatures, times, and dates on the COCs were present.
2. Requested Analyses Completed – All analyses were completed as requested for the appropriate parameters for the November groundwater sampling event.
3. Holding Times – The lab flagged all pH results for this sampling event with an “T8” to indicate the sample was received too close to the holding time expiration/past holding time for analysis. All reported pH results for these samples should be considered estimated (J). Note, the pH was also measured in the field and would provide a more accurate measurement as they are recorded on-site at the time of sample collection.

# Memorandum *(continued)*



January 3, 2020

Page 2

With the above exception, all other samples were extracted and/or analyzed within their respective holding time.

4. Sample Preservation – All samples were received by the laboratory slightly below the recommended 2 to 6 degrees Celsius (°C) sample preservation temperature range. Because no samples were received frozen, all were considered viable.
5. Laboratory Method Blanks – Method blanks were reviewed to determine the potential for sample cross contamination due to handling within the laboratory. With the following exceptions, no detections of target analytes were noted in the method blanks:
  - Calcium (0.137 mg/L) was detected in the method blank in batch WG1388682. All associated samples exhibited calcium concentrations greater than five times this blank detection. As such, cross-contamination was not a concern, and no data qualifiers were added.
  - Radium-226 (-0.00470 pCi/L) and radium-228 (-0.305 pCi/L) were detected in the method blanks in batches WG1394619 and WG1397762, respectively. Because both of these method blank detections exhibited negative results, they were considered non detect. No samples were qualified based on these method blank results.
6. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – The LCS contains a matrix similar to that of the sample that has been spiked with known concentrations of target analytes. The LCS is prepared and analyzed by the same method as the samples. As a measure of analytical accuracy, the results of the LCS are compared against the known analyte concentrations in the spike to determine the percent recovery (REC). The purpose of the LCS is to determine the performance of the laboratory with respect to analyte recovery, independent of field sample matrix interference. For some methods, the lab performed a LCSD. The results between the LCS and LCSD were compared with each other for reproducibility using the relative percent difference (RPD). All LCS/LCSD RECs and/or RPDs were within their respective QC limits.
7. Matrix Spike/Matrix Spike Duplicates (MS/MSD) – MS/MSDs are typically run for organic and inorganic analyses. A sample is split into three portions (original, MS and MSD), and a known amount of a target analyte is added (spiked) to two portions (MS and MSD) of the sample. The results of these two portions are compared with each other for reproducibility using the RPD. They are also compared against the unspiked portion of the sample for REC of the spike. Qualification is typically limited to the spiked sample for any MS/MSD issues, unless otherwise noted. Site-specific MS/MSDs were collected during each sampling event. The following summarizes these site-specific MS/MSD analyses:
  - MW-8A: The spike amount for sulfate was less than one-fourth the concentration in the noted parent sample. As such, no conclusion could be made regarding the accuracy of this spike. No data qualifiers were added based on this MS/MSD.

January 3, 2020

Page 3

All other MS/MSD results for this noted sample were within control limits.

8. Laboratory Duplicate Results – In instances where a MS/MSD was not applicable, laboratory duplicate analyses were performed. Laboratory duplicates provide information on the ability to reproduce lab results and to account for error introduced from handling, shipping, storage, preparation, and lab analysis. All project-specific laboratory duplicate results were within control limits.
9. Field Duplicate Results – Field duplicate results provide information on the ability to reproduce field results and account for error introduced from handling, shipping, storage, preparation, and analysis of field samples. There are no specific USEPA criteria for qualifying data from field duplicate results. Depending upon the sample concentration, one of the following criteria based upon NFGI is applicable:
  - Is the compound detected in both portions?
  - If the sample concentrations are greater than 5 times the detection limit, then the maximum allowable RPD is 20 percent for water samples.
  - If the sample concentrations are less than 5 times the detection limit, then a sensitivity test is applied. For the sensitivity test, the sample concentrations must agree within  $\pm$  the lower detection limit for water samples.
  - If the radium results are reported above their minimum detectable concentration (MDC), the normalized difference (also called the relative error ratio) between the duplicate pair was calculated. The maximum normalized difference is 1.96 for the radium samples.

One field duplicate pair was collected during each sampling event: MW-2A and DUP-1. Table 2 presents a side-by-side comparison of the field duplicate results. All results were adequately replicated for this field duplicate pair.

10. Detection and Quantitation Limits – The sulfate for one or more samples required a dilution to account for high concentrations and/or matrix interferences. Qualifiers were not necessary based on these dilutions.
11. Conclusion – The data were reviewed for achievement of any method-specified QA/QC criteria. The data are valid, as qualified, for use in reporting the results of this investigation.

## Attachments

Table 1: Data Qualifiers

Table 2: Field Duplicate Results

**Table 1**  
**Data Qualifiers**  
**Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas**  
**Nearman Creek Power Station Bottom Ash Pond – November 2019**

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 MW-13 MW-14 MW-15 MW-16 DUP-1	L1165504-01 L1165504-02 L1165504-03 L1165504-04 L1165504-05 L1165504-06 L1165504-07 L1165504-08 L1165504-09 L1165504-10	pH	J	Holding time exceeded (see text)

J - Estimated Value

**Table 2**  
**Field Duplicate Results**  
**Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas**  
**Nearman Creek Power Station Bottom Ash Pond – November 2019**

Sample Identification: Date Sampled: SDG(s):		MW-2A 11/26/2019 L1165496 (radium)/ L1165504 (all others)	DUP-1 11/26/2019 L1165496 (radium)/ L1165504 (all others)	Meets QC Criteria
Parameter	Unit			
Dissolved Solids	mg/l	471	436	Yes
Chloride	mg/l	14	13.9	Yes
Fluoride	mg/l	0.274	0.271	Yes
Sulfate	mg/l	108	109	Yes
pH	su	7.23 J	7.23 J	Yes
Arsenic	mg/l	0.00248	0.00246	Yes
Barium	mg/l	0.116	0.115	Yes
Boron	mg/l	0.200 U	0.200 U	Yes
Calcium	mg/l	122	123	Yes
Lithium	mg/l	0.0205	0.0223	Yes
Molybdenum	mg/l	0.005 U	0.0500 U	Yes
Selenium	mg/l	0.0100 U	0.0100 U	
Combined Radium (including +/- uncertainty)	pCi/l	0.696 (+/- 0.654)	0.519 (+/- 0.620)	Yes

J - Estimated Value  
mg/l - Milligrams per Liter  
pCi/l - picoCuries per Liter  
QC - Quality Control  
SDG - Sample Delivery Group  
su - Standard Unit  
U - Nondetect

## Kansas City Board of Public Utilities

Sample Delivery Group: L1165496  
Samples Received: 11/27/2019  
Project Number: 62801 BPU Nearman  
Description: groundwater

Report To: Ingrid Setzler  
300 N 65th Street  
Kansas City, KS 66102

Entire Report Reviewed By:



Linda Cashman  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.





<b>Cp: Cover Page</b>	<b>1</b>	
<b>Tc: Table of Contents</b>	<b>2</b>	
<b>Ss: Sample Summary</b>	<b>3</b>	
<b>Cn: Case Narrative</b>	<b>5</b>	
<b>Sr: Sample Results</b>	<b>6</b>	
MW-2A/GW02 L1165496-01	6	
MW-3/GW02 L1165496-02	7	
MW-4/GW02 L1165496-03	8	
MW-8A/GW02 L1165496-04	9	
MW-10/GW02 L1165496-05	10	
MW-13/GW02 L1165496-06	11	
MW-14/GW02 L1165496-07	12	
MW-15/GW02 L1165496-08	13	
MW-16/GW02 L1165496-09	14	
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<b>Qc: Quality Control Summary</b>	<b>16</b>	
Radiochemistry by Method 904	16	
Radiochemistry by Method SM7500Ra B M	17	
<b>Gl: Glossary of Terms</b>	<b>18</b>	
<b>Al: Accreditations &amp; Locations</b>	<b>19</b>	
<b>Sc: Sample Chain of Custody</b>	<b>20</b>	

# SAMPLE SUMMARY



				Collected by	Collected date/time	Received date/time
<b>MW-2A/GW02 L1165496-01 Non-Potable Water</b>				Jonathan Hermanson	11/26/19 13:35	11/27/19 09:10
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

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

				Collected by	Collected date/time	Received date/time
<b>MW-3/GW02 L1165496-02 Non-Potable Water</b>				Jonathan Hermanson	11/26/19 14:35	11/27/19 09:10
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
<b>MW-4/GW02 L1165496-03 Non-Potable Water</b>				Jonathan Hermanson	11/26/19 15:20	11/27/19 09:10
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
<b>MW-8A/GW02 L1165496-04 Non-Potable Water</b>				Jonathan Hermanson	11/26/19 11:25	11/27/19 09:10
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
<b>MW-10/GW02 L1165496-05 Non-Potable Water</b>				Jonathan Hermanson	11/26/19 12:40	11/27/19 09:10
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

				Collected by	Collected date/time	Received date/time
<b>MW-13/GW02 L1165496-06 Non-Potable Water</b>				Jonathan Hermanson	11/26/19 08:20	11/27/19 09:10
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

# SAMPLE SUMMARY

## MW-14/GW02 L1165496-07 Non-Potable Water

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 09:15  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/20/19 10:35	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc

## MW-15/GW02 L1165496-08 Non-Potable Water

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 10:10  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/23/19 09:05	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/23/19 09:05	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

## MW-16/GW02 L1165496-09 Non-Potable Water

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/25/19 12:25  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/23/19 09:05	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/23/19 09:05	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN

## DUP-1/GW02 L1165496-10 Non-Potable Water

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 00:00  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904	WG1397762	1	12/17/19 17:05	12/23/19 09:05	JMR	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG1394619	1	12/18/19 11:15	12/23/19 09:05	JMR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1394619	1	12/18/19 11:15	12/19/19 19:44	RGT	Mt. Juliet, TN



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Linda Cashman  
Project Manager

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



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.670		0.410	0.63	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Barium	102			62.0-143	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Yttrium	102			79.0-136	12/20/2019 10:35	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.696		0.654	1.03	12/20/2019 10:35	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.0255		0.244	0.404	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	80.3			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.881		0.425	0.611	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Barium	98.3			62.0-143	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Yttrium	102			79.0-136	12/20/2019 10:35	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.01		0.604	0.872	12/20/2019 10:35	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.129		0.179	0.261	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	101			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.000		0.441	0.73	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Barium	96.1			62.0-143	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Yttrium	117			79.0-136	12/20/2019 10:35	<a href="#">WG1397762</a>

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.115		0.573	0.899	12/20/2019 10:35	<a href="#">WG1394619</a>

<sup>6</sup> Qc

<sup>7</sup> Gl

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.115		0.132	0.169	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	103			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

<sup>8</sup> Al

<sup>9</sup> Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.309		0.386	0.715	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Barium	89.9			62.0-143	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Yttrium	105			79.0-136	12/20/2019 10:35	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.491		0.564	0.932	12/20/2019 10:35	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.182		0.178	0.217	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	97.2			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	1.77		0.439	0.661	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Barium	93.2			62.0-143	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Yttrium	108			79.0-136	12/20/2019 10:35	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	2.06		0.700	0.985	12/20/2019 10:35	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.287		0.261	0.324	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	109			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.143		0.429	0.733	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Barium	85.8			62.0-143	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Yttrium	105			79.0-136	12/20/2019 10:35	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.546		0.681	0.934	12/20/2019 10:35	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.403		0.252	0.201	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	114			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.0464		0.380	0.639	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Barium	89.2			62.0-143	12/20/2019 10:35	<a href="#">WG1397762</a>
(T) Yttrium	115			79.0-136	12/20/2019 10:35	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.107		0.495	0.839	12/20/2019 10:35	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.0606		0.115	0.2	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	106			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.270		0.415	0.77	12/23/2019 09:05	<a href="#">WG1397762</a>
(T) Barium	85.4			62.0-143	12/23/2019 09:05	<a href="#">WG1397762</a>
(T) Yttrium	108			79.0-136	12/23/2019 09:05	<a href="#">WG1397762</a>

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.398		0.693	1.21	12/23/2019 09:05	<a href="#">WG1394619</a>

<sup>6</sup> Qc

<sup>7</sup> Gl

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.128		0.278	0.436	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	106			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

<sup>8</sup> Al

<sup>9</sup> Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.392		0.392	0.594	12/23/2019 09:05	<a href="#">WG1397762</a>
(T) Barium	97.5			62.0-143	12/23/2019 09:05	<a href="#">WG1397762</a>
(T) Yttrium	112			79.0-136	12/23/2019 09:05	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.995		0.760	0.926	12/23/2019 09:05	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.603		0.368	0.332	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	108			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Radiochemistry by Method 904

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.332		0.435	0.672	12/23/2019 09:05	<a href="#">WG1397762</a>
(T) Barium	99.8			62.0-143	12/23/2019 09:05	<a href="#">WG1397762</a>
(T) Yttrium	114			79.0-136	12/23/2019 09:05	<a href="#">WG1397762</a>

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.519		0.620	0.886	12/23/2019 09:05	<a href="#">WG1394619</a>

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.187		0.185	0.214	12/19/2019 19:44	<a href="#">WG1394619</a>
(T) Barium-133	105			30.0-143	12/19/2019 19:44	<a href="#">WG1394619</a>

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3485607-1 12/20/19 10:35

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	-0.305		0.431
(T) Barium	118		
(T) Yttrium	109		

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1165496-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1165496-04 12/20/19 10:35 • (DUP) R3485607-5 12/20/19 10:35

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.309	0.116	1	90.9	0.261		20	3
(T) Barium	89.9	97.8						
(T) Yttrium	105	110						

Laboratory Control Sample (LCS)

(LCS) R3485607-2 12/20/19 10:35

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.22	104	80.0-120	
(T) Barium			111		
(T) Yttrium			103		

L1165496-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1165496-04 12/20/19 10:35 • (MS) R3485607-3 12/20/19 10:35 • (MSD) R3485607-4 12/20/19 10:35

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	10.0	0.309	12.9	13.2	126	129	1	70.0-130			1.99		20
(T) Barium		89.9			90.6	94.1							
(T) Yttrium		105			112	120							



Method Blank (MB)

(MB) R3485240-1 12/19/19 19:44

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	-0.00470		0.0454
(T) Barium-133	105		

1 Cp

2 Tc

3 Ss

4 Cn

L1165496-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1165496-09 12/19/19 19:44 • (DUP) R3485240-5 12/19/19 19:44

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.603	0.143	1	123	1.15		20	3
(T) Barium-133	108	104						

5 Sr

6 Qc

Laboratory Control Sample (LCS)

(LCS) R3485240-2 12/19/19 19:44

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	5.60	112	80.0-120	
(T) Barium-133			110		

7 Gl

8 Al

9 Sc

L1165496-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1165496-04 12/19/19 19:44 • (MS) R3485240-3 12/19/19 19:44 • (MSD) R3485240-4 12/19/19 19:44

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.1	0.182	18.7	17.2	92.2	84.5	1	75.0-125			8.58		20
(T) Barium-133		97.2			105	111							



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

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

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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

Qualifier Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.  
 \* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

## State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1,6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

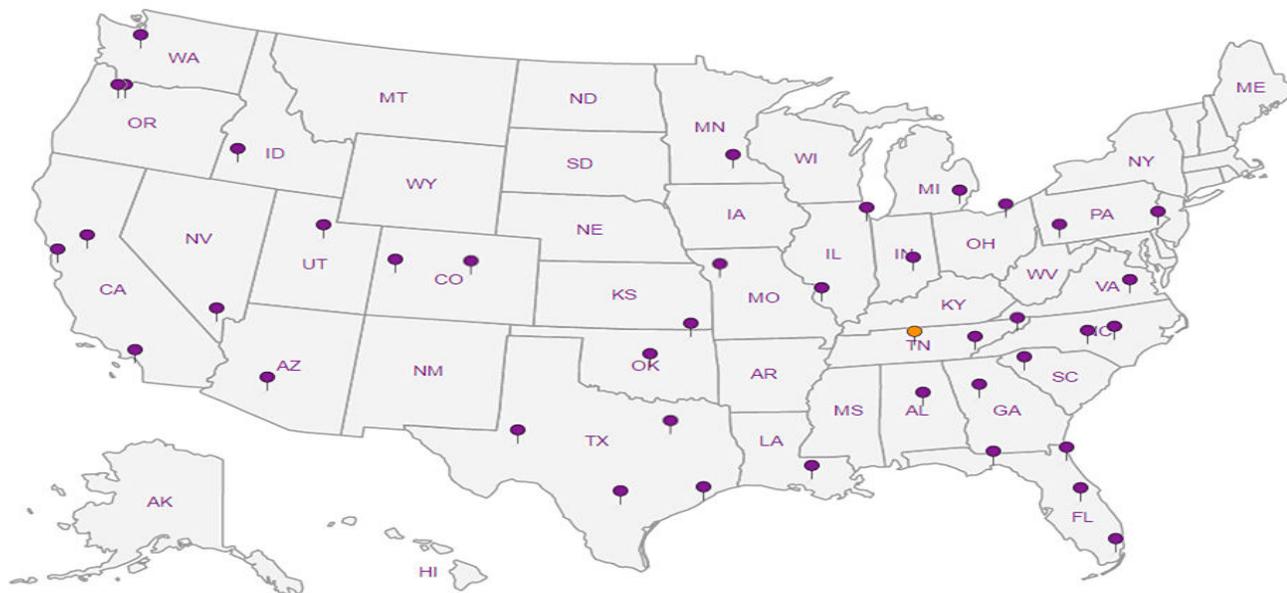
## Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

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

## Our Locations

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



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



**Kansas City Board of Public Utilities**  
 300 N 65th Street  
 Kansas City, KS 66102

Billing Information:  
 Attn: Ellen Bouse  
 300 N 65th Street  
 Kansas City, KS 66102

Pres Chk  
 Analysis / Container / Preservative

Chain of Custody Page \_\_\_ of \_\_\_  
  
 12065 Lebanon Rd  
 Mount Juliet, TN 37122  
 Phone: 615-758-5858  
 Phone: 800-767-5859  
 Fax: 615-758-5859

Report to:  
**Ingrid Setzler**

Email To:  
 isetzler@bpu.com; kbrown@bpu.com; bhoeye@burn

Project Description: **groundwater**

City/State Collected:

Please Circle:  
 PT MT CT ET

Phone: **913-573-9806**  
 Fax:

Client Project #  
**62801 BPU Nearman**

Lab Project #  
**KCKAN02-MW NEARMAN**

Collected by (print):  
*Jonathan Hanson*

Site/Facility ID #

P.O. #

Collected by (signature):  
*Jonathan Hanson*

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

Quote #

Immediately **N/A**  
 Packed on Ice **N**  **Y**

Date Results Needed

No. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs
<del>DUP-2</del>		<del>NPW</del>				<del>3</del>
<del>MW-8A/GW02MS</del>	<del>Grab</del>	<del>GW</del>	<del>-</del>	<del>11-26-19</del>	<del>1125</del>	<del>4</del>
<del>MW-8A/GW02MSD</del>	<del>Grab</del>	<del>GW</del>	<del>-</del>	<del>11-26-19</del>	<del>1125</del>	<del>4</del>

Total Rad, RA226, RA228 1L-HDPE-Add HNO3

SDG # **1165496**  
 Table #  
 Acctnum: **KCKAN02**  
 Template: **T150051**  
 Prelogin: **P741308**  
 PM: **616 - Stacy Kennedy**  
 PB: **11-18-19 MM**  
 Shipped Via: **FedEX Ground**

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

Remarks:  
 pH \_\_\_\_\_ Temp \_\_\_\_\_  
 Flow \_\_\_\_\_ Other \_\_\_\_\_  
 Samples returned via:  
 \_\_\_ UPS \_\_\_ FedEx \_\_\_ Courier \_\_\_\_\_  
 Tracking # \_\_\_\_\_

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

Relinquished by: (Signature)  
*Jonathan Hanson*

Date: **11-26-19**

Time: **1615**

Received by: (Signature)  
*Carol Kemp*

Trip Blank Received: Yes/No  
 HCL/MeOH  
 TBR

Relinquished by: (Signature)  
*Jonathan Hanson*

Date: **11-26-19**

Time: **1800**

Received by: (Signature)  
*Carol Kemp*

Temp: **16.2 ± 0.8 °C**  
 Bottles Received: **33**

If preservation required by Login: Date/Time

Relinquished by: (Signature)  
*Jonathan Hanson*

Date: \_\_\_\_\_

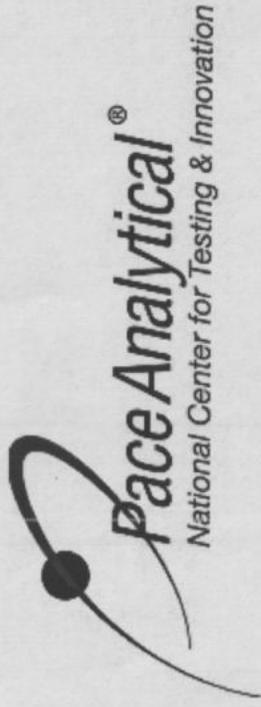
Time: \_\_\_\_\_

Received for lab by: (Signature)  
*Carol Kemp*

Date: **11/27/19** Time: **9:10**

Hold: \_\_\_\_\_ Condition: **NCI 1/2K**

**Matt Shacklock**



<b>Login #:</b> L1165496	<b>Client:</b> KCKAN02	<b>Date:</b> 11/27	<b>Evaluated by:</b> Kelsey S
--------------------------	------------------------	--------------------	-------------------------------

**Non-Conformance (check applicable items)**

<b>Sample Integrity</b>	<b>Chain of Custody Clarification</b>	<b>If Broken Container:</b>
Parameter(s) past holding time	Login Clarification Needed	Insufficient packing material around container
Temperature not in range	Chain of custody is incomplete	Insufficient packing material inside cooler
Improper container type	Please specify Metals requested.	Improper handling by carrier (FedEx / UPS / Courier)
pH not in range.	Please specify TCLP requested.	Sample was frozen
Insufficient sample volume.	Received additional samples not listed on coc.	Container lid not intact
Sample is biphasic.	Sample ids on containers do not match ids on coc	<b>If no Chain of Custody:</b>
Vials received with headspace.	Trip Blank not received.	Received by:
Broken container	Client did not "X" analysis.	Date/Time:
Broken container:	Chain of Custody is missing	Temp./Cont. Rec./pH:
Sufficient sample remains		Carrier:
		Tracking#

**Login Comments: Received MW-16 with a pH of 6. pH adj 1600 11/27.**

<b>Client informed by:</b>	Call	Email	Voice Mail	Date:	Time:
<b>TSR Initials:</b> SK	<b>Client Contact:</b>				

**Login Instructions:**

Noted. Please proceed with analysis. SK 12/2/19



## Kansas City Board of Public Utilities

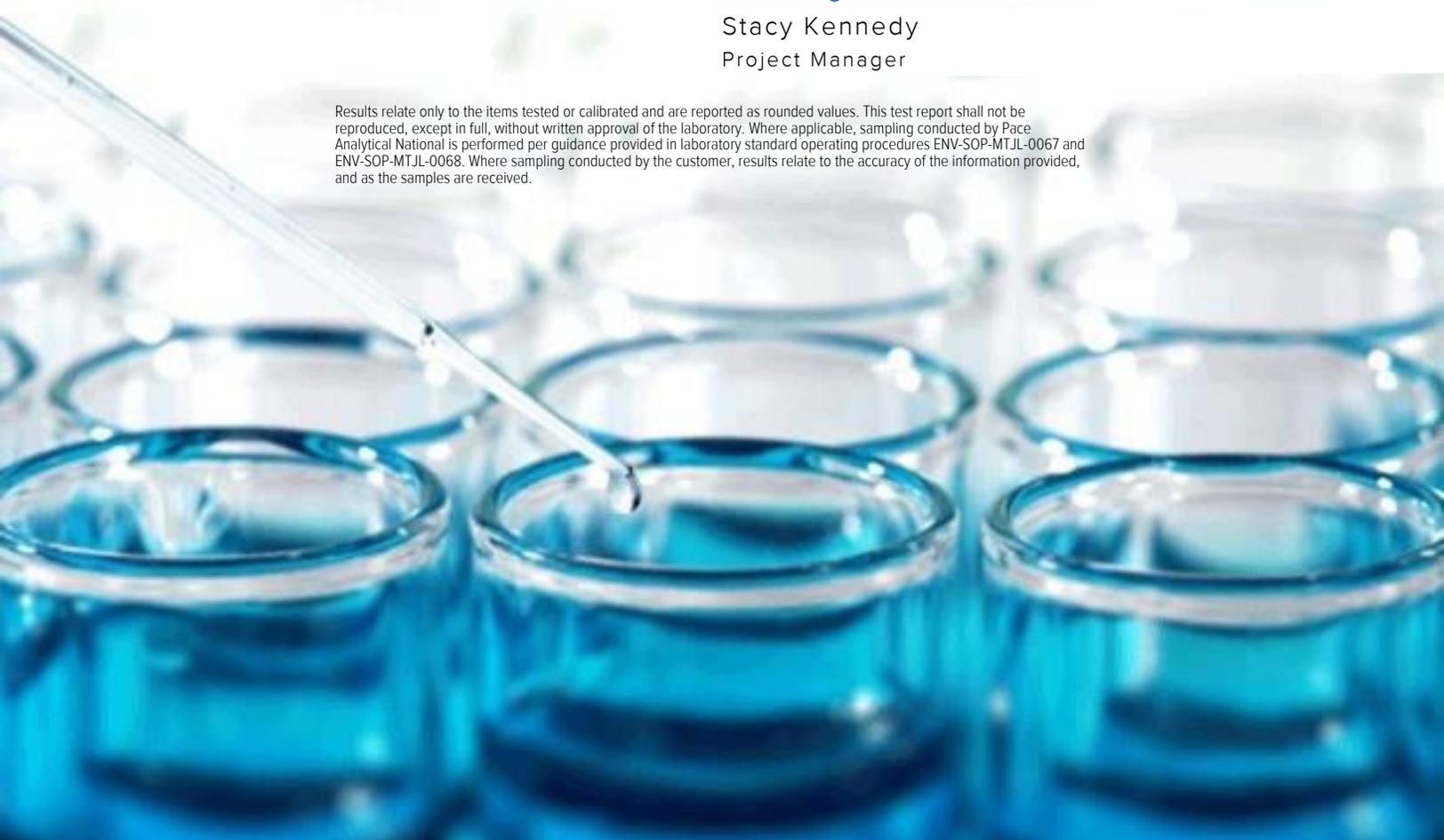
Sample Delivery Group: L1165504  
Samples Received: 11/27/2019  
Project Number: KCBPU Nearman  
Description: GW-Creek Bottom Ash Pond

Report To: Ingrid Setzler  
300 N 65th Street  
Kansas City, KS 66102

Entire Report Reviewed By:

Stacy Kennedy  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.





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# SAMPLE SUMMARY

## MW-2A L1165504-01 GW

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 13:35  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 00:29	12/05/19 00:29	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 09:24	12/05/19 09:24	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:31	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:29	LD	Mt. Juliet, TN

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

## MW-3 L1165504-02 GW

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 14:35  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 00:43	12/05/19 00:43	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:34	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:33	LD	Mt. Juliet, TN

## MW-4 L1165504-03 GW

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 15:20  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 00:57	12/05/19 00:57	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:36	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:36	LD	Mt. Juliet, TN

## MW-8A L1165504-04 GW

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 11:25  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 01:11	12/05/19 01:11	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 01:53	12/05/19 01:53	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:02	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 21:36	LD	Mt. Juliet, TN

## MW-10 L1165504-05 GW

Collected by  
Jonathan  
Hermanson  
Collected date/time  
11/26/19 12:40  
Received date/time  
11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 02:06	12/05/19 02:06	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 03:36	12/05/19 03:36	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:39	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:39	LD	Mt. Juliet, TN

# SAMPLE SUMMARY

## MW-13 L1165504-06 GW

Collected by Jonathan Hermanson  
 Collected date/time 11/26/19 08:20  
 Received date/time 11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 04:04	12/05/19 04:04	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 04:18	12/05/19 04:18	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:41	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:43	LD	Mt. Juliet, TN

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

## MW-14 L1165504-07 GW

Collected by Jonathan Hermanson  
 Collected date/time 11/26/19 09:15  
 Received date/time 11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 04:32	12/05/19 04:32	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 04:46	12/05/19 04:46	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:44	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:46	LD	Mt. Juliet, TN

## MW-15 L1165504-08 GW

Collected by Jonathan Hermanson  
 Collected date/time 11/26/19 10:10  
 Received date/time 11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388445	1	11/27/19 23:00	11/27/19 23:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 05:00	12/05/19 05:00	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 05:14	12/05/19 05:14	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:47	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:49	LD	Mt. Juliet, TN

## MW-16 L1165504-09 GW

Collected by Jonathan Hermanson  
 Collected date/time 11/25/19 12:25  
 Received date/time 11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388931	1	11/30/19 17:00	11/30/19 17:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 05:27	12/05/19 05:27	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 06:09	12/05/19 06:09	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:49	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:52	LD	Mt. Juliet, TN

## DUP-1 L1165504-10 GW

Collected by Jonathan Hermanson  
 Collected date/time 11/26/19 00:00  
 Received date/time 11/27/19 09:10

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1389359	1	12/02/19 13:13	12/02/19 13:58	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1388931	1	11/30/19 17:00	11/30/19 17:00	MSP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	1	12/05/19 06:23	12/05/19 06:23	ELN	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1390722	5	12/05/19 09:38	12/05/19 09:38	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1388682	1	11/29/19 11:23	11/30/19 19:57	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1388687	1	11/29/19 15:30	12/01/19 22:56	LD	Mt. Juliet, TN



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

Stacy Kennedy  
Project Manager

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	471		10.0	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.23	<u>T8</u>	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-01 WG1388445: 7.23 at 16.5C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	14.0		1.00	1	12/05/2019 00:29	<a href="#">WG1390722</a>
Fluoride	0.274		0.100	1	12/05/2019 00:29	<a href="#">WG1390722</a>
Sulfate	108		25.0	5	12/05/2019 09:24	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.116		0.00500	1	11/30/2019 19:31	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:31	<a href="#">WG1388682</a>
Calcium	122		1.00	1	11/30/2019 19:31	<a href="#">WG1388682</a>
Lithium	0.0205		0.0150	1	11/30/2019 19:31	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:31	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:31	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00248		0.00200	1	12/01/2019 22:29	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	638		10.0	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	6.84	<u>T8</u>	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-02 WG1388445: 6.84 at 17.2C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	7.35		1.00	1	12/05/2019 00:43	<a href="#">WG1390722</a>
Fluoride	0.180		0.100	1	12/05/2019 00:43	<a href="#">WG1390722</a>
Sulfate	93.4		5.00	1	12/05/2019 00:43	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.183		0.00500	1	11/30/2019 19:34	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:34	<a href="#">WG1388682</a>
Calcium	181		1.00	1	11/30/2019 19:34	<a href="#">WG1388682</a>
Lithium	0.0462		0.0150	1	11/30/2019 19:34	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:34	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:34	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	12/01/2019 22:33	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	481		10.0	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.10	<u>T8</u>	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-03 WG1388445: 7.1 at 16.9C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	6.94		1.00	1	12/05/2019 00:57	<a href="#">WG1390722</a>
Fluoride	0.235		0.100	1	12/05/2019 00:57	<a href="#">WG1390722</a>
Sulfate	59.7		5.00	1	12/05/2019 00:57	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.134		0.00500	1	11/30/2019 19:36	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:36	<a href="#">WG1388682</a>
Calcium	128		1.00	1	11/30/2019 19:36	<a href="#">WG1388682</a>
Lithium	0.0265		0.0150	1	11/30/2019 19:36	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:36	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:36	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	12/01/2019 22:36	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	787		13.3	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.11	<u>T8</u>	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-04 WG1388445: 7.11 at 16.8C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	27.0		1.00	1	12/05/2019 01:11	<a href="#">WG1390722</a>
Fluoride	0.329		0.100	1	12/05/2019 01:11	<a href="#">WG1390722</a>
Sulfate	324		25.0	5	12/05/2019 01:53	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.176	<u>O1</u>	0.00500	1	11/30/2019 19:02	<a href="#">WG1388682</a>
Boron	2.09	<u>O1</u>	0.200	1	11/30/2019 19:02	<a href="#">WG1388682</a>
Calcium	115	<u>O1</u>	1.00	1	11/30/2019 19:02	<a href="#">WG1388682</a>
Lithium	0.0188		0.0150	1	11/30/2019 19:02	<a href="#">WG1388682</a>
Molybdenum	0.00953		0.00500	1	11/30/2019 19:02	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:02	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.0266		0.00200	1	12/01/2019 21:36	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	832		13.3	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	6.91	T8	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-05 WG1388445: 6.91 at 16.1C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	16.3		1.00	1	12/05/2019 02:06	<a href="#">WG1390722</a>
Fluoride	0.146		0.100	1	12/05/2019 02:06	<a href="#">WG1390722</a>
Sulfate	180		25.0	5	12/05/2019 03:36	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.138		0.00500	1	11/30/2019 19:39	<a href="#">WG1388682</a>
Boron	1.36		0.200	1	11/30/2019 19:39	<a href="#">WG1388682</a>
Calcium	198		1.00	1	11/30/2019 19:39	<a href="#">WG1388682</a>
Lithium	0.0483		0.0150	1	11/30/2019 19:39	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:39	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:39	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	12/01/2019 22:39	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	580		10.0	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.08	<u>T8</u>	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-06 WG1388445: 7.08 at 16.8C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	21.3		1.00	1	12/05/2019 04:04	<a href="#">WG1390722</a>
Fluoride	0.405		0.100	1	12/05/2019 04:04	<a href="#">WG1390722</a>
Sulfate	165		25.0	5	12/05/2019 04:18	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.251		0.00500	1	11/30/2019 19:41	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:41	<a href="#">WG1388682</a>
Calcium	115		1.00	1	11/30/2019 19:41	<a href="#">WG1388682</a>
Lithium	0.0358		0.0150	1	11/30/2019 19:41	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:41	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:41	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.0201		0.00200	1	12/01/2019 22:43	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	533		10.0	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.11	<u>T8</u>	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-07 WG1388445: 7.11 at 16.9C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	12.9		1.00	1	12/05/2019 04:32	<a href="#">WG1390722</a>
Fluoride	0.265		0.100	1	12/05/2019 04:32	<a href="#">WG1390722</a>
Sulfate	121		25.0	5	12/05/2019 04:46	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.0864		0.00500	1	11/30/2019 19:44	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:44	<a href="#">WG1388682</a>
Calcium	130		1.00	1	11/30/2019 19:44	<a href="#">WG1388682</a>
Lithium	0.0154		0.0150	1	11/30/2019 19:44	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:44	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:44	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	12/01/2019 22:46	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	452		10.0	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.45	<u>T8</u>	1	11/27/2019 23:00	<a href="#">WG1388445</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-08 WG1388445: 7.45 at 16.9C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	13.9		1.00	1	12/05/2019 05:00	<a href="#">WG1390722</a>
Fluoride	0.486		0.100	1	12/05/2019 05:00	<a href="#">WG1390722</a>
Sulfate	162		25.0	5	12/05/2019 05:14	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.103		0.00500	1	11/30/2019 19:47	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:47	<a href="#">WG1388682</a>
Calcium	71.4		1.00	1	11/30/2019 19:47	<a href="#">WG1388682</a>
Lithium	0.0414		0.0150	1	11/30/2019 19:47	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:47	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:47	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.0104		0.00200	1	12/01/2019 22:49	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	784		13.3	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	6.76	<u>T8</u>	1	11/30/2019 17:00	<a href="#">WG1388931</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-09 WG1388931: 6.76 at 14.5C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	4.01		1.00	1	12/05/2019 05:27	<a href="#">WG1390722</a>
Fluoride	0.136		0.100	1	12/05/2019 05:27	<a href="#">WG1390722</a>
Sulfate	123		25.0	5	12/05/2019 06:09	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.257		0.00500	1	11/30/2019 19:49	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:49	<a href="#">WG1388682</a>
Calcium	224		1.00	1	11/30/2019 19:49	<a href="#">WG1388682</a>
Lithium	0.0646		0.0150	1	11/30/2019 19:49	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:49	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:49	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.0342		0.00200	1	12/01/2019 22:52	<a href="#">WG1388687</a>



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	436		10.0	1	12/02/2019 13:58	<a href="#">WG1389359</a>

1 Cp

2 Tc

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.23	<u>T8</u>	1	11/30/2019 17:00	<a href="#">WG1388931</a>

3 Ss

4 Cn

Sample Narrative:

L1165504-10 WG1388931: 7.23 at 15.4C

5 Sr

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	13.9		1.00	1	12/05/2019 06:23	<a href="#">WG1390722</a>
Fluoride	0.271		0.100	1	12/05/2019 06:23	<a href="#">WG1390722</a>
Sulfate	109		25.0	5	12/05/2019 09:38	<a href="#">WG1390722</a>

6 Qc

7 Gl

8 Al

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	0.115		0.00500	1	11/30/2019 19:57	<a href="#">WG1388682</a>
Boron	ND		0.200	1	11/30/2019 19:57	<a href="#">WG1388682</a>
Calcium	123		1.00	1	11/30/2019 19:57	<a href="#">WG1388682</a>
Lithium	0.0223		0.0150	1	11/30/2019 19:57	<a href="#">WG1388682</a>
Molybdenum	ND		0.00500	1	11/30/2019 19:57	<a href="#">WG1388682</a>
Selenium	ND		0.0100	1	11/30/2019 19:57	<a href="#">WG1388682</a>

9 Sc

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00246		0.00200	1	12/01/2019 22:56	<a href="#">WG1388687</a>



Method Blank (MB)

(MB) R3478527-1 12/02/19 13:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		2.82	10.0

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

L1165504-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-10 12/02/19 13:58 • (DUP) R3478527-3 12/02/19 13:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	436	448	1	2.71		5

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS)

(LCS) R3478527-2 12/02/19 13:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8490	96.5	85.0-115	



L1165323-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-01 11/27/19 23:00 • (DUP) R3477159-2 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.37	7.35	1	0.272		1

Sample Narrative:

OS: 7.37 at 18.6C  
DUP: 7.35 at 18.5C

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

L1165323-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-02 11/27/19 23:00 • (DUP) R3477159-3 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.30	7.34	1	0.546		1

Sample Narrative:

OS: 7.3 at 17.7C  
DUP: 7.34 at 17.9C

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1165323-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-05 11/27/19 23:00 • (DUP) R3477159-4 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.40	7.34	1	0.814		1

Sample Narrative:

OS: 7.4 at 18.6C  
DUP: 7.34 at 19.2C

L1165323-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-08 11/27/19 23:00 • (DUP) R3477159-5 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.41	7.38	1	0.406		1

Sample Narrative:



L1165323-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-08 11/27/19 23:00 • (DUP) R3477159-5 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
OS: 7.41 at 18.7C						
DUP: 7.38 at 18.4C						

1 Cp

2 Tc

3 Ss

4 Cn

L1165323-12 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-12 11/27/19 23:00 • (DUP) R3477159-6 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.42	7.40	1	0.270		1

5 Sr

6 Qc

Sample Narrative:

OS: 7.42 at 18.2C

DUP: 7.4 at 18C

7 Gl

8 Al

L1165323-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-15 11/27/19 23:00 • (DUP) R3477159-7 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.40	7.42	1	0.270		1

9 Sc

Sample Narrative:

OS: 7.4 at 18.3C

DUP: 7.42 at 18.3C

L1165323-21 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-21 11/27/19 23:00 • (DUP) R3477159-8 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.28	7.31	1	0.411		1

Sample Narrative:

OS: 7.28 at 18.5C

DUP: 7.31 at 18.5C



L1165323-29 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-29 11/27/19 23:00 • (DUP) R3477159-9 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.31	7.36	1	0.682		1

Sample Narrative:

OS: 7.31 at 17.2C  
 DUP: 7.36 at 17.5C

L1165325-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165325-01 11/27/19 23:00 • (DUP) R3477159-10 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	8.26	8.27	1	0.121		1

Sample Narrative:

OS: 8.26 at 18.7C  
 DUP: 8.27 at 18.7C

L1165419-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165419-01 11/27/19 23:00 • (DUP) R3477159-11 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	8.71	8.71	1	0.000		1

Sample Narrative:

OS: 8.71 at 18.5C  
 DUP: 8.71 at 18.7C

L1165497-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165497-01 11/27/19 23:00 • (DUP) R3477159-12 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	10.4	10.4	1	0.000		1

Sample Narrative:

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



L1165497-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165497-01 11/27/19 23:00 • (DUP) R3477159-12 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
OS: 10.37 at 17.6C						
DUP: 10.37 at 17.7C						

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

L1165502-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165502-01 11/27/19 23:00 • (DUP) R3477159-13 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
pH	8.93	8.92	1	0.112		1

<sup>5</sup>Sr

<sup>6</sup>Qc

Sample Narrative:

OS: 8.93 at 16.7C  
DUP: 8.92 at 16.8C

<sup>7</sup>Gl

<sup>8</sup>Al

L1165504-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-01 11/27/19 23:00 • (DUP) R3477159-14 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
pH	7.23	7.29	1	0.826		1

<sup>9</sup>Sc

Sample Narrative:

OS: 7.23 at 16.5C  
DUP: 7.29 at 17.1C

L1165504-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-02 11/27/19 23:00 • (DUP) R3477159-15 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
pH	6.84	6.82	1	0.293		1

Sample Narrative:

OS: 6.84 at 17.2C  
DUP: 6.82 at 17.2C



L1165504-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-03 11/27/19 23:00 • (DUP) R3477159-16 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.10	7.06	1	0.565		1

Sample Narrative:

OS: 7.1 at 16.9C  
DUP: 7.06 at 16.7C

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

L1165504-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-04 11/27/19 23:00 • (DUP) R3477159-17 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.11	7.13	1	0.281		1

Sample Narrative:

OS: 7.11 at 16.8C  
DUP: 7.13 at 17C

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1165504-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-05 11/27/19 23:00 • (DUP) R3477159-18 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	6.91	6.93	1	0.289		1

Sample Narrative:

OS: 6.91 at 16.1C  
DUP: 6.93 at 16.2C

L1165504-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-06 11/27/19 23:00 • (DUP) R3477159-19 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.08	7.08	1	0.000		1

Sample Narrative:



L1165504-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-06 11/27/19 23:00 • (DUP) R3477159-19 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
OS: 7.08 at 16.8C						
DUP: 7.08 at 16.6C						

1 Cp

2 Tc

3 Ss

4 Cn

L1165504-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-07 11/27/19 23:00 • (DUP) R3477159-20 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.11	7.11	1	0.000		1

5 Sr

6 Qc

Sample Narrative:

OS: 7.11 at 16.9C  
DUP: 7.11 at 16.9C

7 Gl

8 Al

L1165504-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-08 11/27/19 23:00 • (DUP) R3477159-21 11/27/19 23:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.45	7.51	1	0.802		1

9 Sc

Sample Narrative:

OS: 7.45 at 16.9C  
DUP: 7.51 at 17.1C

Laboratory Control Sample (LCS)

(LCS) R3477159-1 11/27/19 23:00

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
su	su		%	%	
pH	10.0	9.90	99.0	99.0-101	

Sample Narrative:

LCS: 9.9 at 18.9C



L1165323-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-04 11/30/19 17:00 • (DUP) R3477694-2 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.31	7.40	1	1.22	<u>J3</u>	1

Sample Narrative:

OS: 7.31 at 14.3C

DUP: 7.4 at 14C

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1165323-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-09 11/30/19 17:00 • (DUP) R3477694-3 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.39	7.42	1	0.405		1

Sample Narrative:

OS: 7.39 at 13C

DUP: 7.42 at 13C

L1165323-14 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-14 11/30/19 17:00 • (DUP) R3477694-4 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.42	7.39	1	0.405		1

Sample Narrative:

OS: 7.42 at 13.1C

DUP: 7.39 at 13.7C

L1165323-20 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-20 11/30/19 17:00 • (DUP) R3477694-5 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.63	7.54	1	1.19	<u>J3</u>	1

Sample Narrative:



L1165323-20 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-20 11/30/19 17:00 • (DUP) R3477694-5 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
OS: 7.63 at 13.1C						
DUP: 7.54 at 14C						

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

L1165323-25 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-25 11/30/19 17:00 • (DUP) R3477694-6 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.42	7.34	1	1.08	<u>J3</u>	1

<sup>5</sup>Sr

<sup>6</sup>Qc

Sample Narrative:

OS: 7.42 at 13.4C  
DUP: 7.34 at 13.3C

<sup>7</sup>Gl

<sup>8</sup>Al

L1165323-30 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-30 11/30/19 17:00 • (DUP) R3477694-7 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.41	7.40	1	0.135		1

<sup>9</sup>Sc

Sample Narrative:

OS: 7.41 at 14.2C  
DUP: 7.4 at 14.9C

L1165323-31 Original Sample (OS) • Duplicate (DUP)

(OS) L1165323-31 11/30/19 17:00 • (DUP) R3477694-8 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su			%		%
pH	7.34	7.38	1	0.543		1

Sample Narrative:

OS: 7.34 at 14.4C  
DUP: 7.38 at 14.9C



L1165504-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-09 11/30/19 17:00 • (DUP) R3477694-9 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su		%			%
pH	6.76	6.75	1	0.148		1

Sample Narrative:

OS: 6.76 at 14.5C  
DUP: 6.75 at 14.6C

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

L1165504-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-10 11/30/19 17:00 • (DUP) R3477694-10 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su		%			%
pH	7.23	7.23	1	0.000		1

Sample Narrative:

OS: 7.23 at 15.4C  
DUP: 7.23 at 15.6C

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1165586-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165586-01 11/30/19 17:00 • (DUP) R3477694-11 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su		%			%
pH	8.35	8.40	1	0.597		1

Sample Narrative:

OS: 8.35 at 17.4C  
DUP: 8.4 at 17.6C

L1165616-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1165616-02 11/30/19 17:00 • (DUP) R3477694-12 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su		%			%
pH	6.22	6.25	1	0.481		1

Sample Narrative:



L1165616-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1165616-02 11/30/19 17:00 • (DUP) R3477694-12 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
OS: 6.22 at 16.9C						
DUP: 6.25 at 17.6C						

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

L1165618-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1165618-02 11/30/19 17:00 • (DUP) R3477694-13 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
pH	7.68	7.67	1	0.130		1

<sup>5</sup>Sr

<sup>6</sup>Qc

Sample Narrative:

OS: 7.68 at 14.9C  
DUP: 7.67 at 16.2C

<sup>7</sup>Gl

<sup>8</sup>Al

L1165684-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165684-01 11/30/19 17:00 • (DUP) R3477694-14 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
pH	6.88	6.85	1	0.437		1

<sup>9</sup>Sc

Sample Narrative:

OS: 6.88 at 14.9C  
DUP: 6.85 at 14.8C

L1165684-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1165684-02 11/30/19 17:00 • (DUP) R3477694-15 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
su	su	su		%		%
pH	4.66	4.66	1	0.000		1

Sample Narrative:

OS: 4.66 at 14.4C  
DUP: 4.66 at 14.1C



L1165684-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1165684-03 11/30/19 17:00 • (DUP) R3477694-16 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	3.85	3.88	1	0.776		1

Sample Narrative:

OS: 3.85 at 14.9C

DUP: 3.88 at 15C



L1165723-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165723-01 11/30/19 17:00 • (DUP) R3477694-17 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.02	8.07	1	0.622		1

Sample Narrative:

OS: 8.02 at 16.2C

DUP: 8.07 at 16.2C



L1165844-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1165844-01 11/30/19 17:00 • (DUP) R3477694-18 11/30/19 17:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.17	6.24	1	1.13	J3	1

Sample Narrative:

OS: 6.17 at 16.2C

DUP: 6.24 at 16.6C

Laboratory Control Sample (LCS)

(LCS) R3477694-1 11/30/19 17:00

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	9.98	99.8	99.0-101	

Sample Narrative:

LCS: 9.98 at 19.2C



Method Blank (MB)

(MB) R3479346-1 12/04/19 16:26

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

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

L1165338-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1165338-09 12/04/19 21:43 • (DUP) R3479346-3 12/04/19 21:56

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	7.16	7.13	1	0.466		15
Fluoride	0.156	0.153	1	1.69		15
Sulfate	17.4	17.3	1	0.213		15

L1165504-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-05 12/05/19 02:06 • (DUP) R3479346-7 12/05/19 03:23

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	16.3	16.2	1	0.386		15
Fluoride	0.146	0.147	1	0.547		15

L1165504-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1165504-05 12/05/19 03:36 • (DUP) R3479346-8 12/05/19 03:50

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	180	185	5	2.58		15

Laboratory Control Sample (LCS)

(LCS) R3479346-2 12/04/19 16:40

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Chloride	40.0	38.6	96.4	80.0-120	
Fluoride	8.00	7.80	97.5	80.0-120	
Sulfate	40.0	39.4	98.6	80.0-120	



L1165338-09 Original Sample (OS) • Matrix Spike (MS)

(OS) L1165338-09 12/04/19 21:43 • (MS) R3479346-4 12/04/19 22:10

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	7.16	57.3	100	1	80.0-120	
Fluoride	5.00	0.156	5.12	99.2	1	80.0-120	
Sulfate	50.0	17.4	67.5	100	1	80.0-120	

L1165504-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1165504-04 12/05/19 01:11 • (MS) R3479346-5 12/05/19 01:25 • (MSD) R3479346-6 12/05/19 01:39

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	27.0	70.8	71.2	87.7	88.5	1	80.0-120			0.580	15
Fluoride	5.00	0.329	4.73	4.77	88.0	88.9	1	80.0-120			0.955	15
Sulfate	50.0	315	338	338	46.0	46.4	1	80.0-120	<u>EV</u>	<u>EV</u>	0.0672	15

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3477828-1 11/30/19 18:54

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Boron	U		0.0126	0.200
Calcium	0.137	↓	0.0463	1.00
Lithium	U		0.00530	0.0150
Molybdenum	U		0.00160	0.00500
Selenium	U		0.00740	0.0100

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

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

(LCS) R3477828-2 11/30/19 18:57 • (LCSD) R3477828-3 11/30/19 18:59

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Barium	1.00	0.988	1.01	98.8	101	80.0-120			1.87	20
Boron	1.00	0.982	0.981	98.2	98.1	80.0-120			0.102	20
Calcium	10.0	9.96	10.1	99.6	101	80.0-120			1.13	20
Lithium	1.00	1.03	1.03	103	103	80.0-120			0.387	20
Molybdenum	1.00	0.996	1.01	99.6	101	80.0-120			1.19	20
Selenium	1.00	0.945	0.958	94.5	95.8	80.0-120			1.41	20

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

L1165504-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1165504-04 11/30/19 19:02 • (MS) R3477828-5 11/30/19 19:07 • (MSD) R3477828-6 11/30/19 19:09

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Barium	1.00	0.176	1.16	1.17	97.9	99.6	1	75.0-125			1.45	20
Boron	1.00	2.09	3.05	3.06	95.5	97.0	1	75.0-125			0.489	20
Calcium	10.0	115	124	124	87.9	86.5	1	75.0-125			0.112	20
Lithium	1.00	0.0188	1.02	1.03	100	101	1	75.0-125			1.08	20
Molybdenum	1.00	0.00953	1.01	1.03	100	102	1	75.0-125			1.71	20
Selenium	1.00	ND	0.980	0.991	98.0	99.1	1	75.0-125			1.13	20



Method Blank (MB)

(MB) R3477867-1 12/01/19 21:26

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

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

(LCS) R3477867-2 12/01/19 21:29 • (LCSD) R3477867-3 12/01/19 21:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.0489	0.0496	97.8	99.3	80.0-120			1.52	20

L1165504-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1165504-04 12/01/19 21:36 • (MS) R3477867-5 12/01/19 21:43 • (MSD) R3477867-6 12/01/19 21:46

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.0266	0.0760	0.0748	98.7	96.5	1	75.0-125			1.48	20

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

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

### Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.  
 \* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

## State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1,6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

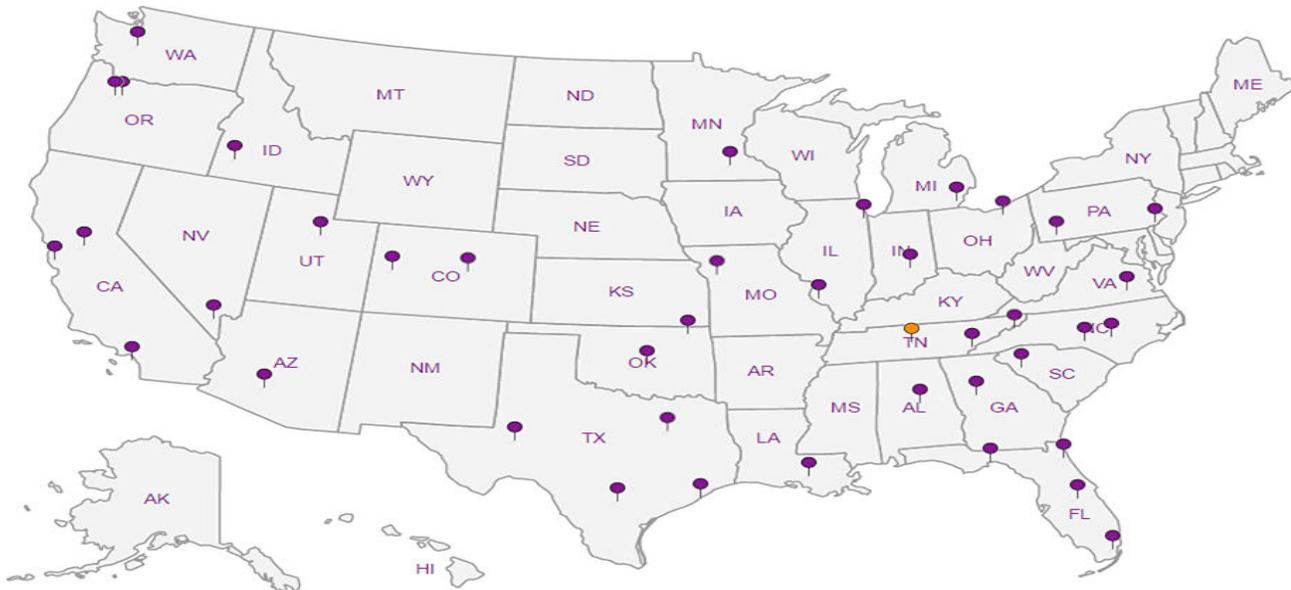
## Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

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

## Our Locations

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



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

# Kansas City Board of Public Utilities

300 N 65th Street  
Kansas City, KS 66102

Billing Information:  
300 N 65th St  
Kansas City, KS 66102

Pres  
Chk

Report to:  
Ingrid Setzler

Email To:  
isetzler@bpu.com; kbrown@bpu.com; bhoeye@burn

Project  
Description: **GW-Creek Bottom Ash Pond**

City/State Collected: \_\_\_\_\_  
Please Circle: PT MT CT ET

Phone: 913-573-9806  
Fax: 913-573-9838

Client Project #  
**KCBPU Nearman**

Lab Project #  
**KCKAN02-MW NEARMAN2**

Collected by (print):  
*Jonathan Hummer*

Site/Facility ID #

P.O. #

Collected by (signature):  
*Jonathan Hummer*

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

Quote #  
Date Results Needed

Immediately Packed on Ice N  Y

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, F, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres									
MW-2A/6W02	Grab	GW	-	11-26-19	1335	3	X	X	X									-9
MW-3/6W02	Grab	GW	-	11-26-19	1435	3	X	X	X									02
MW-4/6W02	Grab	GW	-	11-26-19	1520	3	X	X	X									03
MW-8A/6W02	Grab	GW	-	11-26-19	1625	3	X	X	X									04
MW-10/6W02	Grab	GW	-	11-26-19	1740	3	X	X	X									05
MW-13/6W02	Grab	GW	-	11-26-19	0820	3	X	X	X									06
MW-14/6W02	Grab	GW	-	11-26-19	0915	3	X	X	X									07
MW-15/6W02	Grab	GW	-	11-26-19	1010	3	X	X	X									08
MW-16/6W02	Grab	GW	-	11-25-19	1225	3	X	X	X									09
DUP-1/6W02	Grab	GW	-	11-26-19	-	3	X	X	X									10

Analysis / Container / Preservative

Chain of Custody Page \_\_\_ of \_\_\_



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



SDG # **116 5504**  
**G135**

Acctnum: KCKAN02  
Template: T159295

Prelogin: P741307  
PM: 616 - Stacy Kennedy  
PB: 11/18/19 *my*

Shipped Via: **FedEX Ground**

Remarks | Sample # (lab only)

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

Remarks:

pH \_\_\_\_\_ Temp \_\_\_\_\_  
Flow \_\_\_\_\_ Other \_\_\_\_\_

Sample Receipt Checklist	
COC Seal Present/Intact:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
COC Signed/Accurate:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Bottles arrive intact:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Correct bottles used:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Sufficient volume sent:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
If Applicable	
VCA Zero Headspace:	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Preservation Correct/Checked:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
RAD Screen <0.5 mR/hr:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N

Samples returned via:  
 UPS  FedEx  Courier

Tracking #

Trip Blank Received: Yes/No  
HCL/MeOH  
TBR

Temp: \_\_\_\_\_ °C  
Bottles Received: **36**

If preservation required by Login: Date/Time

Relinquished by: (Signature)  
*Jonathan Hummer*  
Date: 11-26-19 Time: 6:15

Received by: (Signature)  
*Carol Kern*  
Date: 11-26-19 Time: 1:00

Received for lab by: (Signature)  
*Carol Kern*  
Date: 11/27/19 Time: 9:10

Hold: \_\_\_\_\_  
Condition: NCF 10X

# Kansas City Board of Public Utilities

300 N 65th Street  
Kansas City, KS 66102

Billing Information:  
300 N 65th St  
Kansas City, KS 66102

Report to:  
Ingrid Setzler

Email To:  
isetzler@bpu.com; kbrown@bpu.com; bhoye@burn

Project Description: **GW-Creek Bottom Ash Pond**

City/State Collected:

Please Circle:  
PT MT CT ET

Phone: 913-573-9806  
Fax: 913-573-9838

Client Project #  
**KCBPU Nearman**

Lab Project #  
**KCKAN02-MW NEARMAN2**

Collected by (print):  
*Jonathan Hummer*

Site/Facility ID #

P.O. #

Collected by (signature):  
*Jonathan Hummer*

Rush? (Lab MUST Be Notified)

Quote #

Same Day Five Day  
Next Day 5 Day (Rad Only)  
Two Day 10 Day (Rad Only)  
Three Day

Date Results Needed

No. of Cntrs

Immediately Packed on Ice N \_\_\_ Y \_\_\_

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Remarks	Sample # (lab only)
<del>DUP-2</del>		GW				3	X	X	X		
<del>MS - MW-BA/GW02MS Grab</del>		GW	-	11-26-19	1125	3	X	X	X		09
<del>MS-D - MW-BA/GW02MS Grab</del>		GW	-	11-26-19	1125	3	X	X	X		09

*Jonathan Hummer*

11-26-19

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

Remarks:

pH \_\_\_\_\_ Temp \_\_\_\_\_  
Flow \_\_\_\_\_ Other \_\_\_\_\_

Samples returned via:  
\_\_\_ UPS \_\_\_ FedEx \_\_\_ Courier

Tracking #

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

Relinquished by: (Signature)  
*Jonathan Hummer*

Date: 11-26-19

Time: 1615

Received by: (Signature)  
*Paul Kemp*

Trip Blank Received: Yes/No  
HCL/MeOH TBR

Relinquished by: (Signature)  
*Paul Kemp*

Date: 11-26-19

Time: 1800

Received by: (Signature)

Temp: 36 °C  
Bottles Received: 36

If preservation required by Login: Date/Time

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)  
*Paul Kemp*

Date: 11/27/19 Time: 9:10

Hold:

Condition:  
NCF /  OY

Analysis / Container / Preservative

Chain of Custody Page \_\_\_ of \_\_\_



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



SDG # 1165500

Table #

Acctnum: KCKAN02

Template: T159295

Prelogin: P741307

PM: 616 - Stacy Kennedy

PB: 11/19/19

Shipped Via: FedEX Ground

Remarks Sample # (lab only)



CREATE AMAZING.

Burns & McDonnell World Headquarters  
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Kansas City, MO 64114  
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F 816-333-3690  
[www.burnsmcd.com](http://www.burnsmcd.com)