2017 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
1/31/2018

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prepared for

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Kansas City, Kansas

Project No. 88777

1/31/2018

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
BA	Bottom Ash
bgs	below ground surface
BPU	Kansas City, Kansas Board of Public Utilities
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CCR	coal combustion residuals
CCR Final Rule	*Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities; Final Rule*, dated April 17, 2015 (USEPA, 2015
CFR	Code of Federal Regulations
Groundwater Monitoring Program	*Groundwater Monitoring Plan for the Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2016a)
NCPS	Nearman Creek Power Station
Report	Annual Groundwater Monitoring Report
SAP	Sampling and Analysis Plan
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

This Annual Groundwater Monitoring 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) § 257 and 261, dated April 17, 2015 (USEPA, 2015) (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 and well installations activities performed in 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). Groundwater monitoring activities completed at the Site in 2015, 2016, and 2017 included:

- The establishment of a groundwater monitoring well network in accordance with Final CCR Rule requirements;
- Hydraulic conductivity testing at each of the wells included in the Bottom Ash (BA) Pond monitoring well network;
- Routine gauging of Site monitoring wells to assess the direction of groundwater flow beneath the BA Pond; and
- Collecting and analyzing at least 8 rounds of groundwater samples from each of the five wells included in the BA Pond well network prior to October 17, 2017 for analysis of Appendix III and Appendix IV parameters in accordance with 40 CFR §257.94(b).
- Initiating evaluation of groundwater monitoring data for statistically significant increases over background levels for constituents listed in Appendix III of 40 CFR § 257, as required by 40 CFR § 257.94.

1.1 Purpose and Scope

This Report has been prepared per 40 CFR 257.90(e) and documents the status of the groundwater monitoring and corrective action program for the CCR unit (BA Pond), summarize key actions

completed, describe any problems encountered, discuss any actions to resolve the problems, and project key activities for the upcoming year. This document is the first routine annual groundwater monitoring report and has been prepared for the BA Pond. Future annual groundwater monitoring reports will present information from the previous calendar year, as per the requirements contained in 40 CFR §257.90(e).

1.2 Overview

This Report is organized in sections as summarized below:

- **Section 1.0 Introduction**
- **Section 2.0 Monitoring Well Installation Activities** - Section 2.0 describes monitoring well installation activities and a description of the BA Pond monitoring well network.
- **Section 3.0 Groundwater Monitoring Activities and Results–** Section 3.0 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 4.0 Statistical Analysis –** Section 4.0 discusses statistical analyses of data generated during the reporting period.
- **Section 5.0 Certifications and Notifications to the Operating Record –** Section 5.0 presents certifications and notifications that were prepared during the reporting period and placed in the operating record.
- **Section 6.0 – Key Activities for the Upcoming Year** – Section 6.0 presents an account of anticipated activities for 2018.
- **Section 7.0 References** - Section 7.0 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 MONITORING WELL INSTALLATION

2.1 Scope of Well Installation Activities

To meet the requirements presented in the Final Rule, three new monitoring wells were installed at the BA Pond to supplement the existing monitoring well network. These new wells were installed to provide downgradient monitoring locations that were screened within the same hydrogeologic units as upgradient Monitoring Wells MW-3 and MW-4. Figure 2-1 presents the BA Pond monitoring well network relative to the CCR surface impoundment. Monitoring well boring logs. well construction diagrams, and well development forms are included in Appendix A.

2.2 Drilling and Well Installation Activities

Drilling and well installation activities for Monitoring Wells MW-2A, MW-8A, and MW-10 were conducted by Razek Environmental, LLC, a Kansas-licensed driller using the procedures presented in the Sampling and Analysis Plan (SAP). MW-2A, MW-8A, and MW-10 were screened just below the top of the uppermost water bearing unit, within the same silt/silty sand unit that is screened by upgradient wells MW-3 and MW-4. All drilling, sampling and investigation equipment was decontaminated prior to beginning field activities, between boring/well locations, and upon completion of well installation activities. Monitoring Wells MW-3 and MW-4 were installed in 1982 and were incorporated into the BA Pond well network.

As presented in Appendix A, Monitoring Wells MW-2A, MW-8A, and MW-10 were constructed with 2-inch nominal diameter, Schedule 40 polyvinyl chloride with 5-foot, 0.01-inch, machine-cut screens. Filter pack consisted of washed 20/40 silica sand placed in the borehole to a depth of at least 3 feet above the top of the screen. The remaining annulus was then filled to approximately 3 feet bgs with bentonite chips that were hydrated in 1-foot lifts. The remainder of the borehole was filled with portland cement, which was completed as a 6-inch thick well pad. Monitoring wells were finished with a lockable, stick-up completion and four concrete-filled bollards were installed around each monitoring well completion. Appendix A includes drilling logs and well construction diagrams for Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, and MW-10.

2.3 Well Development

All newly installed monitoring wells were developed following procedures presented in the SAP by intermittently surging the well screen and purging the wells until development had been achieved. Monitoring well development forms are presented in Appendix A.

2.4 Hydrologic Testing

Following development, pneumatic slug testing was performed on Monitoring Wells MW-2A, MW-8A, and MW-10 to assess the hydraulic conductivity of the materials screened by the newly installed wells. For pneumatic slug tests to be effective, the water level within the tested well must be above the top of the screened interval. As a result, hydraulic testing was not performed on the existing wells MW-3 and MW-4 due to the length of the screened intervals. Seven pneumatic slug tests were performed on each of the wells tested by applying a vacuum and allow the well to stabilize before releasing the vacuum and measuring the well's response using a data logger. The resulting data was used to calculate the hydraulic conductivity of the screened interval. Table 2-1 presents the results of each test as well as the averages of the tests performed at each location. Hydraulic test data is presented in Appendix B.

2.5 Pump Installation

Dedicated low-flow pneumatic pumps supplied by QED Environmental Systems were installed in Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, and MW-10. The pumps were installed so that the pump inlet was suspended approximately 1 foot above the bottom of the screened interval.

2.6 Well Surveying

The new groundwater monitoring wells were surveyed for both vertical and horizontal control by Kaw Valley Engineering, Inc., a licensed Kansas Professional Land Surveyor. The well locations were surveyed horizontally to the nearest 0.01 foot and tied into the Kansas State Plane coordinate system. The well pad and top of casing elevations of each well was measured to the nearest 0.01 foot relative to mean annual sea level and reported using North American Vertical Datum 1988. Survey data is provided in Appendix C.

3.0 GROUNDWATER MONITORING ACTIVITIES AND RESULTS

Groundwater samples were collected using low-flow sampling techniques following the procedures presented in the SAP and in accordance with the requirements of the Groundwater Monitoring Program and the Final CCR Rule.

3.1 Description of the Groundwater Monitoring Program

The BA Pond is currently in detection monitoring. Since the Final CCR Rule went into effect, a total of 9 background monitoring events have been performed at the BA Pond to provide a minimum of eight independent groundwater samples for each of the parameters listed in 40 CFR §257 Appendix III and IV. The following bullets present a summary of the timing of each of the nine background monitoring events performed at the Site. In accordance with the Groundwater Monitoring Program, samples were collected from Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, and MW-10, and the BA Pond during each event. No transitions between detection and assessment groundwater monitoring programs occurred during the reporting period.

- October 2015 – Groundwater sampling activities were performed on October 29 and 30, 2015.
- January 2016 – Groundwater sampling activities were performed on January 27, 2016.
- April 2016 – Groundwater sampling activities were performed on April 27 and 29, 2016.
- July 2016 – Groundwater sampling activities were performed on July 25 and 26, 2016.
- October 2016 – Groundwater sampling activities were performed on October 26 and 27, 2016
- January 2017 – Groundwater sampling activities were performed on January 23 and 24, 2017.
- April 2017 – Groundwater sampling activities were performed on April 24 and 25, 2017
- July 2017 – Groundwater sampling activities were performed on July 24 and July 25, 2017.
- September 2017- Groundwater sampling activities were performed on September 14, 2017.

With the exception of the July 2017 event, each of the locations identified were sampled for the 40 CFR §257 Appendix III and IV parameters during each of the sampling events listed above. During the July 2017 event, samples were not collected for radium 226/228 combined, as the appropriate sample containers were not provided. However, this did not preclude the collection of eight independent samples for Radium 226/228 prior to October 17, 2017, as required by 40 CFR § 257.90(b)(iii).

3.2 Narrative of Groundwater Sampling Activities

During each event, the depth to groundwater was gauged prior to sampling using a decontaminated water level or oil/water interface probe. The measured depth to groundwater and calculated water level

elevations for each event are presented in Tables 3-1 through 3-9. Once gauged, the wells were purged using dedicated low-flow sampling pumps until stabilization criteria had been met and the turbidity was below 5 Nephelometric Turbidity Units. Once stabilized, the BA Pond monitoring wells were sampled for 40 CFR §257 Appendix III and IV parameters using the analytical methods presented on Table 3-10. Samples were maintained in accordance with the SAP and were provided to ESC Lab Sciences (ESC) for analysis. With the exception of the radium 226/228 combined samples not being collected during the July 2017 sampling event (See Section 3.1), no issues were encountered during the nine sampling events performed at the BA Pond. Monitoring well sampling forms for each of the groundwater monitoring events are presented in Appendix D. While analytical data are summarized in Table 3-10, 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 F and all data are considered fit for reporting as qualified.

As presented on Figures 3-1 through 3-9, the primary groundwater gradients observed during the reporting period were predominantly to the northwest. Intermittent variations in the gradient were observed during periods of high river stage in the Missouri River.

4.0 STATISTICAL ANALYSIS

4.1 Summary of Statistical Analyses Performed During the Reporting Period

As required by 40 CFR § 257.90(b)(iv), the evaluations of the groundwater monitoring data for statistically significant increases over background levels for the constituents listed in Appendix III of 40 CFR § 257, per 40 CFR § 257.94, was initiated prior to October 17, 2017. In accordance with 40 CFR §257.93(h)(2), statistical analysis of the background data was completed by January 15, 2018, within 90 days following analysis of the samples collected during the final background sampling event and will be included in the 2018 Annual Groundwater Monitoring and Corrective Action Report, to be prepared by January 31, 2019.

5.0 CERTIFICATIONS AND NOTIFICATIONS TO THE OPERATING RECORD

The following certifications and notifications were made to the operating record during the reporting period in association with the groundwater monitoring activities:

- Certification of the BA Pond Groundwater Monitoring Network - *Groundwater Monitoring System Certification for Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2016c)
- Selection of Statistical Method – *Selection of Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2017)

6.0 KEY ACTIVITIES FOR THE UPCOMING YEAR

Groundwater monitoring and statistical assessments are expected to be performed in 2018 as required by the BA Pond detection monitoring program and, if necessary, an assessment monitoring program to be developed in accordance with 40 CFR §257.94 and 40 CFR §257.95, as appropriate.

7.0 REFERENCES

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell), 2016a, *Groundwater Monitoring Plan for the Nearman Creek Power Station Bottom Ash Pond*, March 14, 2016.

Burns & McDonnell, 2016b, *Sampling and Analysis Plan for the Nearman Creek Power Station Bottom Ash Pond*, March 14, 2016.

Burns & McDonnell, 2016c, *Groundwater Monitoring System Certification for Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond*, June 15, 2016.

Burns & McDonnell, 2017, *Selection of Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond*, October 17, 2017.

United States Environmental Protection Agency, 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, 2015, http://www.gpo.gov/fdsys/pkg/FR-2015-04-17/pdf/2015-00257.pdf.

TABLES

Table 2-1
Summary of Pneumatic Slug Test Results
Kansas City Board of Public Utilities
Nearman Creek Power Station - Bottom Ash Pond

Well	Test 1 K (cm/sec)	Test 2 K (cm/sec)	Test 3 K (cm/sec)	Test 4 K (cm/sec)	Test 5 K (cm/sec)	Test 6 K (cm/sec)	Test 7 K (cm/sec)	Average K (cm/sec)
MW-2A	0.01541	0.01603	0.01656	0.01657	0.01449	0.0168	0.01668	0.016077
MW-8A	0.004732	0.004251	0.004891	0.004737	0.004853	0.007572	0.007186	0.005460
MW-10	0.007573	0.007414	0.007625	0.007036	0.007867	0.007613	0.007886	0.007573

Notes:
K = Hydraulic Conductivity
cm/sec = Centimeters per second

Table 3-1
Monitoring Well Gauging Data - October 2015
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	10/29/2015	747.86	31.64	31.44	21.32	726.54
MW-3	10/29/2015	750.44	33.52	33.80	23.38	727.06
MW-4	10/29/2015	746.9	32.25	31.67	19.78	727.12
MW-8A	10/29/2015	750.1	35.38	34.99	24.45	725.65
MW-10	10/29/2015	745.25	29.66	29.41	19.45	725.80

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

Table 3-2
Monitoring Well Gauging Data - January 2016
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	1/27/2016	747.86	31.64	31.65	21.30	726.56
MW-3	1/27/2016	750.44	33.52	33.99	23.35	727.09
MW-4	1/27/2016	746.9	32.25	31.88	19.34	727.56
MW-8A	1/27/2016	750.1	35.38	35.20	24.90	725.20
MW-10	1/27/2016	745.25	29.66	29.64	19.50	725.75

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

Table 3-3
Monitoring Well Gauging Data - April 2016
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	4/27/2016	747.86	31.64	31.65	20.53	727.33
MW-3	4/27/2016	750.44	33.52	33.98	23.50	726.94
MW-4	4/27/2016	746.9	32.25	31.89	20.14	726.76
MW-8A	4/27/2016	750.1	35.38	35.21	23.52	726.58
MW-10	4/27/2016	745.25	29.66	29.64	18.20	727.05

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

Table 3-4
Monitoring Well Gauging Data - July 2016
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	7/25/2016	747.86	31.64	NM	18.42	729.44
MW-3	7/25/2016	750.44	33.52	NM	20.52	729.92
MW-4	7/25/2016	746.9	32.25	NM	17.03	729.87
MW-8A	7/25/2016	750.1	35.38	NM	22.03	728.07
MW-10	7/25/2016	745.25	29.66	NM	16.57	728.68

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 3-5
Monitoring Well Gauging Data - October 2016
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	10/24/2016	747.86	31.64	NM	20.54	727.32
MW-3	10/24/2016	750.44	33.52	NM	22.79	727.65
MW-4	10/24/2016	746.9	32.25	NM	19.32	727.58
MW-8A	10/24/2016	750.1	35.38	NM	23.96	726.14
MW-10	10/24/2016	745.25	29.66	NM	19.55	725.70

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 3-6
Monitoring Well Gauging Data - January 2017
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	1/23/2017	747.86	31.64	31.65	24.26	723.60
MW-3	1/23/2017	750.44	33.52	33.96	26.70	723.74
MW-4	1/23/2017	746.9	32.25	31.90	23.30	723.60
MW-8A	1/23/2017	750.1	35.38	35.17	27.71	722.39
MW-10	1/23/2017	745.25	29.66	29.65	22.26	722.99

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 3-7
Monitoring Well Gauging Data - April 2017
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	4/24/2017	747.86	31.64	31.68	20.87	726.99
MW-3	4/24/2017	750.44	33.52	33.93	23.62	726.82
MW-4	4/24/2017	746.9	32.25	31.90	20.32	726.58
MW-8A	4/24/2017	750.1	35.38	35.00	23.80	726.30
MW-10	4/24/2017	745.25	29.66	29.59	18.58	726.67

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 3-8
Monitoring Well Gauging Data - July 2017
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	7/24/2017	747.86	31.64	NM	20.32	727.54
MW-3	7/24/2017	750.44	33.52	NM	22.38	728.06
MW-4	7/24/2017	746.9	32.25	NM	18.86	728.04
MW-8A	7/24/2017	750.1	35.38	NM	23.95	726.15
MW-10	7/24/2017	745.25	29.66	NM	18.55	726.70

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 3-9
Monitoring Well Gauging Data - September 2017
Nearman Creek Power Station
Bottom Ash Pond

Well	Date Measuerd	Top of Casing Elevation (ft MSL)	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	9/14/2017	747.86	31.64	NM	21.07	726.79
MW-3	9/14/2017	750.44	33.52	NM	23.25	727.19
MW-4	9/14/2017	746.9	32.25	NM	19.55	727.35
MW-8A	9/14/2017	750.1	35.38	NM	24.66	725.44
MW-10	9/14/2017	745.25	29.66	NM	19.33	725.92

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 3-10
Summary of Analytical Results
October 2015 through September 2017 Sampling Events
Nearman 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-4	MW-4	MW-4	MW-4
		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	10/30/2015	1/27/2016	4/27/2016	7/25/2016
		Lab ID	L798087-02 L798090-01	L814632-02 390438002	20160407-02	20160702-02	20161076-02	20170052-02	20170354-02	L925244-02	L936894-02 20170864-02	L798087-03 L798090-02	L814632-03 390438003	20160407-03	20160702-03
Analytical Method	**Analyte**	**Unit**													
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	0.218	0.219	0.244	0.272	0.24	0.208	0.2 U	0.218	0.226	0.2 U	0.2 U	0.2 U	0.2 U
6010B	Calcium	mg/l	194	199	201	235	218	212	191	218	195	200	191	206	181 V
9056MOD	Chloride	mg/l	4.45	4.65	4.64	4.37	5.23	5.88	7.83	6.69	5.63	9.72	8.98	13.4	3.9
9056MOD	Fluoride	mg/l	0.158	0.125	0.139	0.1 U	0.138	0.176	0.136	0.141	0.157	0.112	0.12	0.108	0.104
9040C	pH	su	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	6.92 J	7.02 J	6.84 J	6.87 J
In Situ	pH	su	6.93	6.7	6.33	6.87	6.74	6.75	6.68	6.63	6.6	6.8	6.7	6.11	6.81
9056MOD	Sulfate	mg/l	109	114	121	117	121	130	115	143	106	116	109	128	74.5
2540 C-2011	Total Dissolved Solids	mg/l	717	749	771	845	697	831	715	827	733	780	736	755	683
Appendix IV - Assessment Monitoring															
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	0.002 U	0.002 U
6020	Arsenic	mg/l	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	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Barium	mg/l	0.151	0.152	0.154	0.197	0.173	0.165	0.145	0.159	0.177	0.16	0.148	0.152	0.141
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	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	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	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	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.158	0.125	0.139	0.1 U	0.138	0.176	0.136	0.141	0.157	0.112	0.12	0.108	0.104
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	0.005 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.0441	0.0525	0.0528	0.0536	0.0551	0.0542	0.0548	0.0461	0.0486	0.0372	0.0439	0.0418	0.0425
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	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	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	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	0.01 U	0.00576	0.00406	0.0196	0.00685	0.002 U	0.002 U	0.00411	0.00568	0.0423	0.0562	0.00642	0.0315
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	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	0.637	1.63	2.09	0.630 J	1.06	4.26	1.27 J	NA	1.27 J	0.266	1.16	0.460	0.700 J

Notes:

Samples were collected for background analysis of Appendix III/IV under the detection monitoring program.

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated for potential high bias

mg/l = milligram per liter

NA = Not Available

NM = Not Measured

pCi/L = picocurie per liter

su = Standard Units

U - Non Detect at the identified concentration

U* = Qualified as non detect durring data validation process

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

* = pH measurement was collected on 5/4/2016

Table 3-10
Summary of Analytical Results
October 2015 through September 2017 Sampling Events
Nearman Power Station
Bottom Ash Pond

		Sample Location	MW-4	MW-4	MW-4	MW-4	MW-4	MW-2A	MW-2A	DUP-1	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	DUP-2
		Sample Date	10/25/2016	1/24/2017	4/24/2017	7/26/2017	9/14/2017	10/29/2015	1/27/2016	1/27/2016	4/27/2016	7/25/2016	10/25/2016	1/23/2017	4/24/2017	4/24/2017
		Lab ID	L868992-03	L886074-03	L905439-03	L925244-03	L936894-03	L798087-06	L814632-01	L814632-07	L832453-01	L849542-01	L868992-01	L886084-01	L905439-01	L905439-10
			20161076-03	20170052-03	20170354-03		20170864-03	L798090-03	390438001	390438007	20160407-01	20160702-01	20161076-01	20170052-01	20170354-01	20170354-09
Analytical Method	**Analyte**	**Unit**							*Duplicate Pair*						*Duplicate Pair*	
Appendix III - Detection Monitoring																
6010B	Boron	mg/l	0.2 U	0.2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.221	0.353	0.261	0.2 U	0.495	0.2 U	0.2 U
6010B	Calcium	mg/l	186	207	224	193	186	223	208	206	200 V	231	163	193	128	130
9056MOD	Chloride	mg/l	6.27	11.2	12.4	6.6	4.92	7.54	5.81	5.92	6.47	6.64	9.7	14.9	9.83	9.88
9056MOD	Fluoride	mg/l	0.131	0.172	0.119	0.135	0.148 J-	0.129	0.159	0.154	0.158	0.114	0.13	0.187	0.181	0.191
9040C	pH	su	7.30 J	6.87 J	6.86 J	6.71 J	6.88 J	6.86 J	6.91 J	6.93 J	6.85 J	6.69 J	7.00 J	6.84 J	7.0 J	7.02 J
In Situ	pH	su	6.86	6.81	6.69	6.79	6.70	6.96	6.8	6.8	6.26	6.63	6.86	6.75	6.85	6.85
9056MOD	Sulfate	mg/l	96.2	148	148	117	100	227	180	182	153	196	127	153	81.6	82.5
2540 C-2011	Total Dissolved Solids	mg/l	837	774	840	736	732	852	811	783	848	865	616	734	508	478
Appendix IV - Assessment Monitoring																
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	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00361	0.00468	0.00465	0.00416	0.00492	0.00499	0.00541	0.00381	0.00326
6010B	Barium	mg/l	0.149	0.173	0.151	0.14	0.146	0.127	0.125	0.126	0.12	0.135	0.102	0.129	0.0796	0.0796
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	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	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	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	0.0112	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	0.131	0.172	0.119	0.135	0.148 J-	0.129	0.159	0.154	0.158	0.114	0.13	0.187	0.181	0.191
6020	Lead	mg/l	0.002 U	0.002 U	0.002 U	0.002 U	0.002 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
6010B	Lithium	mg/l	0.0464	0.0411	0.0442	0.0353	0.0428	0.0357	0.0395	0.04	0.0442	0.0457	0.0351	0.0334	0.0305	0.0305
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	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	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	0.005 U	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	0.0383	0.0155	0.002 U	0.022	0.0186	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
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	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	0.756	0.18 U*	0.191	NA	0.191 J	0.763	2.45	1.21	1.33	1.68	0.72	1.70	0.214 J	0.597 J

Notes:

Samples were collected for background analysis of Appendix III/IV under the detection monitoring program.

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated for potential high bias

mg/l = milligram per liter

NA = Not Available

NM = Not Measured

pCi/L = picocurie per liter

su = Standard Units

U - Non Detect at the identified concentration

U* = Qualified as non detect durring data validation process

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

* = pH measurement was collected on 5/4/2016

Table 3-10
Summary of Analytical Results
October 2015 through September 2017 Sampling Events
Nearman Power Station
Bottom Ash Pond

		Sample Location	MW-2A	DUP-1	MW-2A	DUP-1	MW-8A	DUP-1A	MW-8A	MW-8A	DUP-2	MW-8A	MW-8A	MW-8A	MW-8A
		Sample Date	7/25/2017	7/25/2017	9/14/2017	9/14/2017	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
		Lab ID	L925244-01	L925244-09	L936894-01 20170864-01	L936894-08 20170864-10	L798087-07 L798090-04	L798087-10 L798090-07	L814632-04 390438004	L832453-04 20160407-04	L832453-08 20160407-08	L849542-04 20160702-04	L868992-04 20161076-04	L886084-04 20170052-04	L905439-04 20160407-04
Analytical Method	**Analyte**	**Unit**	*Duplicate Pair*		*Duplicate Pair*		*Duplicate Pair*			*Duplicate Pair*					
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	0.2 U	0.2 U	0.2 U	0.2 U	2.37	2.38	2.48	2.61	2.67	2.66	2.29	2.38	2.26
6010B	Calcium	mg/l	138	140	155	155	186	185	168	186	182	204	156	146	126
9056MOD	Chloride	mg/l	9.67	9.67	6.26	6.33	26.5	30.3	30.4	30.2	30.1	29.3	30.3	26.9	29.6
9056MOD	Fluoride	mg/l	0.189	0.192	0.186	0.181	0.54	0.318	0.267	0.339	0.339	0.292	0.355	0.413	0.37
9040C	pH	su	6.94 J	7.01 J	6.91 J	6.99 J	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
In Situ	pH	su	6.84	6.84	6.8	6.8	6.94	6.94	6.9	6.75	6.75	6.56	6.92	6.88	6.86
9056MOD	Sulfate	mg/l	74.6	74.7	89	89.6	491	598	471	520	522	453	412	386	383
2540 C-2011	Total Dissolved Solids	mg/l	512	506	571	568	1180	1130	1060	1170	1170	1190	1040	935	880
Appendix IV - Assessment Monitoring															
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	0.002 U	0.002 U
6020	Arsenic	mg/l	0.00578	0.00553	0.00487	0.00487	0.012	0.0132	0.0127	0.0308	0.0299	0.0122	0.0134	0.0156	0.0232
6010B	Barium	mg/l	0.111	0.111	0.116	0.115	0.073	0.0738	0.0635	0.0937	0.0924	0.0624	0.0473	0.0524	0.0565
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	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	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	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	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.189	0.192	0.186	0.181	0.54	0.318	0.267	0.339	0.339	0.292	0.355	0.413	0.37
6020	Lead	mg/l	0.002 U	0.002 U	0.002 U	0.002 U	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
6010B	Lithium	mg/l	0.0206	0.0221	0.0294	0.0298	0.0243	0.0242	0.0309	0.0298	0.0298	0.0368	0.0316	0.0268	0.0275
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	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00584	0.00591	0.005 U	0.005 U	0.00623	0.00685
6010B	Selenium	mg/l	0.002 U	0.002 U	0.002 U	0.002 U	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
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	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	NA	NA	1.31 J	1.10 J	0.36	0.298	1.44	0.673	0.127	1.45	1.11	0.536	1.07 J

Notes:

Samples were collected for background analysis of Appendix III/IV under the detection monitoring program.

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated for potential high bias

mg/l = milligram per liter

NA = Not Available

NM = Not Measured

pCi/L = picocurie per liter

su = Standard Units

U - Non Detect at the identified concentration

U* = Qualified as non detect durring data validation process

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

* = pH measurement was collected on 5/4/2016

Table 3-10
Summary of Analytical Results
October 2015 through September 2017 Sampling Events
Nearman Power Station
Bottom Ash Pond

		Sample Location	MW-8A	MW-8A	MW-10	MW-10	MW-10	DUP-1	MW-10	DUP-1	MW-10	DUP-1	MW-10	MW-10	MW-10	MW-10
		Sample Date	7/25/2017	9/14/2017	10/29/2015	1/27/2016	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
		Lab ID	L925244-04	L936894-04 20170864-06	L798087-08 L798090-05	L814632-05 390438005	L832453-05 20160407-05	L832453-07 20160407-07	L849542-05 20160702-05	L849542-08 20160702-08	L868992-05 20161076-05	L868992-08 20161076-08	L886084-05 20170052-05	L905439-05 20170354-05	L925244-05	L936894-05 20170964-07
Analytical Method	**Analyte**	**Unit**					*Duplicate Pair*				*Duplicate Pair*					
Appendix III - Detection Monitoring																
6010B	Boron	mg/l	2.4	2.27	1.08	0.907	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	161	153	217	213	179	178	218	217	217	221	191	157	193	195
9056MOD	Chloride	mg/l	28.9	28.4	30.2	17	21.9	21.8	20.4	20.4	18	46.3	23.2	21.6	26	22.6
9056MOD	Fluoride	mg/l	0.325	0.268	0.327	0.104	0.125	0.105	0.125	0.1 U	0.111	0.101	0.183	0.161	0.143	0.144
9040C	pH	su	6.88 J	6.89 J	6.82 J	6.89 J	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	6.73	6.74	7.03	7.1	6.5	6.5	6.66	6.66	6.70	6.70	6.78	6.87	6.70	6.64
9056MOD	Sulfate	mg/l	477	380	623	227	220	226	223	217	228	75	238	193	280	258
2540 C-2011	Total Dissolved Solids	mg/l	1020	1000	1130	916	797	820	905	903	911	739	845	709	852	880
Appendix IV - Assessment Monitoring																
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	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.0145	0.0144	0.00743	0.00489	0.0135	0.0115	0.00519	0.00536	0.00351	0.00365	0.0107	0.0143	0.00612	0.00635
6010B	Barium	mg/l	0.0539	0.0541	0.183	0.106	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	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	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	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	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.325	0.268	0.327	0.104	0.125	0.105	0.125	0.1 U	0.111	0.11	0.183	0.161	0.143	0.144
6020	Lead	mg/l	0.002 U	0.002 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	0.002 U	0.002 U
6010B	Lithium	mg/l	0.0201	0.0269	0.0501	0.0571	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	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.00569	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	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	0.002 U	0.002 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	0.002 U	0.002 U
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	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	NA	0.980 J	0.442	2.32	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:

Samples were collected for background analysis of Appendix III/IV under the detection monitoring program.

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated for potential high bias

mg/l = milligram per liter

NA = Not Available

NM = Not Measured

pCi/L = picocurie per liter

su = Standard Units

U - Non Detect at the identified concentration

U* = Qualified as non detect durring data validation process

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

* = pH measurement was collected on 5/4/2016

Table 3-10
Summary of Analytical Results
October 2015 through September 2017 Sampling Events
Nearman Power Station
Bottom Ash Pond

		Sample Location	BA POND	DUP-2	BA POND	DUP-2	BA POND	BA POND	DUP-2	BA POND	DUP-2	BA POND	DUP-2	BA POND	DUP-1
		Sample Date	10/30/2015	10/30/2015	1/27/2016	1/27/2016	4/27/2016	7/25/2016	7/25/2016	10/27/2016	10/27/2016	1/24/2017	1/24/2017	4/24/2017	4/25/2017
		Lab ID	L798087-09	L798087-11	L814632-06	L814632-08	L832453-06	L849542-07	L849542-09	L868992-07	L868992-09	L886084-07	L886084-09	L905439-08	L905439-09
			L798090-06	L798090-08	390438006	390438008	20160407-06	20160702-07	20160702-09	20161076-07	20161076-09	20170052-07	20170052-09	20170354-07	20170354-08
Analytical Method	**Analyte**	**Unit**	*Duplicate Pair*		*Duplicate Pair*			*Duplicate Pair*		*Duplicate Pair*		*Duplicate Pair*		*Duplicate Pair*	
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	2.89	2.9	1.81	1.8	1.51	1.78	1.75	1.65	1.65	1.59	1.59	1.81	1.82
6010B	Calcium	mg/l	128	127	126	127	76.3	74.1	73.6	78	83.9	121	120	126	125
9056MOD	Chloride	mg/l	19.3	26.4	24.3	24.4	25.6	24.4	24.5	24.4	24.5	26.1	25.4	29.5	29.7
9056MOD	Fluoride	mg/l	0.109	0.535	0.407	0.405	0.413	0.495	0.502	0.503	0.519	0.542	0.603	0.588	0.611
9040C	pH	su	8.16 J	7.74 J	8.19 J	8.07 J	8.29 J	8.22 J	8.51 J	8.67 J	8.83 J	7.96 J	8.01 J	8.55 J	8.57 J
In Situ	pH	su	7.9	7.9	NM	NM	7.20*	NM	NM	8.85	8.85	8.13	8.13	9.37	9.37
9056MOD	Sulfate	mg/l	282	490	323	315	271	273	273	281	277	303	304	388	380
2540 C-2011	Total Dissolved Solids	mg/l	703	716	674	678	518	516	522	510	507	652	659	702 J	7150 J
Appendix IV - Assessment Monitoring															
6020	Antimony	mg/l	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00219 B	0.00211 B	0.002 U	0.002 U	0.00302	0.0021	0.002 U	0.002 U
6020	Arsenic	mg/l	0.002 U	0.002 U	0.00224	0.00205	0.002 U	0.00254	0.00245	0.00205	0.00213	0.00497	0.00426	0.002 U	0.002 U
6010B	Barium	mg/l	0.174	0.173	0.24	0.238	0.0822	0.265	0.264	0.15	0.176	0.223	0.225	0.146	0.145
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	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	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	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	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.109	0.535	0.407	0.405	0.413	0.495	0.502	0.503	0.519	0.542	0.603	0.588	0.611
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	0.002 U	0.002 U
6010B	Lithium	mg/l	0.015 U	0.015 U	0.0249	0.0226	0.0216	0.0219	0.0221	0.0197	0.0215	0.0218	0.0221	0.0314	0.0291
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	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.0534	0.053	0.0326	0.0327	0.0315	0.0312	0.0309	0.0337	0.0314	0.0412	0.0408	0.0529	0.0523
6010B	Selenium	mg/l	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	0.00205	0.002 U	0.002 U
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	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	0.354	0.0782	1.02	0.72	0.541	0.110 J	0.457 J	0.674 U*	0.809 U*	0.297 U*	0.364	0.023 J	0.165 J

Notes:

Samples were collected for background analysis of Appendix III/IV under the detection monitoring program.

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated for potential high bias

mg/l = milligram per liter

NA = Not Available

NM = Not Measured

pCi/L = picocurie per liter

su = Standard Units

U - Non Detect at the identified concentration

U* = Qualified as non detect durring data validation process

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

* = pH measurement was collected on 5/4/2016

Table 3-10
Summary of Analytical Results
October 2015 through September 2017 Sampling Events
Nearman Power Station
Bottom Ash Pond

		Sample Location	BA POND	BA POND
		Sample Date	7/26/2017	9/14/2017
		Lab ID	L925244-08	L936894-07
				20170864-09
Analytical Method	**Analyte**	**Unit**		
Appendix III - Detection Monitoring				
6010B	Boron	mg/l	2.03	1.61
6010B	Calcium	mg/l	103	94.1
9056MOD	Chloride	mg/l	31.4	24.3
9056MOD	Fluoride	mg/l	0.628	0.431
9040C	pH	su	8.82 J	8.67 J
In Situ	pH	su	8.81	8.74
9056MOD	Sulfate	mg/l	422	326
2540 C-2011	Total Dissolved Solids	mg/l	660	578
Appendix IV - Assessment Monitoring				
6020	Antimony	mg/l	0.002 U	0.002 U
6020	Arsenic	mg/l	0.003	0.00341
6010B	Barium	mg/l	0.269	0.222
6010B	Beryllium	mg/l	0.002 U	0.002 U
6010B	Cadmium	mg/l	0.002 U	0.002 U
6010B	Chromium	mg/l	0.01 U	0.01 U
6010B	Cobalt	mg/l	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.628	0.431
6020	Lead	mg/l	0.002 U	0.002 U
6010B	Lithium	mg/l	0.0202	0.021
7470A	Mercury	mg/l	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.0402	0.0309
6010B	Selenium	mg/l	0.002 U	0.002 U
6020	Thallium	mg/l	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	NA	0.023

Notes:

Samples were collected for background analysis of Appendix III/IV under the detection monitoring prog

B = The same analyte is found in the associated blank

BA = Bottom Ash

J = Result qualified as estimated

J+ = Result qualified as estimated for potential high bias

mg/l = milligram per liter

NA = Not Available

NM = Not Measured

pCi/L = picocurie per liter

su = Standard Units

U - Non Detect at the identified concentration

U* = Qualified as non detect durring data validation process

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

* = pH measurement was collected on 5/4/2016

Figures

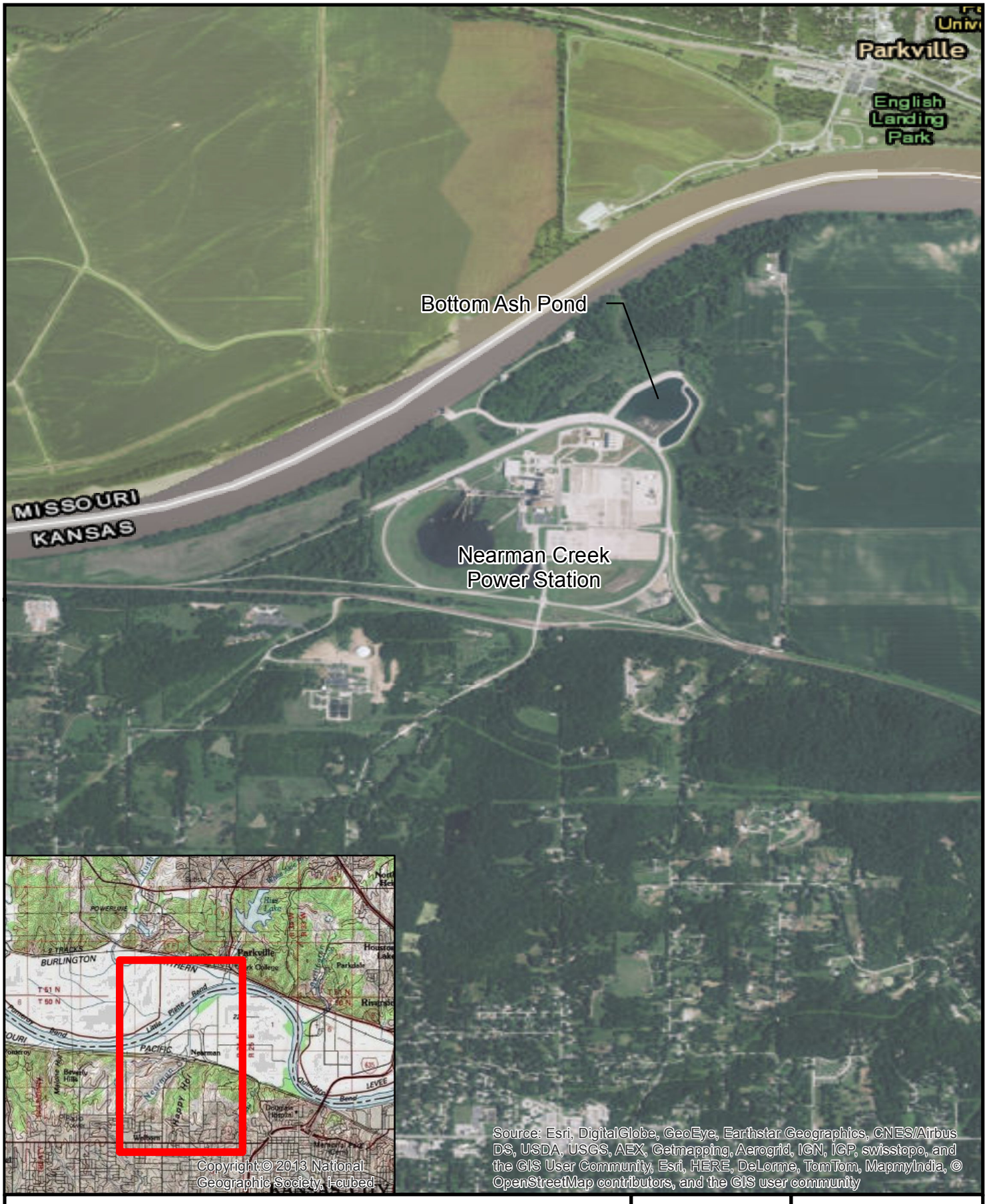

FIGURE 1-1
SITE LOCATION
NEARMAN CREEK
POWER STATION
KANSAS CITY BPU

Source: ESRI and Burns & McDonnell Engineering.
Issued: October, 9 2015

Legend

Wells Included in BA Pond CCR Monitoring Well Network

- Upgradient Monitroing Well
- Downgradient Monitoring Well

0 100 200

Feet

N

Source: ESRI and Burns & McDonnell Engineering.

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FIGURE 2-1
BOTTOM ASH POND
MONITORING WELL NETWORK
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Issued: January, 2 2018

MW-10
TOC = 745.25
GW Elv. = 725.80

MW-2A
TOC = 747.86
GW Elv. = 726.54

MW-8A
TOC = 750.1
GW Elv. = 725.65

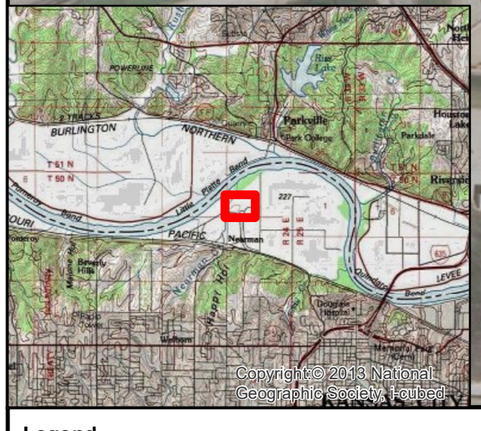
MW-3
TOC = 750.44
GW Elv. = 727.06

MW-4
TOC = 746.90
GW Elv. = 727.12

726

726.5

727



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

Legend

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

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on October 29, 2015 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-1
OCTOBER 2015
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\68777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-1_20151026_Piezometric Surface Map.mxd

Issued: January, 31 2018

MW-2A
TOC = 747.86
GW Elv. = 726.56

MW-10
TOC = 745.25
GW Elv. = 725.75

MW-8A
TOC = 750.1
GW Elv. = 725.20

MW-3
TOC = 750.44
GW Elv. = 727.09

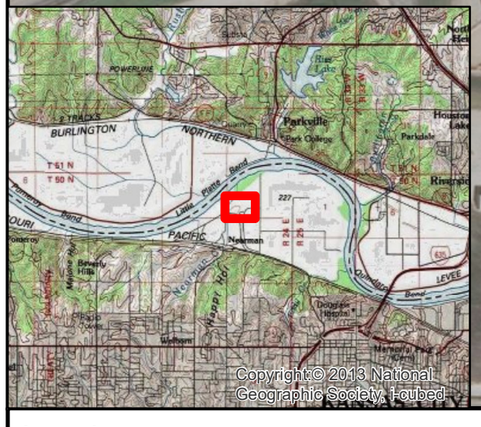
MW-4
TOC = 746.90
GW Elv. = 727.56

725.5

726

726.5

727



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

Legend

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

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on January 27, 2016 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-2
JANUARY 2016
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-2_20160127_Piezometric Surface Map.mxd

Issued: January, 25 2018

MW-10
TOC = 745.25
GW Elv. = 727.05

MW-2A
TOC = 747.86
GW Elv. = 727.33

MW-8A
TOC = 750.1
GW Elv. = 726.58

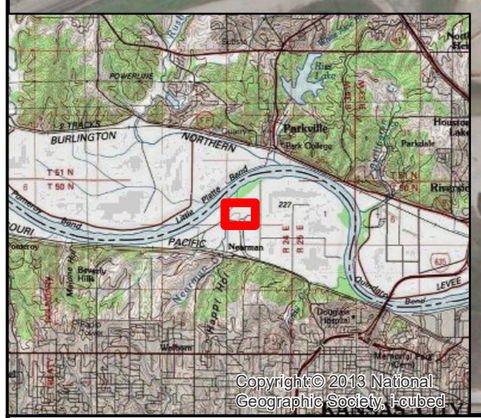
MW-3
TOC = 750.44
GW Elv. = 726.94

MW-4
TOC = 746.90
GW Elv. = 726.76

727.25

727

726.75



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

Legend

- Inferred Direction of Groundwater Flow
- Piezometric Surface Contour
- Monitoring Well

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on April 27, 2016 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-3
APRIL 2016
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-3_20160427_Piezometric Surface Map.mxd

Issued: January, 26 2018

MW-10
TOC = 745.25
GW Elv. =728.68

MW-2A
TOC = 747.86
GW Elv. = 729.44

MW-8A
TOC = 750.1
GW Elv. = 728.07

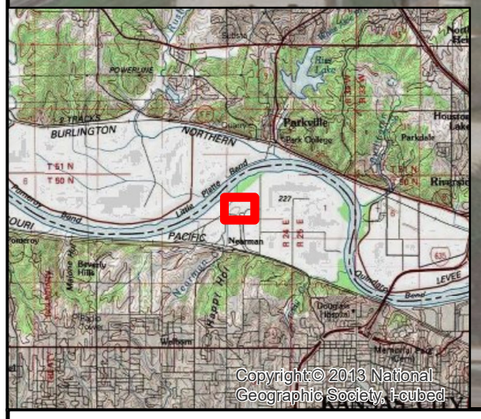
MW-3
TOC = 750.44
GW Elv. = 729.92

MW-4
TOC = 746.90
GW Elv. = 729.87

728.5

729

729.5



Legend

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

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on July 25, 2016 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-4
JULY 2016
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-4_20160725a_Piezometric Surface Map.mxd

Issued: January, 25 2018

MW-10
TOC = 745.25
GW Elv. =725.70

MW-2A
TOC = 747.86
GW Elv. = 727.32

MW-8A
TOC = 750.1
GW Elv. = 726.14

MW-3
TOC = 750.44
GW Elv. = 727.65

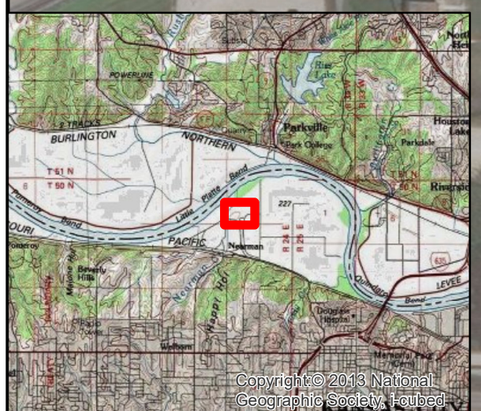
MW-4
TOC = 746.90
GW Elv. = 727.58

726

726.5

727

727.5



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

Legend

- Monitoring Well
- Inferred Direction of Groundwater Flow
- Piezometric Surface Contour

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on October 24, 2016 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-5
OCTOBER 2016
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\EN\SK\CBPU\88777_CCR\GWMON\Studies\Geospatial\ArcDocs\Figure 3-5_20161024_Piezometric Surface Map.mxd

Issued: January, 25 2018

MW-2A
TOC = 747.86
GW Elv. = 723.6

MW-10
TOC = 745.25
GW Elv. = 722.99

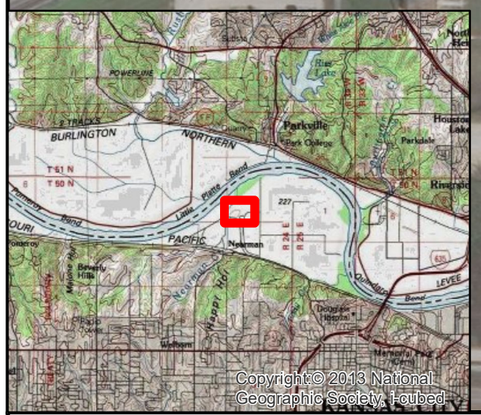
MW-8A
TOC = 750.1
GW Elv. = 722.39

MW-3
TOC = 750.44
GW Elv. = 723.74

MW-4
TOC = 746.90
GW Elv. = 723.6

723.5

722.5



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

Legend

- Monitoring Well
- Piezometric Surface Contour
- Groundwater Flow Direction

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on January 23, 2017 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-6
JANUARY 2017
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-6_20170123_Piezometric Surface Map.mxd

Issued: January, 26 2018

MW-2A
TOC = 747.86
WL = 726.99

MW-10
TOC = 745.25
WL = 726.67

MW-8A
TOC = 750.10
WL = 726.30

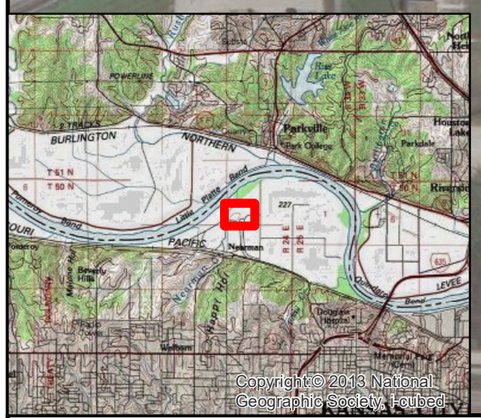
726.8

726.4

726.6

MW-3
TOC = 750.44
WL = 726.82

MW-4
TOC = 746.90
WL = 726.58



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

Legend

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

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on April 24, 2017 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-7
APRIL 2017
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-7_20170424_Piezometric Surface Map.mxd

Issued: January, 26 2018

MW-2A
TOC = 747.86
WL = 727.54

MW-10
TOC = 745.25
WL = 726.70

MW-8A
TOC = 750.10
WL = 726.15

726.5

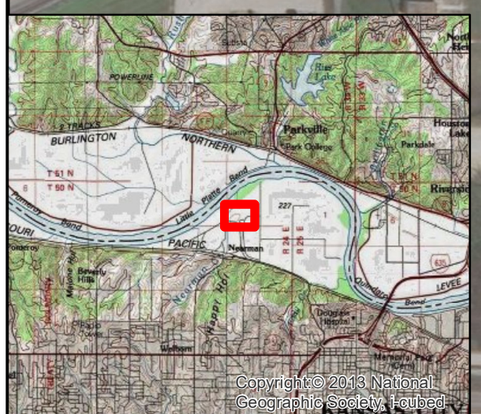
727

727.5

MW-3
TOC = 750.44
WL = 728.06

728

MW-4
TOC = 746.90
WL=728.04



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

Legend

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

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on July 24, 2017 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-8
JULY 2017
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\EN\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-8_20170724_Piezometric Surface Map.mxd

Issued: January, 25 2018

MW-2A
TOC = 747.86
WL = 726.79

MW-10
TOC = 745.25
WL = 725.92

MW-8A
TOC = 750.10
WL = 725.44

725.5

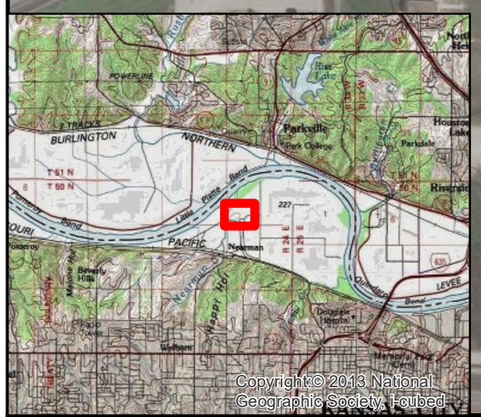
726

726.5

727

MW-3
TOC = 750.44
WL = 727.19

MW-4
TOC = 746.90
WL = 727.37



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

Legend

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

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on September 14, 2017 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 3-9
SEPTEMBER 2017
PIEZOMETRIC SURFACE
NEARMAN CREEK POWER STATION
KANSAS CITY BPU KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\Figure 3-9_20170914_Piezometric Surface Map.mxd

Issued: January, 25 2018

APPENDIX A – MONITORING WELL BORING LOGS, CONSTRUCTION DIAGRAMS, AND DEVELOPMENT FORMS

Drilling Log

Project Name	Project No.	Boring Number
BPU MW Network Enhancements	88019	MW-2A
Ground Elevation	**Location**	**Page**
745.4 ft. NAVD 88	Kansas City, Kansas Latitude 323923.74 Longitude 2250166.32	1 of 2
Air Monitoring Equipment		**Total Footage**
4-GAS		30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
HSA	8.25	30	0	--	--	16.31	10-19-15

Drilling Company: Razek Environmental, LLC	Drillers (s): Tony Poulter & Rob Ray
Drilling Rig: 7822 DT	Type of Sampler: Macrocore
Date: 10-19-15 To: 10-20-15	Field Observer (s): Kevin Bolling

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	SILT - Brown 10YR 4/3, Dry to Damp.	ML	NA	4.2/ 5	1612					
5	SAND - Light Grayish Borwn 10YR 6/2, Very fine grained, loose, dry.	SP		3.3/ 5	1616					
10	SANDY SILT - Very Dark Gray 10YR 3/1, moist.	SM								
11	SAND - Very Dark Gray 10YR 3/1, Very fine to fine, becomes wet at 11.5.	SP		2.7/ 5	1622					
14	CLAY - Very Dark Gray 10Y 3/1, with silt, moist.	CL								

ENVIRONMENTAL LOG CCR WELL NETWORK.GPJ WILLIAMS.GDT 12/17/15

BURNS McDONNELL

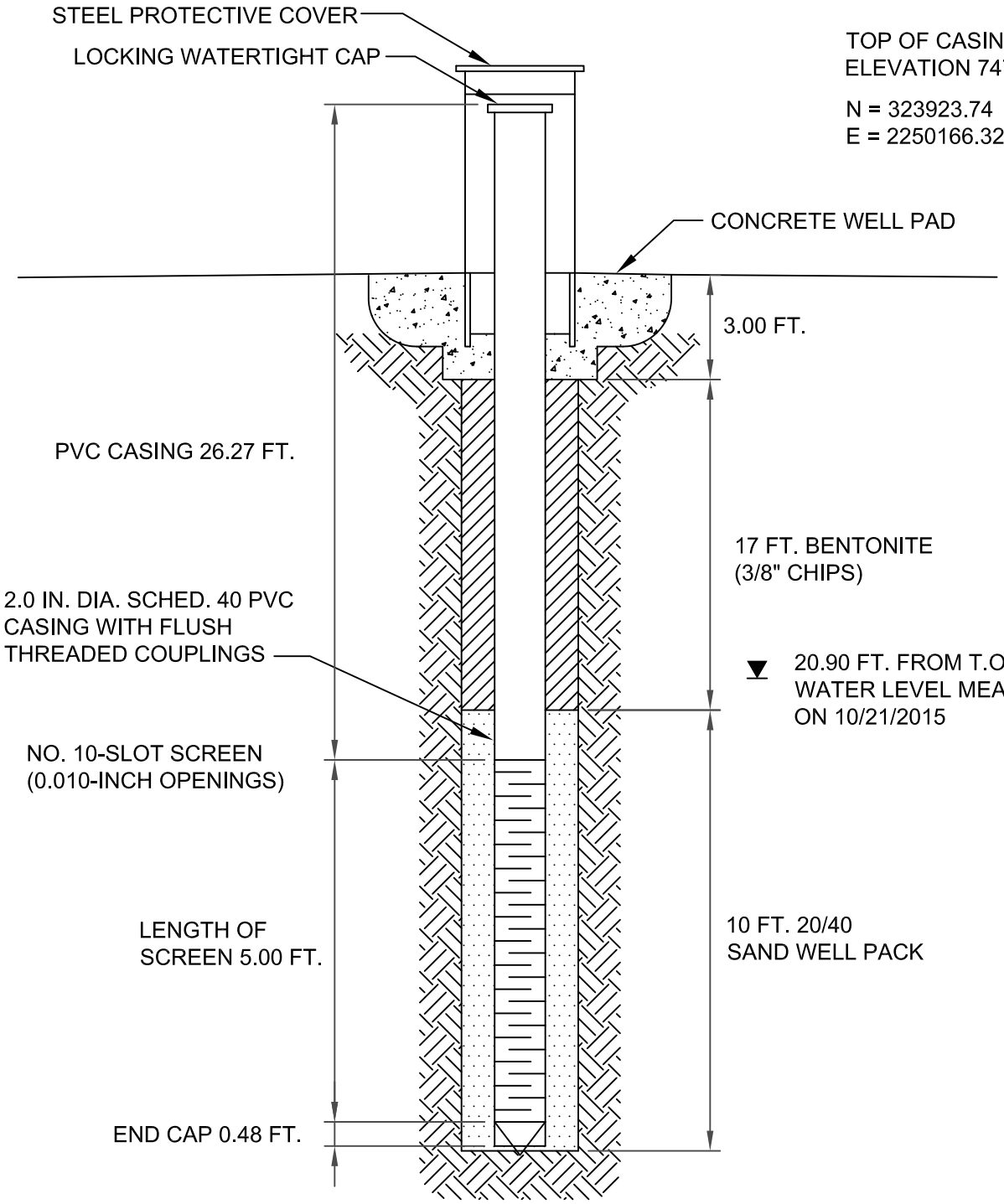
Drilling Log, continued

Project Name	BPU MW Network Enhancements
Project Number	88019
Boring Number	MW-2A
Page	2 of 2
Date	10-19-15

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	CLAY - Very Dark Gray 10Y 3/1, with silt, moist.	CL								
15	SAND - Very Dark Gray 10YR 3/1, Some silt, fine to medium graind, moist.	SM								
16										Observed Water Level at 16:31
17	SAND - Strong Brown 7.5 YR 5/6, medium grained, moist to wet.	SP		3.1/ 5	1627					
18	SAND - Dark Gray 10 YR 4/1, Some silt, wet, loose.	SM								
19										
20	SAND - Strong Brown 7.5 YR 5/6, Wet.	SP								
21	SAND - Brown 10YR 4/5, medium grained, loose, wet, medium to coarse trace gravel at 27 ft.	SP								
22			NA							
23				2.1/ 5	1631					
24										
25										
26										
27				2.8/ 5	1638					
28										
29										
30	SAND - Gray 10YR 5/1, fine grained, wet.	SP								
31										

ENVIRONMENTAL LOG CCR WELL NETWORK.GPJ WILLIAMS.GDT 12/17/15

BURNS McDONNELL



DATE INSTALLED 10/20/2015
DATE DEVELOPED 10/21/2015

BOTTOM OF BORING 30 FT.
BELOW GRADE.

BOTTOM OF WELL AS
MEASURED FOLLOWING
DEVELOPMENT
31.64 FT. BELOW T.O.C.

NOT TO SCALE

BURNS McDONNELL

MW-2A
MONITORING WELL
CONSTRUCTION DIAGRAM
NEARMAN CREEK
POWER STATION
KANSAS CITY, KS

\ MW-2A Stickup Well Construction Diagram.dwg BHOYE December 17, 2015

Drilling Log

Project Name	Project No.	Boring Number
BPU MW Network Enhancements	88019	MW-8A
Ground Elevation	**Location**	**Page**
748.0 ft. NAVD 88	Kansas City, Kansas Latitude 323462.51 Longitude 2249347.76	1 of 3
Air Monitoring Equipment		**Total Footage**
4-GAS		34.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
HSA	8.25	34.5	0	--	--	21.7	10-19-15

Drilling Company: Razek Environmental, LLC	Drillers (s): Tony Poulter & Rob Ray
Drilling Rig: 7822 DT	Type of Sampler: Macrocore
Date: 10-19-15 To: 10-19-15	Field Observer (s): Kevin Bolling

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
0	SILT - Dary Grayish Brown 10Y 4/2, Trace Clay, Plant Roots, Dry.	ML								
5				5/ 5	933					
6	SAND - Light Grayish Brown 10YR 6/2, fine grained, loose, dry.	SP								
	SILT									
7			NA							
	SAND - Light Grayish Brown 10YR 6/2, fine grained, loose, dry.	SW		3.4/ 5	935					
8	SILT - Dark Grayish Brown 10 YR 3/2, Some clay, soft, damp.	ML								
10										
	SAND - Light Grayish Brown 10YR 6/2, fine grained, poorly graded, loose, damp.	SP		2.5/ 5	941					
14										

ENVIRONMENTAL LOG CCR WELL NETWORK.GPJ WILLIAMS.GDT 12/17/15

BURNS McDONNELL

Drilling Log, continued

Boring Number MW-8A
Project Name BPU MW Network Enhancements
Page 2 of 3
Project Number 88019
Date 10-19-15

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
		SP								
	SAND - Dark Gray 10YR 4/1, Fine grained, some silt, poorly graded, damp.	SP								
15										
	SAND - Light Grayish Brown 10YR 6/2, Medium grained, poorly graded, loose, damp.	SP								
16										
17				3/ 5	949					
18										
19										
20										
21										
22										Wet Observed Water Level at 10:04
23			NA	2.8/ 5	952					
24										Becomes Medium Grained
25	SAND - Yellowish Brown 10YR 5/6, Medium grained, loose, moist to wet.	SP								
26										
27				/ 5	1003					
28	SAND - Gray 10YR 6/1, Fine Grained, wet, loose.	SP								
29										
30										
31										

ENVIRONMENTAL LOG CCR WELL NETWORK.GPJ WILLIAMS.GDT 12/17/15

BURNS McDONNELL

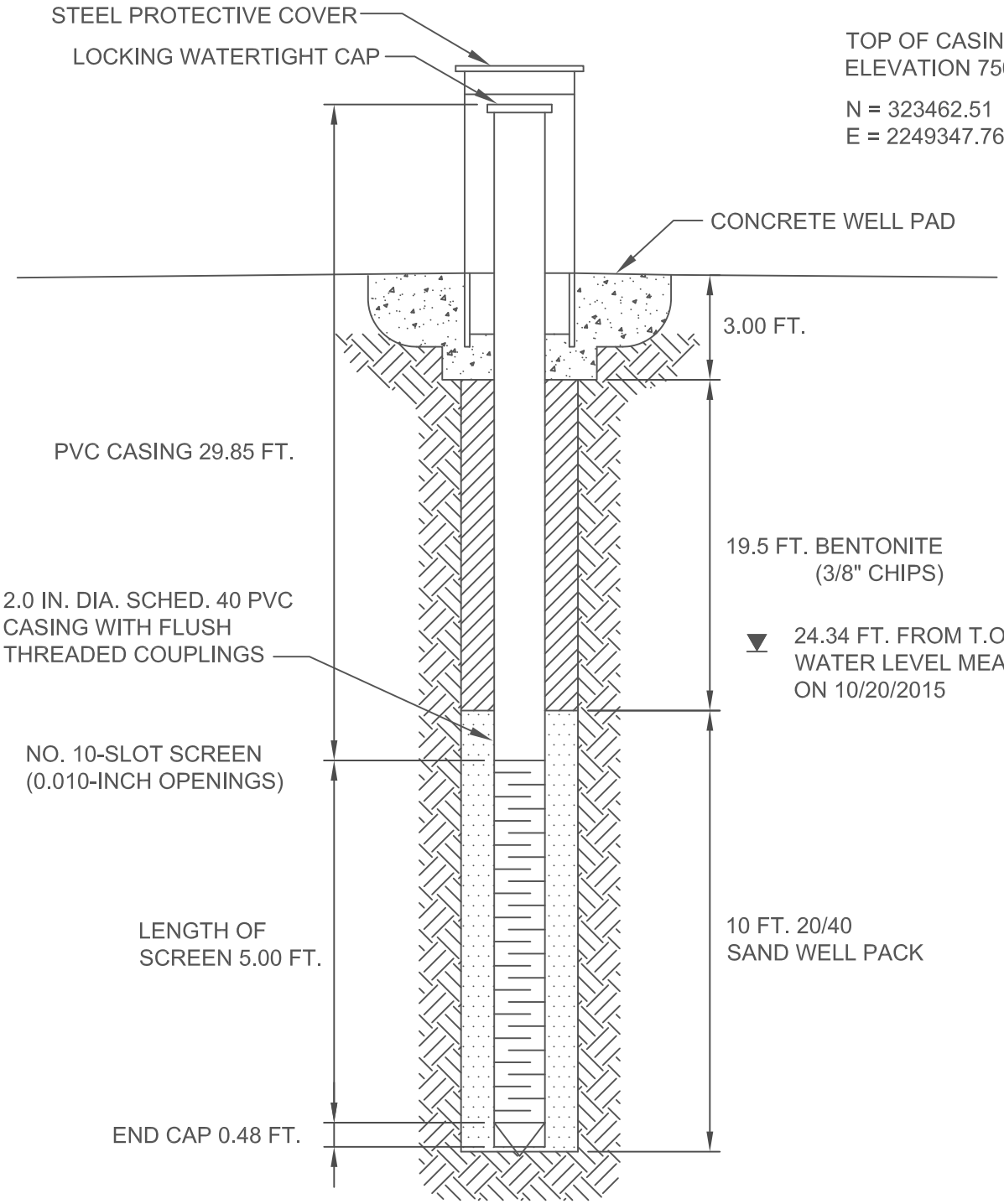
Drilling Log, continued

Project Name	BPU MW Network Enhancements
Project Number	88019
Boring Number	MW-8A
Page	3 of 3
Date	10-19-15

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
32	SAND - Gray 10YR 6/1, Fine Grained, wet, loose.	SP	NA	/ 4.5	1010					
33										
34										
35										End of Boring @ 30 ft bgs
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										

ENVIRONMENTAL LOG CCR WELL NETWORK.GPJ WILLIAMS.GDT 12/17/15

BURNS McDONNELL



DATE INSTALLED 10/19/2015
DATE DEVELOPED 10/20/2015

BOTTOM OF BORING 34.5 FT.
BELOW GRADE.

BOTTOM OF WELL AS
MEASURED FOLLOWING
DEVELOPMENT
35.38 FT. BELOW T.O.C.

NOT TO SCALE

BURNS McDONNELL

MW-8A
MONITORING WELL
CONSTRUCTION DIAGRAM
NEARMAN CREEK
POWER STATION
KANSAS CITY, KS

\ MW-8A Stickup Well Construction Diagram.dwg BHOYE December 17, 2015

Drilling Log

Project Name	Project No.	Boring Number
BPU MW Network Enhancements	88019	MW-10
Ground Elevation	**Location**	**Page**
743.0 ft. NAVD 88	Kansas City, Kansas Latitude 323845.38 Longitude 2249728.55	1 of 2
Air Monitoring Equipment		**Total Footage**
4-GAS		30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	Date Measured
HSA	8.25	30	0	--	--	16.1	10-19-15

Drilling Company: Razek Environmental, LLC	Drillers (s): Tony Poulter & Rob Ray
Drilling Rig: 7822 DT	Type of Sampler: Macrocore
Date: 10-19-15 To: 10-19-15	Field Observer (s): Kevin Bolling

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	SILT - Very Dark Grayish Brown 10YR 3/2, Dry.									
2	SAND - Yellowish Brown 10 YR 5/4, Fine grained, trace silt, loose, damp.	SM		3.3/ 5	1330					
5	SILT - Dark Grayish Brown 10YR 4/2, Some sand, moist.	ML								
6	SAND - Light Yellowish Brown 2.5Y 6/3, Fine grained, loose, damp.	SP	NA	3.5/ 5	1324					
10				/ 5	1330					

ENVIRONMENTAL LOG CCR WELL NETWORK.GPJ WILLIAMS.GDT 12/17/15

BURNS McDONNELL

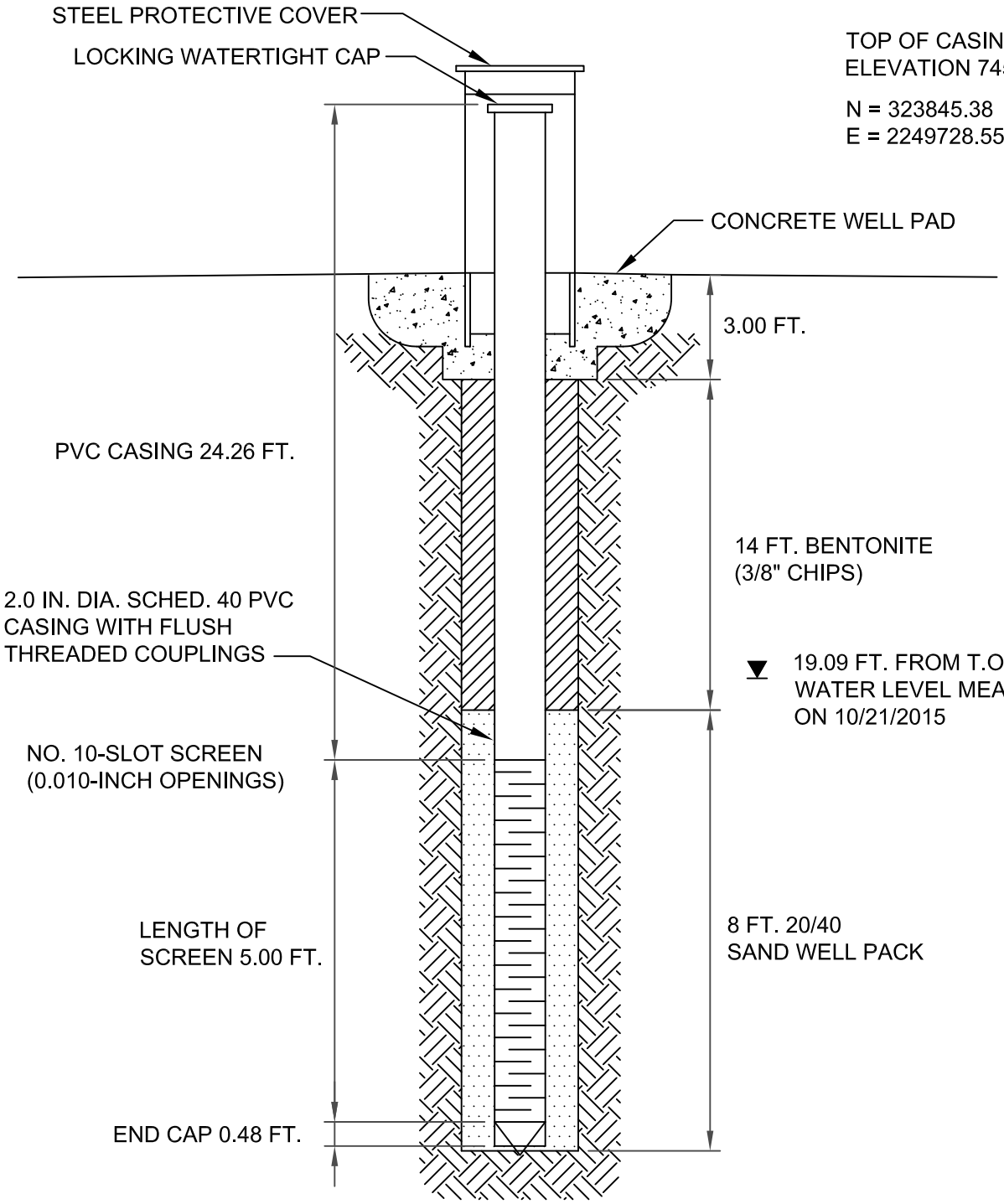
Drilling Log, continued

Boring Number MW-10
Project Name BPU MW Network Enhancements
Page 2 of 2
Project Number 88019
Date 10-19-15

Depth	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND - Light Yellowish Brown 2.5Y 6/3, Fine grained, loose, damp.	SP								
15	SAND - Light Yellowish Brown 10YR 6/4, Medium to coarse grained, loose, damp.	SP								
16										Observed WL at 13:20
17										
18				2.5/ 5	1332					
19										
20										
21										
22			NA							
23				3/ 5	1338					
24	SAND - Grayish Brown 10YR 5/2, Fine grained, loose, wet.	SP								
25										
26										
27				3/ 5	1348					
28	SAND - Grayish Brown 10YR 5/2, Fine to coarse grained, well graded, wet.	SW								
29	SAND - Gray 10YR 5/1, Fine grained, poorly graded, wet.	SP								
30										
31										

ENVIRONMENTAL LOG CCR WELL NETWORK.GPJ WILLIAMS.GDT 12/17/15

BURNS McDONNELL



DATE INSTALLED 10/19/2015
DATE DEVELOPED 10/20/2015

BOTTOM OF BORING 30 FT.
BELOW GRADE.

BOTTOM OF WELL AS
MEASURED FOLLOWING
DEVELOPMENT
29.66 FT. BELOW T.O.C.

NOT TO SCALE

BURNS McDONNELL

MW-10
MONITORING WELL
CONSTRUCTION DIAGRAM
NEARMAN CREEK
POWER STATION
KANSAS CITY, KS

\ MW-10 Stickup Well Construction Diagram.dwg BHOYE December 17, 2015

WATER WELL RECORD Form WWC-5

■ Original Record ☐ Correction ☐ Change in Well Use

Division of Water Resources App. No. _____ Well ID _____

1 LOCATION OF WATER WELL: County: Wyandotte | Fraction: ¼ NE ¼ SE ¼ SW ¼ | Section Number: 13 | Township Number: T 10 S | Range Number: R 24 ■ E ☐ W

2 WELL OWNER: Last Name: First: Business: Kansas City BPU Address: 540 Minnesota Avenue Address: City: Kansas City State: KS ZIP: 66101

Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: ☐
Kansas City BPU Nearman Plant
4240 North 55th Street, Kansas City, KS 66104

3 LOCATE WELL WITH "X" IN SECTION BOX: N / W / E / S; NW, NE, SW (X), SE; 1 mile

4 DEPTH OF COMPLETED WELL: 28 ft.
Depth(s) Groundwater Encountered: 1) ____ ft. 2) N/A ft. 3) N/A ft. or 4) ☐ Dry Well
WELL'S STATIC WATER LEVEL: ____ ft.
☐ below land surface, measured on (mo-day-yr)____
■ above land surface, measured on (mo-day-yr)____
Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm
Well water was N/A ft. after N/A hours pumping N/A gpm
Estimated Yield: N/A gpm
Bore Hole Diameter: 8.25 in. to 28 ft. and N/A in. to N/A ft.

5 Latitude: 39.175691 (decimal degrees)
Longitude: -94.691150 (decimal degrees)
Horizontal Datum: ■ WGS 84 ☐ NAD 83 ☐ NAD 27
Source for Latitude/Longitude:
☐ GPS (unit make/model: ____) (WAAS enabled? ☐ Yes ☐ No)
☐ Land Survey ■ Topographic Map
☐ Online Mapper: ____

6 Elevation: 747 ft. ■ Ground Level ☐ TOC
Source: ☐ Land Survey ☐ GPS ■ Topographic Map ☐ Other ____

7 WELL WATER TO BE USED AS:
1. Domestic: ☐ Household ☐ Lawn & Garden ☐ Livestock
2. ☐ Irrigation
3. ☐ Feedlot
4. ☐ Industrial
5. ☐ Public Water Supply: well ID ____
6. ☐ Dewatering: how many wells? ____
7. ☐ Aquifer Recharge: well ID ____
8. ■ Monitoring: well ID MW-2A
9. Environmental Remediation: well ID ____ ☐ Air Sparge ☐ Soil Vapor Extraction ☐ Recovery ☐ Injection
10. ☐ Oil Field Water Supply: lease ____
11. Test Hole: well ID ____ ☐ Cased ☐ Uncased ☐ Geotechnical
12. Geothermal: how many bores? ____ a) Closed Loop ☐ Horizontal ☐ Vertical b) Open Loop ☐ Surface Discharge ☐ Inj. of Water
13. ☐ Other (specify): ____

Was a chemical/bacteriological sample submitted to KDHE? ☐ Yes ■ No If yes, date sample was submitted: ____
Water well disinfected? ☐ Yes ■ No

8 TYPE OF CASING USED: ☐ Steel ■ PVC ☐ Other ____ CASING JOINTS: ☐ Glued ☐ Clamped ☐ Welded ■ Threaded
Casing diameter 2 in. to 23 ft., Diameter N/A in. to N/A ft., Diameter N/A in. to N/A ft.
Casing height above land surface 30 in. Weight N/A lbs./ft. Wall thickness or gauge No. Sch. 40

TYPE OF SCREEN OR PERFORATION MATERIAL:
☐ Steel ☐ Stainless Steel ☐ Fiberglass ■ PVC ☐ Other (Specify) ____
☐ Brass ☐ Galvanized Steel ☐ Concrete tile ☐ None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
☐ Continuous Slot ■ Mill Slot ☐ Gauze Wrapped ☐ Torch Cut ☐ Drilled Holes ☐ Other (Specify) ____
☐ Louvered Shutter ☐ Key Punched ☐ Wire Wrapped ☐ Saw Cut ☐ None (Open Hole)

SCREEN-PERFORATED INTERVALS: From 23 ft. to 28 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.
GRAVEL PACK INTERVALS: From 20 ft. to 28 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.

9 GROUT MATERIAL: ☐ Neat cement ☐ Cement grout ■ Bentonite ■ Other 0 to 2 feet concrete
Grout Intervals: From 2 ft. to 20 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.

Nearest source of possible contamination:
☐ Septic Tank ☐ Lateral Lines ☐ Pit Privy ☐ Livestock Pens ☐ Insecticide Storage
☐ Sewer Lines ☐ Cess Pool ☐ Sewage Lagoon ☐ Fuel Storage ☐ Abandoned Water Well
☐ Watertight Sewer Lines ☐ Seepage Pit ☐ Feedyard ☐ Fertilizer Storage ☐ Oil Well/Gas Well
■ Other (Specify) Flyash lagoon
Direction from well? south Distance from well? <50-feet ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	4.5	Silt			
4.5	30	Sand			

Notes:

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was ■ constructed, ☐ reconstructed, or ☐ plugged under my jurisdiction and was completed on (mo-day-year) 10-20-2015 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 759 This Water Well Record was completed on (mo-day-year) 11-27-2015 under the business name of RAZEK Environmental, LLC Signature [signature]

Mail 1 white copy along with a fee of $5.00 for each constructed well to: Kansas Department of Health and Environment, Bureau of Water, GWTS Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Mail one to Water Well Owner and retain one for your records. Telephone 785-296-5524.
Visit us at http://www.kdheks.gov/bwater/well/index.html KSA 82a-1212 Revised 7/10/2015

WATER WELL RECORD Form WWC-5

■ Original Record ☐ Correction ☐ Change in Well Use

Division of Water Resources App. No. _____ Well ID _____

1 LOCATION OF WATER WELL: County: Wyandotte | Fraction: ¼ NE ¼ SE ¼ SW ¼ | Section Number: 13 | Township Number: T 10 S | Range Number: R 24 ■ E ☐ W

2 WELL OWNER: Last Name: Business: Kansas City BPU First: Address: 540 Minnesota Avenue Address: City: Kansas City State: KS ZIP: 66101

Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: ☐
Kansas City BPU Nearman Plant
4240 North 55th Street, Kansas City, KS 66104

3 LOCATE WELL WITH "X" IN SECTION BOX: N / W / E / S; NW, NE, SW, SE; X in SW; ├──1 mile──┤

4 DEPTH OF COMPLETED WELL: 32 ft.
Depth(s) Groundwater Encountered: 1) ____ ft. 2) N/A ft. 3) N/A ft., or 4) ☐ Dry Well
WELL'S STATIC WATER LEVEL: ____ ft.
☐ below land surface, measured on (mo-day-yr)____
■ above land surface, measured on (mo-day-yr)____
Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm
Well water was N/A ft. after N/A hours pumping N/A gpm
Estimated Yield: N/A gpm
Bore Hole Diameter: 8.25 in. to 32 ft. and N/A in. to N/A ft.

5 Latitude: 39.174513 (decimal degrees)
Longitude: -94.694030 (decimal degrees)
Horizontal Datum: ■ WGS 84 ☐ NAD 83 ☐ NAD 27
Source for Latitude/Longitude:
☐ GPS (unit make/model: ____) (WAAS enabled? ☐ Yes ☐ No)
☐ Land Survey ■ Topographic Map
☐ Online Mapper: ____

6 Elevation: 749 ft. ■ Ground Level ☐ TOC
Source: ☐ Land Survey ☐ GPS ■ Topographic Map ☐ Other ____

7 WELL WATER TO BE USED AS:
1. Domestic: ☐ Household ☐ Lawn & Garden ☐ Livestock
2. ☐ Irrigation
3. ☐ Feedlot
4. ☐ Industrial
5. ☐ Public Water Supply: well ID ____
6. ☐ Dewatering: how many wells? ____
7. ☐ Aquifer Recharge: well ID ____
8. ■ Monitoring: well ID MW-8A
9. Environmental Remediation: well ID ____ ☐ Air Sparge ☐ Soil Vapor Extraction ☐ Recovery ☐ Injection
10. ☐ Oil Field Water Supply: lease ____
11. Test Hole: well ID ____ ☐ Cased ☐ Uncased ☐ Geotechnical
12. Geothermal: how many bores? ____ a) Closed Loop ☐ Horizontal ☐ Vertical b) Open Loop ☐ Surface Discharge ☐ Inj. of Water
13. ☐ Other (specify): ____

Was a chemical/bacteriological sample submitted to KDHE? ☐ Yes ■ No If yes, date sample was submitted: ____
Water well disinfected? ☐ Yes ■ No

8 TYPE OF CASING USED: ☐ Steel ■ PVC ☐ Other ____ CASING JOINTS: ☐ Glued ☐ Clamped ☐ Welded ■ Threaded
Casing diameter 2 in. to 27 ft., Diameter N/A in. to N/A ft., Diameter N/A in. to N/A ft.
Casing height above land surface 30 in. Weight N/A lbs./ft. Wall thickness or gauge No. Sch. 40

TYPE OF SCREEN OR PERFORATION MATERIAL:
☐ Steel ☐ Stainless Steel ☐ Fiberglass ■ PVC ☐ Other (Specify) ____
☐ Brass ☐ Galvanized Steel ☐ Concrete tile ☐ None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
☐ Continuous Slot ■ Mill Slot ☐ Gauze Wrapped ☐ Torch Cut ☐ Drilled Holes ☐ Other (Specify) ____
☐ Louvered Shutter ☐ Key Punched ☐ Wire Wrapped ☐ Saw Cut ☐ None (Open Hole)

SCREEN-PERFORATED INTERVALS: From 27 ft. to 32 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.
GRAVEL PACK INTERVALS: From 24 ft. to 32 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.

9 GROUT MATERIAL: ☐ Neat cement ☐ Cement grout ■ Bentonite ■ Other 0 to 2 feet concrete
Grout Intervals: From 2 ft. to 24 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.

Nearest source of possible contamination:
☐ Septic Tank ☐ Lateral Lines ☐ Pit Privy ☐ Livestock Pens ☐ Insecticide Storage
☐ Sewer Lines ☐ Cess Pool ☐ Sewage Lagoon ☐ Fuel Storage ☐ Abandoned Water Well
☐ Watertight Sewer Lines ☐ Seepage Pit ☐ Feedyard ☐ Fertilizer Storage ☐ Oil Well/Gas Well
■ Other (Specify) Flyash lagoon
Direction from well? East Distance from well? <50-feet ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	11	Silt w/ lenses			
11	34	Sand			

Notes:

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was ■ constructed, ☐ reconstructed, or ☐ plugged under my jurisdiction and was completed on (mo-day-year) 10-19-2015 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 759. This Water Well Record was completed on (mo-day-year) 11-27-2015 under the business name of RAZEK Environmental, LLC Signature ____

Mail 1 white copy along with a fee of $5.00 for each constructed well to: Kansas Department of Health and Environment, Bureau of Water, GWTS Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Mail one to Water Well Owner and retain one for your records. Telephone 785-296-5524.
Visit us at http://www.kdheks.gov/waterwell/index.html KSA 82a-1212 Revised 7/10/2015

WATER WELL RECORD Form WWC-5

■ Original Record ☐ Correction ☐ Change in Well Use

Division of Water Resources App. No. _____ Well ID _____

1 LOCATION OF WATER WELL: County: Wyandotte | Fraction: ¼ NE ¼ SE ¼ SW ¼ | Section Number: 13 | Township Number: T 10 S | Range Number: R 24 ■ E ☐ W

2 WELL OWNER: Last Name: First:
Business: Kansas City BPU
Address: 540 Minnesota Avenue
Address:
City: Kansas City State: KS ZIP 66101

Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: ☐
Kansas City BPU Nearman Plant
4240 North 55th Street, Kansas City, KS 66104

3 LOCATE WELL WITH "X" IN SECTION BOX:
N / W / E / S; NW, NE, SW (X), SE; 1 mile

4 DEPTH OF COMPLETED WELL: 27.5 ft.
Depth(s) Groundwater Encountered: 1) _____ ft. 2) N/A ft. 3) N/A ft., or 4) ☐ Dry Well
WELL'S STATIC WATER LEVEL: _____ ft.
☐ below land surface, measured on (mo-day-yr)_____
■ above land surface, measured on (mo-day-yr)_____
Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm
Well water was N/A ft. after N/A hours pumping N/A gpm
Estimated Yield: N/A gpm
Bore Hole Diameter: 8.25 in. to 27.5 ft. and N/A in. to N/A ft.

5 Latitude: 39.175387 (decimal degrees)
Longitude: -94.692896 (decimal degrees)
Horizontal Datum: ■ WGS 84 ☐ NAD 83 ☐ NAD 27
Source for Latitude/Longitude:
☐ GPS (unit make/model: _____) (WAAS enabled? ☐ Yes ☐ No)
☐ Land Survey ■ Topographic Map
☐ Online Mapper: _____

6 Elevation: 756 ft. ■ Ground Level ☐ TOC
Source: ☐ Land Survey ☐ GPS ■ Topographic Map ☐ Other _____

7 WELL WATER TO BE USED AS:
1. Domestic: ☐ Household ☐ Lawn & Garden ☐ Livestock
2. ☐ Irrigation
3. ☐ Feedlot
4. ☐ Industrial
5. ☐ Public Water Supply: well ID _____
6. ☐ Dewatering: how many wells? _____
7. ☐ Aquifer Recharge: well ID _____
8. ■ Monitoring: well ID MW-10
9. Environmental Remediation: well ID _____ ☐ Air Sparge ☐ Soil Vapor Extraction ☐ Recovery ☐ Injection
10. ☐ Oil Field Water Supply: lease _____
11. Test Hole: well ID _____ ☐ Cased ☐ Uncased ☐ Geotechnical
12. Geothermal: how many bores? _____ a) Closed Loop ☐ Horizontal ☐ Vertical b) Open Loop ☐ Surface Discharge ☐ Inj. of Water
13. ☐ Other (specify): _____

Was a chemical/bacteriological sample submitted to KDHE? ☐ Yes ■ No If yes, date sample was submitted: _____
Water well disinfected? ☐ Yes ■ No

8 TYPE OF CASING USED: ☐ Steel ■ PVC ☐ Other _____ CASING JOINTS: ☐ Glued ☐ Clamped ☐ Welded ■ Threaded
Casing diameter 2 in. to 22.5 ft., Diameter N/A in. to N/A ft., Diameter N/A in. to N/A ft.
Casing height above land surface 30 in. Weight N/A lbs./ft. Wall thickness or gauge No. Sch. 40

TYPE OF SCREEN OR PERFORATION MATERIAL:
☐ Steel ☐ Stainless Steel ☐ Fiberglass ■ PVC ☐ Other (Specify) _____
☐ Brass ☐ Galvanized Steel ☐ Concrete tile ☐ None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
☐ Continuous Slot ■ Mill Slot ☐ Gauze Wrapped ☐ Torch Cut ☐ Drilled Holes ☐ Other (Specify) _____
☐ Louvered Shutter ☐ Key Punched ☐ Wire Wrapped ☐ Saw Cut ☐ None (Open Hole)

SCREEN-PERFORATED INTERVALS: From 22.5 ft. to 27.5 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.
GRAVEL PACK INTERVALS: From 20.5 ft. to 27.5 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.

9 GROUT MATERIAL: ☐ Neat cement ☐ Cement grout ■ Bentonite ■ Other 0 to 2 feet concrete
Grout Intervals: From 2 ft. to 20.5 ft., From N/A ft. to N/A ft., From N/A ft. to N/A ft.

Nearest source of possible contamination:
☐ Septic Tank ☐ Lateral Lines ☐ Pit Privy ☐ Livestock Pens ☐ Insecticide Storage
☐ Sewer Lines ☐ Cess Pool ☐ Sewage Lagoon ☐ Fuel Storage ☐ Abandoned Water Well
☐ Watertight Sewer Lines ☐ Seepage Pit ☐ Feedyard ☐ Fertilizer Storage ☐ Oil Well/Gas Well
■ Other (Specify) Flyash lagoon
Direction from well? East Distance from well? <50-feet ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	5	Silt			
5	30	Sand			

Notes:

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was ■ constructed, ☐ reconstructed, or ☐ plugged under my jurisdiction and was completed on (mo-day-year) 10-19-2015 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 759 This Water Well Record was completed on (mo-day-year) 11-27-2015 under the business name of RAZEK Environmental, LLC Signature _____

Mail 1 white copy along with a fee of $5.00 for each constructed well to: Kansas Department of Health and Environment, Bureau of Water, GWTS Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Mail one to Water Well Owner and retain one for your records. Telephone 785-296-5524
Visit us at http://www.kdheks.gov/water/well/index.html

KSA 82a-1212 **Revised 7/10/2015**

JUL 13 '93 09:37 LAYNE GEOSCIENCE KC

WATER WELL RECORD Form WWC-5 KSA 82a-1212

Bottom left #3

ATION OF WATER WELL:	Fraction	Section Number	Township Number	Range Number
ty: Wyandotte	SW ¼ NE ¼ SW ¼	13	T 50 N	R 24 E/W

nce and direction from nearest town or city street address of well if located within city?

0 N. 55th Street Kansas City, Kansas

ER WELL OWNER: Board of Public Utilities

Address; Box # : 700 Minnesota Avenue

tate, ZIP Code : Kansas City, Kansas 66101

Board of Agriculture, Division of Water Resource
Application Number:

CATE WELL'S LOCATION WITH "X" IN SECTION BOX:

N / NW / NE / W / E / SW / SE / S (X)

4 DEPTH OF COMPLETED WELL 32 ft. ELEVATION: 746.00

Depth(s) Groundwater Encountered 1. 13.5 ft. 2. ft. 3. ft.

WELL'S STATIC WATER LEVEL 13.5 ft. below land surface measured on mo/day/yr 9/16/82

Pump test data: Well water was ft. after hours pumping gpm

Est. Yield gpm: Well water was ft. after hours pumping gpm

Bore Hole Diameter 8 in. to 32 ft., and in. to ft

WELL WATER TO BE USED AS: 5 Public water supply 8 Air conditioning 11 Injection well
1 Domestic 3 Feedlot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)
2 Irrigation 4 Industrial 7 Lawn and garden only (10) Observation well

Was a chemical/bacteriological sample submitted to Department? Yes No X ; If yes, mo/day/yr sample was submitted

Water Well Disinfected? Yes X No

TYPE OF BLANK CASING USED: 5 Wrought iron 8 Concrete tile CASING JOINTS: Glued X Clamped
(1) Steel 3 RMP (SR) 6 Asbestos-Cement 9 Other (specify below) Welded
(2) PVC 4 ABS 7 Fiberglass Threaded

Blank casing diameter 4 in. to 12 ft., Dia in. to ft., Dia in. to ft

Casing height above land surface 24 in., weight 1.98 lbs./ft. Wall thickness or gauge No.

TYPE OF SCREEN OR PERFORATION MATERIAL:
1 Steel 3 Stainless steel 5 Fiberglass (7) PVC 10 Asbestos-cement
2 Brass 4 Galvanized steel 6 Concrete tile 8 RMP (SR) 11 Other (specify)
9 ABS 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
1 Continuous slot 3 Mill slot 5 Gauzed wrapped (8) Saw cut 11 None (open hole)
2 Louvered shutter 4 Key punched 6 Wire wrapped 9 Drilled holes
7 Torch cut 10 Other (specify)

SCREEN/PERFORATED INTERVALS: From 12 ft. to 32 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

GRAVEL PACK INTERVALS: From 10 ft. to 32 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 0 ft. to 10 ft., From ft. to ft., From ft. to ft.

What is the nearest source of possible contamination:
1 Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 14 Abandoned water well
2 Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 15 Oil well/Gas well
3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer storage 16 Other (specify below)
13 Insecticide storage Ash Pond
Direction from well? Southwest How many feet? 480'

FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHOLOGIC LOG
0	13.5	Brown silty clay			
13.5	32.0	Gray fine sandy silt			

CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 7/1/82 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 106. This Water Well Record was completed on (mo/day/yr) 7/1/82 and this record was transmitted to the business name of Layne-Western Company, Inc. by (signature)

INSTRUCTIONS: Use typewriter or ball point pen. PLEASE PRESS FIRMLY and PRINT clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Division of Environment, Environmental Geology Section, Topeka, KS 66620. Send one to WATER WELL OWNER and retain one for your records.

WATER WELL RECORD Form WWC-5 KSA 82a-1212 Remote NW 4

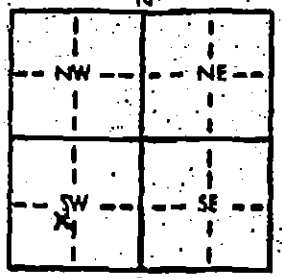
TION OF WATER WELL:	Fraction:	Section Number	Township Number	Range Number
Wyandotte	SW ¼ SW ¼ NE ¼	23	T 50 SN	R 24 EW

and direction from nearest town or city street address of well if located within city?
240 N. 55th Street Kansas City, Kansas

WELL OWNER: Board of Public Utilities
St. Address, Box #: 700 Minnesota Avenue
te, ZIP Code: Kansas City, Kansas 66101

Board of Agriculture, Division of Water Resources
Application Number:

TE WELL'S LOCATION WITH "X" IN SECTION BOX:



4 DEPTH OF COMPLETED WELL 31 ft. ELEVATION: 745.00
Depth(s) Groundwater Encountered 1. 10 ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 10 ft. below land surface measured on mo/day/yr 11/11/82
Pump test data: Well water was ft. after hours pumping gpm
Est. Yield gpm: Well water was ft. after hours pumping gpm
Bore Hole Diameter 8 in. to 31 ft., and in. to ft.
WELL WATER TO BE USED AS: 5 Public water supply 8 Air conditioning 11 Injection well
1 Domestic 3 Feedlot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)
2 Irrigation 4 Industrial 7 Lawn and garden only (10) Observation well
Was a chemical/bacteriological sample submitted to Department? Yes No X; If yes, mo/day/yr sample was submitted
Water Well Disinfected? Yes X No

PE OF BLANK CASING USED: 5 Wrought iron 8 Concrete tile CASING JOINTS: Glued X Clamped
Steel 3 RMP (SR) 6 Asbestos-Cement 9 Other (specify below) Welded
PVC 4 ABS 7 Fiberglass Threaded
casing diameter 4 in. to 11 ft., Dia in. to ft., Dia in. to ft.
height above land surface 24 in., weight 1.98 lbs./ft. Wall thickness or gauge No.

OF SCREEN OR PERFORATION MATERIAL: (7) PVC 10 Asbestos-cement
1 Steel 3 Stainless steel 5 Fiberglass 8 RMP (SR) 11 Other (specify)
2 Brass 4 Galvanized steel 6 Concrete tile 9 ABS 12 None used (open hole)

N OR PERFORATION OPENINGS ARE: 5 Gauzed wrapped (8) Saw cut 11 None (open hole)
Continuous slot 3 Mill slot 6 Wire wrapped 9 Drilled holes
2 Louvered shutter 4 Key punched 7 Torch cut 10 Other (specify)

ERFORATED INTERVALS: From 11 ft. to 31 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

GRAVEL PACK INTERVALS: From 10 ft. to 31 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

OUT MATERIAL: 1 Neat cement (2) Cement grout 3 Bentonite 4 Other
ntervals: From 0 ft. to 10 ft., From ft. to ft., From ft. to ft.

Is the nearest source of possible contamination:
Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 14 Abandoned water well
Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 15 Oil well/Gas well
3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer storage (16) Other (specify below)
on from well? Northwest 13 Insecticide storage Ash Pond
How many feet? 200'

M	TO	LITHOLOGIC LOG	FROM	TO	LITHOLOGIC LOG
.0	1.0	Topsoil			
.0	8.0	Brown clayey silt			
0	31.0	Brown & gray silty fine sand			

RACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was
leted on (mo/day/year) 1/20/83 and this record is true to the best of my knowledge and belief. Kansas
r Well Contractor's License No. 102 This Water Well Record was completed on (mo/day/yr) 2/1/83
r the business name of Layne-Western Company, Inc. by (signature)

INSTRUCTIONS: Use typewriter or ball point pen. PLEASE PRESS FIRMLY and PRINT clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Division of Environment, Environmental Geology Section, Topeka, KS 66620. Send one to WATER WELL OWNER and retain one for your records.

Well Development Form

Project Number: 88019	Well Number: MW-2A

Project Information	Elevation of Well
Facility Name: KCBPU Nearman Creek	Ground Surface Elevation (GS):
Location: N E	Top of Casing Elevation (TOC):

Well Information	Well Volume Calculation
Date Well Installed: 10-20-15	
Total Depth of Well: 31.55 feet from BTOC	
Depth to Top of Screen: 26.3 feet from BTOC	
Length of Casing Screened: 5 feet	
Type of Formation Screened: SAND	1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))2

Well Development Method				
Equipment:	12 Volt Pump			Method Description:
Surge	X	Bail		
Airlift		Pump	X	

Observations During Well Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed Gallons	Fluid Removed Total	Temp. (degrees F)	pH (units)	S.C. (S/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
10-21-15	0850	20.89	31.55	-	-	16.6	6.9	1320	001	
	0852	21.30		5	5	15.3	6.9	1790	001	
	0854			5	10	14.8	6.8	1290	001	
	0856			5	15	14.7	6.8	1300	001	
	0858	21.30		5	20	14.8	6.8	1270	2483	
	0900			5	25	15.0	6.9	1290	1703	
	0902			5	30	14.7	6.8	1280	41.5	
	0904			5	35	14.6	6.8	1290	19.2	
	0906	21.31		5	40	14.9	6.8	1300	9.06	
	0908			3	45	14.6	6.8	1300	11.30	
	0910			5	50	14.7	6.9	1300	18.9	
	0912			5	55	14.7	6.8	1306	61.8	
	0914			5	60	14.7	6.8	1300	13.4	
	0916			5	65	14.7	6.8	1300	937	
	0918			5	70	14.7	6.8	1300	39.8	
	0920	21.31	31.64	5	75	14.7	6.9	1300	5.14	

* From TOC unless otherwise noted in Remarks

Well Development Form

Project Number: 88019	Well Number: MW-8A

Project Information

Facility Name:	KC BPU Nearman
Location:	N E

Elevation of Well

Ground Surface Elevation (GS):	
Top of Casing Elevation (TOC):	

Well Information

Date Well Installed:	10-19-15		
Total Depth of Well:	35.38	feet from	TOC
Depth to Top of Screen:	30	feet from	TOS
Length of Casing Screened:	5	feet	
Type of Formation Screened:	SAND		

Well Volume Calculation

1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))2

Well Development Method

Equipment:	12-volt Pump			Method Description:
Surge	X	Bail		
Airlift		Pump	X	

Observations During Well Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (S/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
~~10-20-15~~	1200			-	-	17.4	7.1	1630	3162	
	1205			10	10	17.0	7.0	1610	1025	
	1235			~~10~~	20	16.2	7.0	1580	963	
	1240			~~30~~	30	16.3	7.0	1580	1609	
	1245			40	40	16.0	6.9	1720	4.15	
	1250			10	50	15.9	6.9	1760	1.98	
	1255	26.0C		10	60	15.8	6.7	1740	0.93	
	1300	25.80	35.38	10	70	15.8	6.9	1760	0.91	

* From TOC unless otherwise noted in Remarks

Burns & McDonnell SINCE 1898

Well Development Form

Project Number: 88019	Well Number: MW-10

Project Information	Elevation of Well
Facility Name: KC BPU Neosman Creek	Ground Surface Elevation (GS):
Location: N E	Top of Casing Elevation (TOC):

Well Information	
Date Well Installed:	10-19-15
Total Depth of Well:	29.38 feet from TOC
Depth to Top of Screen:	24. feet from TOC
Length of Casing Screened:	5 feet
Type of Formation Screened:	SAND

Well Volume Calculation

1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))2

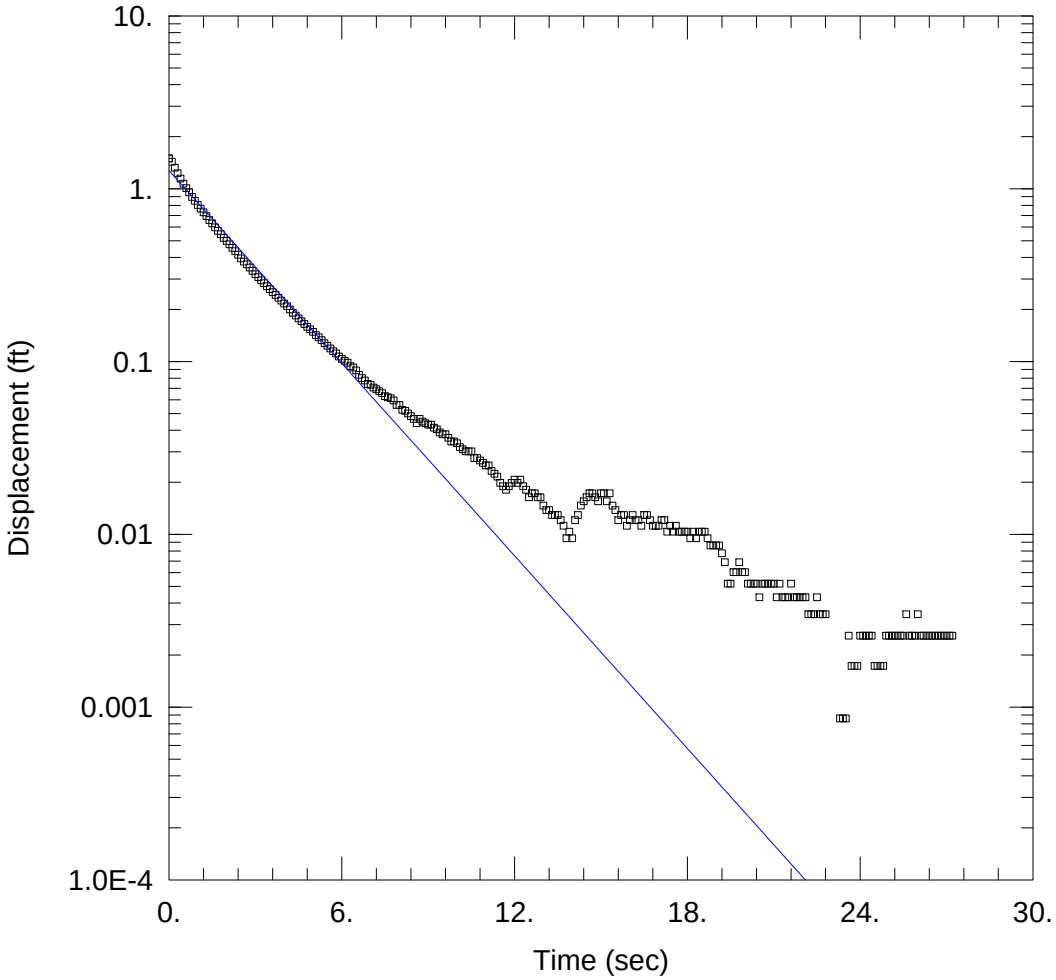
Well Development Method				
Equipment:	12-volt Pump			Method Description:
Surge	X	Bail		
Airlift		Pump	X	

Observations During Well Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (S/cm)	Turbidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
				Gallons	Total					
10-20-15	15 25	18.87	29.38	—	—	18.6	7.2	1290	OOR	
	15 27	19.60		5	5	16.3	6.9	1350	3162	
	1529	19.64		5	10	16.2	6.8	1360	3741	
	1531	19.68		5	15	15.7	6.8	1380	3806	
	1533	19.71		5	20	15.6	6.8	1380	2227	
	1535	19.74		5	25	15.5	6.8	1390	34.9	
	1537	19.76		5	30	15.5	6.8	1350	15.4	
	1539	19.77		5	35	15.5	6.8	1400	35.1	
	1541	19.78		5	40	15.5	6.8	1360	11.1	
	1543	19.78		5	45	15.6	6.8	1380	62.7	
	1545	19.78		5	50	15.6	6.8	1380	11.66	
	1547	19.78		5	55	15.6	6.8	1390	14.0	
	1549	19.78		5	60	15.6	6.8	1380	6472	
	1551	19.78		5	65	15.6	6.8	1390	178.4	
	1553	19.78		5	70	15.6	6.8	1380	551	
	1555	18.93	29.66	5	75	15.6	6.8	1380	598	

* From TOC unless otherwise noted in Remarks

APPENDIX B – HYDRAULIC TEST DATA



WELL TEST ANALYSIS

Data Set: Z:\...\MW-2A_TEST1.aqt
Date: 11/03/15 Time: 07:31:19

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-2A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2A)

Initial Displacement: 1.498 ft Static Water Column Height: 10.29 ft
Total Well Penetration Depth: 10.29 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01541 cm/sec y0 = 1.273 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-2A\MW-2A_TES
Date: 11/03/15
Time: 07:31:55

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-2A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-2A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.498 ft
Static Water Column Height: 10.29 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.29 ft

No. of Observations: 273

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	1.498	13.7	0.01122
0.1	1.432	13.8	0.00949
0.2	1.323	13.9	0.01035
0.3	1.229	14.	0.00949
0.4	1.145	14.1	0.01208
0.5	1.069	14.2	0.01294
0.6	1.008	14.3	0.01467
0.7	0.9524	14.4	0.01553
0.8	0.8963	14.5	0.01639
0.9	0.8515	14.6	0.01726
1.	0.8049	14.7	0.01726
1.1	0.7669	14.8	0.01639
1.2	0.7298	14.9	0.01553
1.3	0.6945	15.	0.01726
1.4	0.6591	15.1	0.01726
1.5	0.6298	15.2	0.01553
1.6	0.597	15.3	0.01726
1.7	0.5702	15.4	0.01467
1.8	0.5452	15.5	0.01381
1.9	0.5193	15.6	0.01208
2.	0.4986	15.7	0.01294
2.1	0.4771	15.8	0.01294
2.2	0.4546	15.9	0.01122
2.3	0.4348	16.	0.01208
2.4	0.4149	16.1	0.01294
2.5	0.3951	16.2	0.01208
2.6	0.3787	16.3	0.01208
2.7	0.3649	16.4	0.01122
2.8	0.3503	16.5	0.01294
2.9	0.3347	16.6	0.01294

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.	0.3201	16.7	0.01208
3.1	0.308	16.8	0.01122
3.2	0.295	16.9	0.01122
3.3	0.2838	17.	0.01122
3.4	0.2726	17.1	0.01208
3.5	0.2623	17.2	0.01208
3.6	0.2519	17.3	0.01035
3.7	0.2433	17.4	0.01122
3.8	0.2338	17.5	0.01035
3.9	0.2252	17.6	0.01122
4.	0.2165	17.7	0.01035
4.1	0.2088	17.8	0.01035
4.2	0.2001	17.9	0.01035
4.3	0.1915	18.	0.01035
4.4	0.1846	18.1	0.00949
4.5	0.1777	18.2	0.01035
4.6	0.1708	18.3	0.00949
4.7	0.1648	18.4	0.01035
4.8	0.1587	18.5	0.01035
4.9	0.1536	18.6	0.01035
5.	0.1484	18.7	0.00949
5.1	0.1423	18.8	0.00863
5.2	0.138	18.9	0.00863
5.3	0.1329	19.	0.00863
5.4	0.1277	19.1	0.00863
5.5	0.1234	19.2	0.00777
5.6	0.1191	19.3	0.0069
5.7	0.1147	19.4	0.00518
5.8	0.1113	19.5	0.00518
5.9	0.107	19.6	0.00604
6.	0.1035	19.7	0.00604
6.1	0.1009	19.8	0.0069
6.2	0.09835	19.9	0.00604
6.3	0.09403	20.	0.00604
6.4	0.09231	20.1	0.00518
6.5	0.08886	20.2	0.00518
6.6	0.08368	20.3	0.00518
6.7	0.08023	20.4	0.00518
6.8	0.07764	20.5	0.00432
6.9	0.07419	20.6	0.00518
7.	0.07333	20.7	0.00518
7.1	0.07074	20.8	0.00518
7.2	0.06902	20.9	0.00518
7.3	0.06729	21.	0.00518
7.4	0.06557	21.1	0.00432
7.5	0.06298	21.2	0.00518
7.6	0.06212	21.3	0.00432
7.7	0.06125	21.4	0.00432
7.8	0.05953	21.5	0.00432
7.9	0.05608	21.6	0.00518
8.	0.05608	21.7	0.00432
8.1	0.05263	21.8	0.00432
8.2	0.05176	21.9	0.00432
8.3	0.05004	22.	0.00432
8.4	0.04831	22.1	0.00432
8.5	0.04659	22.2	0.00345
8.6	0.044	22.3	0.00345
8.7	0.04659	22.4	0.00345
8.8	0.04486	22.5	0.00432
8.9	0.044	22.6	0.00345
9.	0.04314	22.7	0.00345
9.1	0.04314	22.8	0.00345
9.2	0.04141	22.9	0.
9.3	0.04055	23.	-0.00086
9.4	0.03882	23.1	-0.00086
9.5	0.03796	23.2	-0.00086

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.6	0.03796	23.3	0.00086
9.7	0.03623	23.4	0.00086
9.8	0.03451	23.5	0.00086
9.9	0.03451	23.6	0.00259
10.	0.03365	23.7	0.00173
10.1	0.03192	23.8	0.00173
10.2	0.03106	23.9	0.00173
10.3	0.0302	24.	0.00259
10.4	0.0302	24.1	0.00259
10.5	0.0302	24.2	0.00259
10.6	0.02761	24.3	0.00259
10.7	0.02761	24.4	0.00259
10.8	0.02675	24.5	0.00173
10.9	0.02588	24.6	0.00173
11.	0.02502	24.7	0.00173
11.1	0.02502	24.8	0.00173
11.2	0.02329	24.9	0.00259
11.3	0.02243	25.	0.00259
11.4	0.02157	25.1	0.00259
11.5	0.01984	25.2	0.00259
11.6	0.01898	25.3	0.00259
11.7	0.01812	25.4	0.00259
11.8	0.01898	25.5	0.00259
11.9	0.01984	25.6	0.00345
12.	0.02071	25.7	0.00259
12.1	0.01984	25.8	0.00259
12.2	0.02071	25.9	0.00259
12.3	0.01898	26.	0.00345
12.4	0.01812	26.1	0.00259
12.5	0.01639	26.2	0.00259
12.6	0.01726	26.3	0.00259
12.7	0.01726	26.4	0.00259
12.8	0.01639	26.5	0.00259
12.9	0.01639	26.6	0.00259
13.	0.01467	26.7	0.00259
13.1	0.01381	26.8	0.00259
13.2	0.01381	26.9	0.00259
13.3	0.01294	27.	0.00259
13.4	0.01294	27.1	0.00259
13.5	0.01294	27.2	0.00259
13.6	0.01208		

SOLUTION

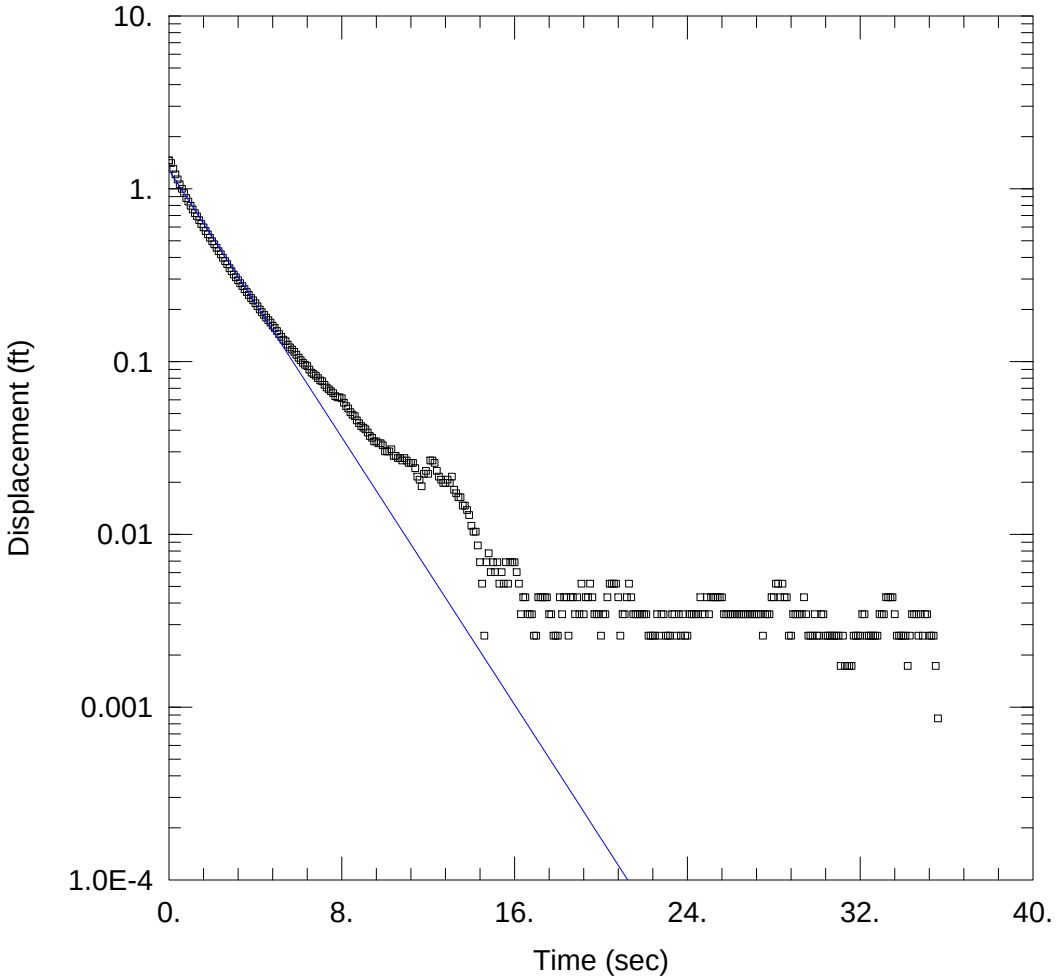
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.728

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.01541	cm/sec
y0	1.273	ft

$T = K*b = 54.\ cm^2/sec$



WELL TEST ANALYSIS

Data Set: Z:\...\MW-2A_TEST2.aqt
Date: 11/03/15 Time: 07:35:08

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-2A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2A)

Initial Displacement: 1.455 ft Static Water Column Height: 10.29 ft
Total Well Penetration Depth: 10.29 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01603 cm/sec y0 = 1.281 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-2A\MW-2A_TES
Date: 11/03/15
Time: 07:35:45

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-2A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-2A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.455 ft
Static Water Column Height: 10.29 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.29 ft

No. of Observations: 358

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	1.455	17.9	0.00259
0.1	1.407	18.	0.00259
0.2	1.304	18.1	0.00432
0.3	1.211	18.2	0.00345
0.4	1.134	18.3	0.00432
0.5	1.061	18.4	0.00432
0.6	0.999	18.5	0.00259
0.7	0.9438	18.6	0.00432
0.8	0.8825	18.7	0.00432
0.9	0.842	18.8	0.00345
1.	0.7963	18.9	0.00432
1.1	0.7592	19.	0.00345
1.2	0.7229	19.1	0.00518
1.3	0.6927	19.2	0.00345
1.4	0.6582	19.3	0.00432
1.5	0.6246	19.4	0.00432
1.6	0.597	19.5	0.00518
1.7	0.5685	19.6	0.00432
1.8	0.5435	19.7	0.00345
1.9	0.5202	19.8	0.00345
2.	0.496	19.9	0.00345
2.1	0.4762	20.	0.00259
2.2	0.4546	20.1	0.00345
2.3	0.4348	20.2	0.00345
2.4	0.4175	20.3	0.00432
2.5	0.3986	20.4	0.00518
2.6	0.3813	20.5	0.00518
2.7	0.3658	20.6	0.00518
2.8	0.3468	20.7	0.00518
2.9	0.333	20.8	0.00432

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.	0.3183	20.9	0.00259
3.1	0.3071	21.	0.00345
3.2	0.295	21.1	0.00345
3.3	0.2838	21.2	0.00432
3.4	0.2735	21.3	0.00518
3.5	0.2623	21.4	0.00432
3.6	0.2528	21.5	0.00345
3.7	0.2424	21.6	0.00345
3.8	0.2329	21.7	0.00345
3.9	0.226	21.8	0.00345
4.	0.2174	21.9	0.00345
4.1	0.2088	22.	0.00345
4.2	0.2001	22.1	0.00345
4.3	0.1932	22.2	0.00259
4.4	0.1863	22.3	0.00259
4.5	0.1794	22.4	0.00259
4.6	0.1734	22.5	0.00259
4.7	0.1682	22.6	0.00345
4.8	0.1613	22.7	0.00259
4.9	0.1562	22.8	0.00345
5.	0.1501	22.9	0.00345
5.1	0.1441	23.	0.00259
5.2	0.1389	23.1	0.00259
5.3	0.1337	23.2	0.00259
5.4	0.1311	23.3	0.00345
5.5	0.1251	23.4	0.00345
5.6	0.1208	23.5	0.00259
5.7	0.1173	23.6	0.00345
5.8	0.1139	23.7	0.00259
5.9	0.1096	23.8	0.00345
6.	0.1053	23.9	0.00259
6.1	0.1018	24.	0.00259
6.2	0.09835	24.1	0.00345
6.3	0.09576	24.2	0.00345
6.4	0.09403	24.3	0.00345
6.5	0.08972	24.4	0.00345
6.6	0.08627	24.5	0.00345
6.7	0.08454	24.6	0.00432
6.8	0.08282	24.7	0.00345
6.9	0.08023	24.8	0.00345
7.	0.07764	24.9	0.00432
7.1	0.07678	25.	0.00345
7.2	0.07333	25.1	0.00432
7.3	0.07074	25.2	0.00432
7.4	0.06902	25.3	0.00432
7.5	0.06729	25.4	0.00432
7.6	0.06557	25.5	0.00432
7.7	0.06298	25.6	0.00432
7.8	0.06212	25.7	0.00345
7.9	0.06212	25.8	0.00345
8.	0.06125	25.9	0.00345
8.1	0.0578	26.	0.00345
8.2	0.05521	26.1	0.00345
8.3	0.05349	26.2	0.00345
8.4	0.0509	26.3	0.00345
8.5	0.04918	26.4	0.00345
8.6	0.04831	26.5	0.00345
8.7	0.04572	26.6	0.00345
8.8	0.044	26.7	0.00345
8.9	0.04227	26.8	0.00345
9.	0.04141	26.9	0.00345
9.1	0.04055	27.	0.00345
9.2	0.03882	27.1	0.00345
9.3	0.0371	27.2	0.00345
9.4	0.03623	27.3	0.00345
9.5	0.03451	27.4	0.00345

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.6	0.03451	27.5	0.00259
9.7	0.03365	27.6	0.00345
9.8	0.03365	27.7	0.00345
9.9	0.03278	27.8	0.00345
10.	0.0302	27.9	0.00432
10.1	0.0302	28.	0.00432
10.2	0.0302	28.1	0.00518
10.3	0.03106	28.2	0.00518
10.4	0.02847	28.3	0.00432
10.5	0.02847	28.4	0.00518
10.6	0.02761	28.5	0.00432
10.7	0.02761	28.6	0.00432
10.8	0.02675	28.7	0.00259
10.9	0.02761	28.8	0.00259
11.	0.02675	28.9	0.00345
11.1	0.02588	29.	0.00345
11.2	0.02588	29.1	0.00345
11.3	0.02588	29.2	0.00345
11.4	0.02416	29.3	0.00345
11.5	0.02157	29.4	0.00432
11.6	0.02071	29.5	0.00345
11.7	0.01898	29.6	0.00259
11.8	0.02243	29.7	0.00259
11.9	0.02329	29.8	0.00259
12.	0.02243	29.9	0.00345
12.1	0.02675	30.	0.00259
12.2	0.02675	30.1	0.00259
12.3	0.02588	30.2	0.00345
12.4	0.02329	30.3	0.00345
12.5	0.02157	30.4	0.00259
12.6	0.02071	30.5	0.00259
12.7	0.01984	30.6	0.00259
12.8	0.01984	30.7	0.00259
12.9	0.02071	30.8	0.00259
13.	0.01984	30.9	0.00259
13.1	0.02157	31.	0.00259
13.2	0.01812	31.1	0.00173
13.3	0.01726	31.2	0.00259
13.4	0.01639	31.3	0.00173
13.5	0.01639	31.4	0.00173
13.6	0.01467	31.5	0.00173
13.7	0.01467	31.6	0.00173
13.8	0.01381	31.7	0.00259
13.9	0.01294	31.8	0.00259
14.	0.01122	31.9	0.00259
14.1	0.01035	32.	0.00259
14.2	0.01035	32.1	0.00345
14.3	0.00863	32.2	0.00345
14.4	0.0069	32.3	0.00259
14.5	0.00518	32.4	0.00259
14.6	0.00259	32.5	0.00259
14.7	0.0069	32.6	0.00259
14.8	0.00777	32.7	0.00259
14.9	0.00604	32.8	0.00259
15.	0.0069	32.9	0.00345
15.1	0.00604	33.	0.00345
15.2	0.0069	33.1	0.00345
15.3	0.00518	33.2	0.00432
15.4	0.00604	33.3	0.00432
15.5	0.00518	33.4	0.00432
15.6	0.0069	33.5	0.00432
15.7	0.00518	33.6	0.00345
15.8	0.0069	33.7	0.00259
15.9	0.0069	33.8	0.00259
16.	0.0069	33.9	0.00259
16.1	0.00604	34.	0.00259

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.2	0.00518	34.1	0.00259
16.3	0.00345	34.2	0.00173
16.4	0.00432	34.3	0.00259
16.5	0.00432	34.4	0.00345
16.6	0.00345	34.5	0.00345
16.7	0.00345	34.6	0.00345
16.8	0.00345	34.7	0.00259
16.9	0.00259	34.8	0.00345
17.	0.00259	34.9	0.00259
17.1	0.00432	35.	0.00345
17.2	0.00432	35.1	0.00345
17.3	0.00432	35.2	0.00259
17.4	0.00432	35.3	0.00259
17.5	0.00432	35.4	0.00259
17.6	0.00345	35.5	0.00173
17.7	0.00345	35.6	0.00086
17.8	0.00259	35.7	0.

SOLUTION

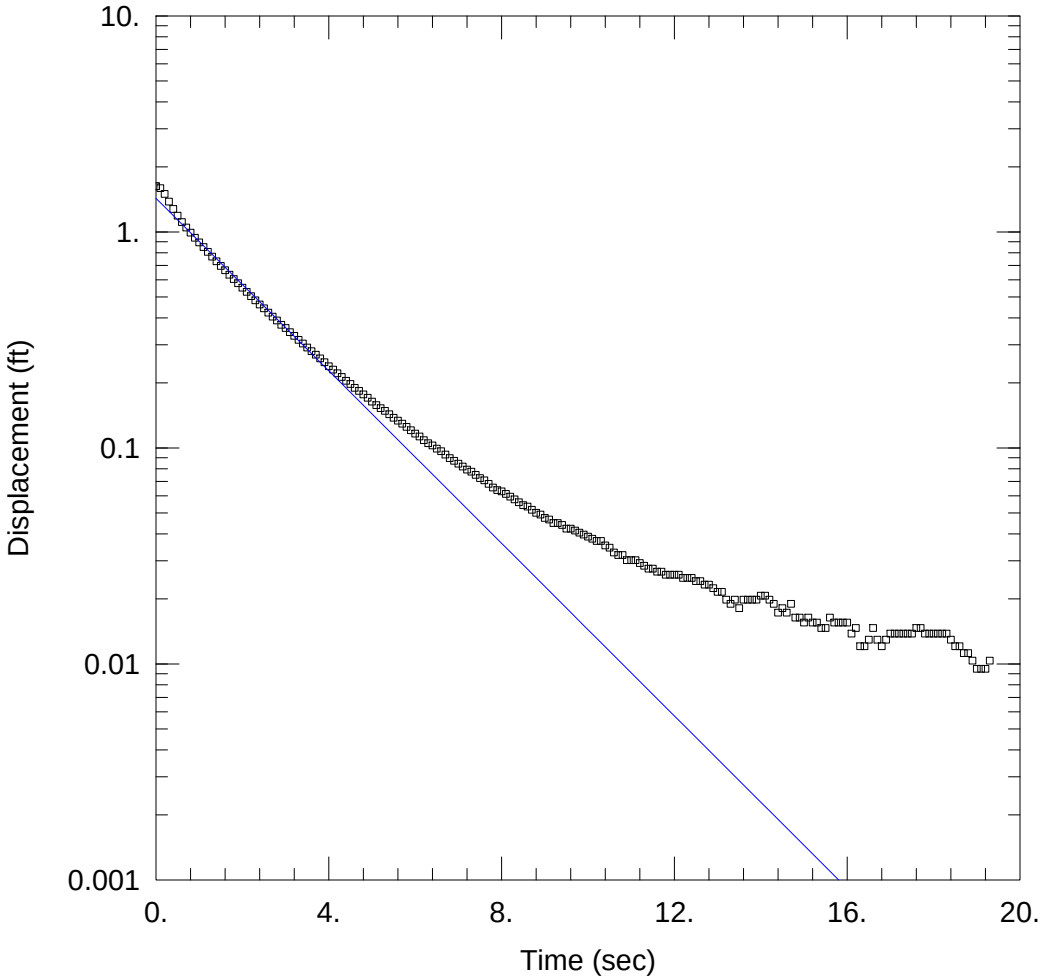
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.728

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.01603	cm/sec
y0	1.281	ft

$T = K*b = 56.2\ cm^2/sec$



WELL TEST ANALYSIS

Data Set: Z:\...\MW-2A_TEST3.aqt
Date: 11/03/15 Time: 07:38:52

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-2A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2A)

Initial Displacement: 1.627 ft Static Water Column Height: 10.29 ft
Total Well Penetration Depth: 10.29 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01656 cm/sec y0 = 1.431 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-2A\MW-2A_TES
Date: 11/03/15
Time: 07:39:14

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-2A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-2A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.627 ft
Static Water Column Height: 10.29 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.29 ft

No. of Observations: 194

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	1.627	9.7	0.04141
0.1	1.594	9.8	0.04055
0.2	1.5	9.9	0.03969
0.3	1.382	10.	0.03882
0.4	1.277	10.1	0.03796
0.5	1.19	10.2	0.0371
0.6	1.111	10.3	0.0371
0.7	1.047	10.4	0.03537
0.8	0.9921	10.5	0.03451
0.9	0.9403	10.6	0.03278
1.	0.8946	10.7	0.03192
1.1	0.8506	10.8	0.03192
1.2	0.8083	10.9	0.0302
1.3	0.7687	11.	0.0302
1.4	0.7307	11.1	0.0302
1.5	0.6962	11.2	0.02933
1.6	0.6643	11.3	0.02847
1.7	0.6341	11.4	0.02761
1.8	0.6056	11.5	0.02761
1.9	0.5789	11.6	0.02675
2.	0.5521	11.7	0.02675
2.1	0.528	11.8	0.02588
2.2	0.5038	11.9	0.02588
2.3	0.4822	12.	0.02588
2.4	0.4615	12.1	0.02588
2.5	0.4426	12.2	0.02502
2.6	0.4227	12.3	0.02502
2.7	0.4055	12.4	0.02502
2.8	0.3891	12.5	0.02416
2.9	0.3718	12.6	0.02416

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.	0.3589	12.7	0.02329
3.1	0.3433	12.8	0.02329
3.2	0.3304	12.9	0.02243
3.3	0.3166	13.	0.02157
3.4	0.3045	13.1	0.02157
3.5	0.2916	13.2	0.01984
3.6	0.2804	13.3	0.01898
3.7	0.27	13.4	0.01984
3.8	0.2597	13.5	0.01812
3.9	0.2493	13.6	0.01984
4.	0.239	13.7	0.01984
4.1	0.2303	13.8	0.01984
4.2	0.2217	13.9	0.01984
4.3	0.2131	14.	0.02071
4.4	0.2045	14.1	0.02071
4.5	0.1976	14.2	0.01984
4.6	0.1898	14.3	0.01898
4.7	0.1838	14.4	0.01726
4.8	0.1769	14.5	0.01812
4.9	0.1708	14.6	0.01726
5.	0.1639	14.7	0.01898
5.1	0.1579	14.8	0.01639
5.2	0.1527	14.9	0.01639
5.3	0.1484	15.	0.01553
5.4	0.1432	15.1	0.01639
5.5	0.138	15.2	0.01553
5.6	0.1337	15.3	0.01553
5.7	0.1294	15.4	0.01467
5.8	0.1251	15.5	0.01467
5.9	0.1208	15.6	0.01639
6.	0.1165	15.7	0.01553
6.1	0.113	15.8	0.01553
6.2	0.1087	15.9	0.01553
6.3	0.1053	16.	0.01553
6.4	0.1027	16.1	0.01381
6.5	0.09921	16.2	0.01467
6.6	0.09662	16.3	0.01208
6.7	0.09317	16.4	0.01208
6.8	0.08972	16.5	0.01294
6.9	0.08713	16.6	0.01467
7.	0.08454	16.7	0.01294
7.1	0.08196	16.8	0.01208
7.2	0.07937	16.9	0.01294
7.3	0.07764	17.	0.01381
7.4	0.07506	17.1	0.01381
7.5	0.07247	17.2	0.01381
7.6	0.07074	17.3	0.01381
7.7	0.06815	17.4	0.01381
7.8	0.06557	17.5	0.01381
7.9	0.06384	17.6	0.01467
8.	0.06298	17.7	0.01467
8.1	0.06125	17.8	0.01381
8.2	0.05953	17.9	0.01381
8.3	0.0578	18.	0.01381
8.4	0.05608	18.1	0.01381
8.5	0.05435	18.2	0.01381
8.6	0.05349	18.3	0.01381
8.7	0.05176	18.4	0.01294
8.8	0.05004	18.5	0.01208
8.9	0.04918	18.6	0.01208
9.	0.04745	18.7	0.01122
9.1	0.04659	18.8	0.01122
9.2	0.04486	18.9	0.01035
9.3	0.04486	19.	0.00949
9.4	0.044	19.1	0.00949
9.5	0.04227	19.2	0.00949

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.6	0.04227	19.3	0.01035

SOLUTION

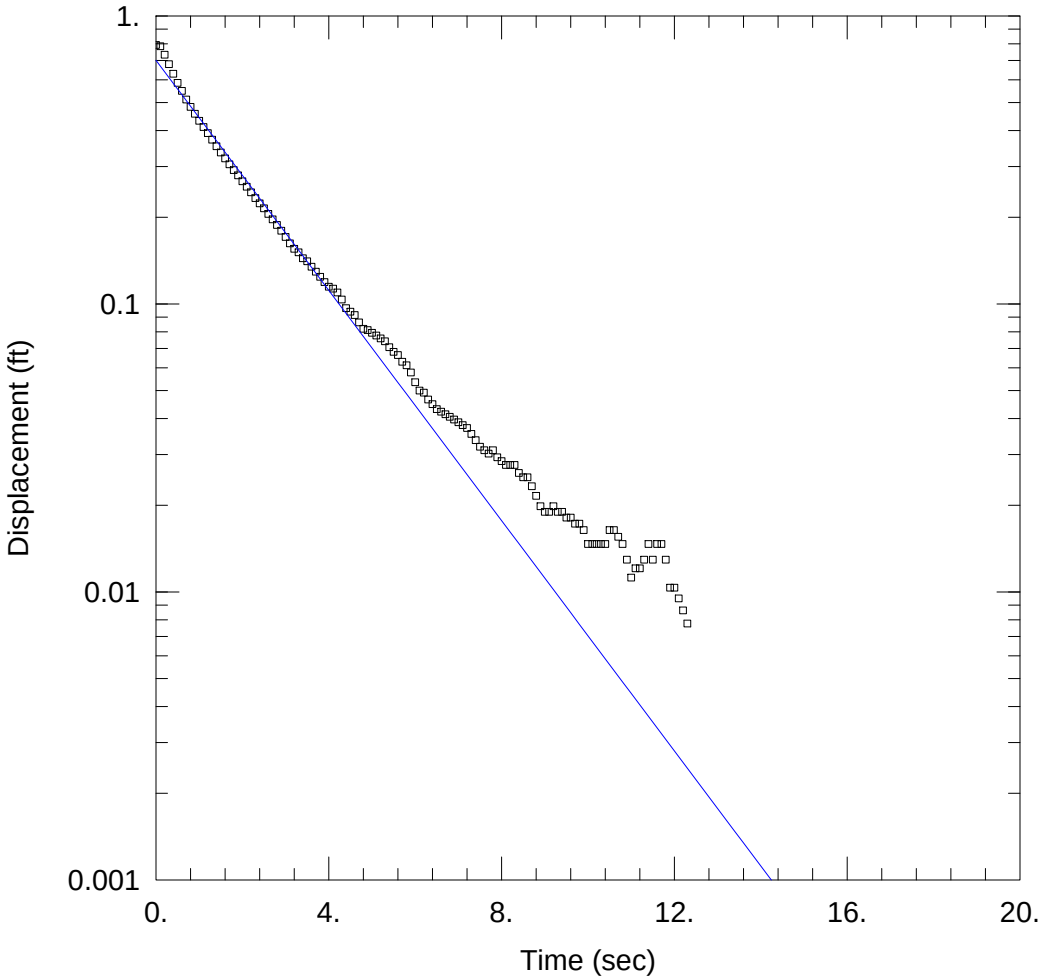
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.728

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.01656	cm/sec
y0	1.431	ft

$T = K*b = 58.03$ cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-2A_TEST4.aqt
Date: 11/03/15 Time: 07:41:54

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-2A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2A)

Initial Displacement: 0.7928 ft Static Water Column Height: 10.29 ft
Total Well Penetration Depth: 10.29 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01657 cm/sec y0 = 0.7015 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-2A\MW-2A_TES
Date: 11/03/15
Time: 07:42:18

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-2A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-2A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.7928 ft
Static Water Column Height: 10.29 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.29 ft

No. of Observations: 123

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.785	6.3	0.04659
0.2	0.7333	6.4	0.04486
0.3	0.6798	6.5	0.04314
0.4	0.6298	6.6	0.04227
0.5	0.5858	6.7	0.04141
0.6	0.5495	6.8	0.04055
0.7	0.5124	6.9	0.03969
0.8	0.4831	7.	0.03882
0.9	0.4572	7.1	0.03796
1.	0.4322	7.2	0.0371
1.1	0.4115	7.3	0.03537
1.2	0.3917	7.4	0.03365
1.3	0.3718	7.5	0.03192
1.4	0.3528	7.6	0.03106
1.5	0.3356	7.7	0.0302
1.6	0.3201	7.8	0.03106
1.7	0.3054	7.9	0.02933
1.8	0.2916	8.	0.02847
1.9	0.2795	8.1	0.02761
2.	0.2666	8.2	0.02761
2.1	0.2554	8.3	0.02761
2.2	0.2441	8.4	0.02588
2.3	0.2329	8.5	0.02502
2.4	0.2234	8.6	0.02502
2.5	0.2148	8.7	0.02329
2.6	0.2053	8.8	0.02157
2.7	0.1967	8.9	0.01984
2.8	0.1881	9.	0.01898
2.9	0.1794	9.1	0.01898
3.	0.1708	9.2	0.01984

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.1622	9.3	0.01898
3.2	0.1553	9.4	0.01898
3.3	0.151	9.5	0.01812
3.4	0.1441	9.6	0.01812
3.5	0.1406	9.7	0.01726
3.6	0.1346	9.8	0.01726
3.7	0.1294	9.9	0.01639
3.8	0.1242	10.	0.01467
3.9	0.1191	10.1	0.01467
4.	0.1147	10.2	0.01467
4.1	0.113	10.3	0.01467
4.2	0.1096	10.4	0.01467
4.3	0.1035	10.5	0.01639
4.4	0.09662	10.6	0.01639
4.5	0.09403	10.7	0.01553
4.6	0.09145	10.8	0.01467
4.7	0.08627	10.9	0.01294
4.8	0.08196	11.	0.01122
4.9	0.08109	11.1	0.01208
5.	0.07937	11.2	0.01208
5.1	0.07764	11.3	0.01294
5.2	0.07592	11.4	0.01467
5.3	0.07419	11.5	0.01294
5.4	0.07074	11.6	0.01467
5.5	0.06815	11.7	0.01467
5.6	0.06643	11.8	0.01294
5.7	0.06298	11.9	0.01035
5.8	0.06125	12.	0.01035
5.9	0.0578	12.1	0.00949
6.	0.05349	12.2	0.00863
6.1	0.05004	12.3	0.00777
6.2	0.04918		

SOLUTION

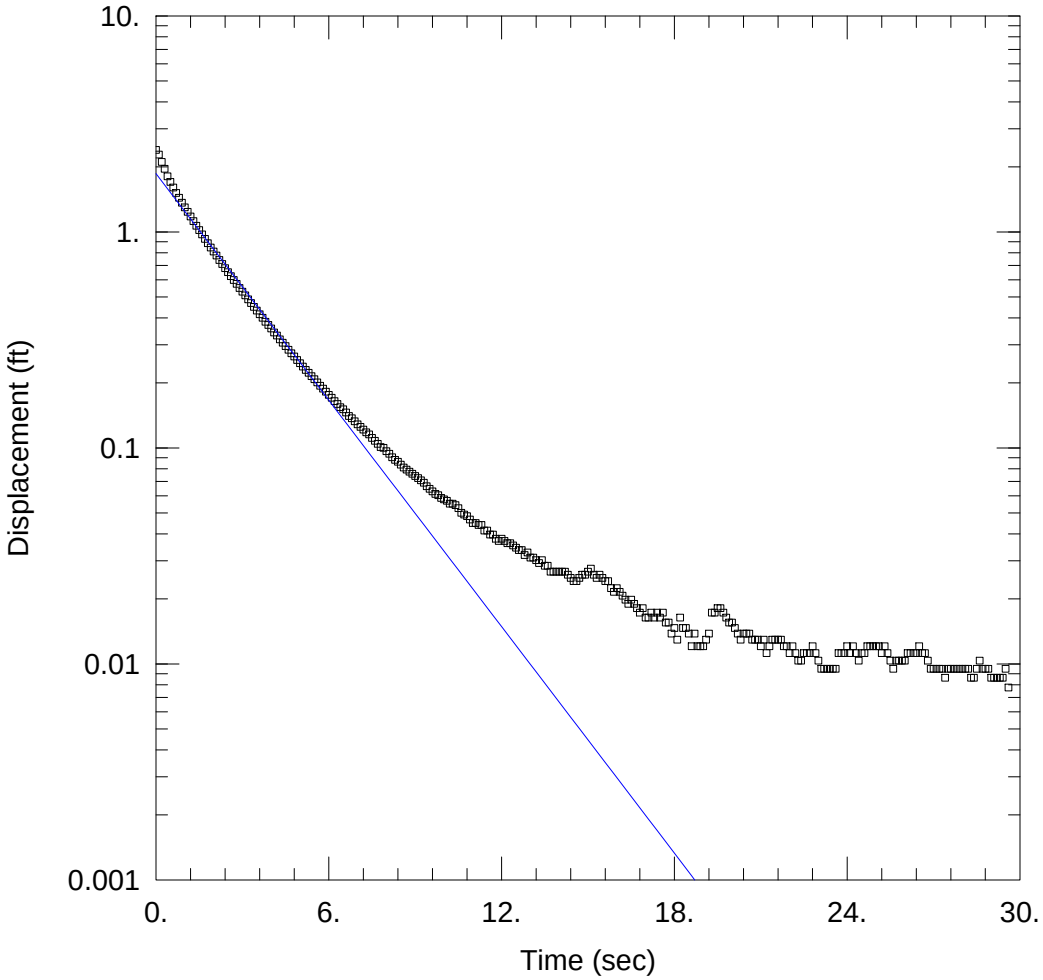
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.728

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.01657	cm/sec
y0	0.7015	ft

$T = K*b = 58.08$ cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-2A_TEST5.aqt
Date: 11/03/15 Time: 07:46:02

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-2A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2A)

Initial Displacement: 2.397 ft Static Water Column Height: 10.29 ft
Total Well Penetration Depth: 10.29 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01449 cm/sec y0 = 1.861 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-2A\MW-2A_TES
Date: 11/03/15
Time: 07:46:21

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-2A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-2A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.397 ft
Static Water Column Height: 10.29 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.29 ft

No. of Observations: 296

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	2.279	14.9	0.02588
0.2	2.109	15.	0.02675
0.3	1.959	15.1	0.02761
0.4	1.808	15.2	0.02588
0.5	1.703	15.3	0.02502
0.6	1.605	15.4	0.02588
0.7	1.516	15.5	0.02502
0.8	1.44	15.6	0.02416
0.9	1.366	15.7	0.02416
1.	1.3	15.8	0.02243
1.1	1.238	15.9	0.02157
1.2	1.179	16.	0.02243
1.3	1.122	16.1	0.02157
1.4	1.067	16.2	0.02071
1.5	1.021	16.3	0.01984
1.6	0.9731	16.4	0.01898
1.7	0.9283	16.5	0.01984
1.8	0.8868	16.6	0.01898
1.9	0.8471	16.7	0.01812
2.	0.8109	16.8	0.01726
2.1	0.7773	16.9	0.01812
2.2	0.7419	17.	0.01639
2.3	0.7108	17.1	0.01639
2.4	0.6798	17.2	0.01726
2.5	0.6513	17.3	0.01639
2.6	0.6237	17.4	0.01726
2.7	0.5987	17.5	0.01639
2.8	0.5754	17.6	0.01726
2.9	0.5504	17.7	0.01553
3.	0.5288	17.8	0.01553

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.5081	17.9	0.01381
3.2	0.4874	18.	0.01467
3.3	0.4684	18.1	0.01294
3.4	0.4495	18.2	0.01639
3.5	0.4322	18.3	0.01467
3.6	0.4158	18.4	0.01467
3.7	0.4003	18.5	0.01381
3.8	0.3839	18.6	0.01208
3.9	0.371	18.7	0.01381
4.	0.3572	18.8	0.01208
4.1	0.3425	18.9	0.01208
4.2	0.3313	19.	0.01208
4.3	0.3183	19.1	0.01294
4.4	0.3071	19.2	0.01381
4.5	0.2959	19.3	0.01726
4.6	0.2847	19.4	0.01726
4.7	0.2743	19.5	0.01812
4.8	0.2648	19.6	0.01812
4.9	0.2554	19.7	0.01726
5.	0.2467	19.8	0.01639
5.1	0.2381	19.9	0.01553
5.2	0.2295	20.	0.01553
5.3	0.2226	20.1	0.01467
5.4	0.2148	20.2	0.01381
5.5	0.2079	20.3	0.01294
5.6	0.201	20.4	0.01381
5.7	0.1941	20.5	0.01381
5.8	0.1881	20.6	0.01381
5.9	0.182	20.7	0.01294
6.	0.176	20.8	0.01294
6.1	0.1708	20.9	0.01294
6.2	0.1648	21.	0.01208
6.3	0.1596	21.1	0.01294
6.4	0.1544	21.2	0.01122
6.5	0.151	21.3	0.01208
6.6	0.1458	21.4	0.01294
6.7	0.1406	21.5	0.01294
6.8	0.1372	21.6	0.01294
6.9	0.1329	21.7	0.01294
7.	0.1285	21.8	0.01208
7.1	0.1251	21.9	0.01208
7.2	0.1216	22.	0.01122
7.3	0.1182	22.1	0.01208
7.4	0.1156	22.2	0.01122
7.5	0.1113	22.3	0.01035
7.6	0.1078	22.4	0.01035
7.7	0.1044	22.5	0.01122
7.8	0.1009	22.6	0.01122
7.9	0.1001	22.7	0.01122
8.	0.09662	22.8	0.01208
8.1	0.09403	22.9	0.01122
8.2	0.09058	23.	0.01035
8.3	0.088	23.1	0.00949
8.4	0.08627	23.2	0.00949
8.5	0.08368	23.3	0.00949
8.6	0.08109	23.4	0.00949
8.7	0.07937	23.5	0.00949
8.8	0.07764	23.6	0.00949
8.9	0.07592	23.7	0.01122
9.	0.07419	23.8	0.01122
9.1	0.07247	23.9	0.01122
9.2	0.07074	24.	0.01208
9.3	0.06902	24.1	0.01122
9.4	0.06643	24.2	0.01208
9.5	0.0647	24.3	0.01122
9.6	0.06298	24.4	0.01035

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.06125	24.5	0.01122
9.8	0.06039	24.6	0.01122
9.9	0.05866	24.7	0.01208
10.	0.0578	24.8	0.01208
10.1	0.05694	24.9	0.01208
10.2	0.05521	25.	0.01208
10.3	0.05521	25.1	0.01208
10.4	0.05435	25.2	0.01122
10.5	0.05263	25.3	0.01208
10.6	0.05004	25.4	0.01122
10.7	0.04918	25.5	0.01035
10.8	0.04831	25.6	0.00949
10.9	0.04659	25.7	0.01035
11.	0.04486	25.8	0.01035
11.1	0.04486	25.9	0.01035
11.2	0.044	26.	0.01035
11.3	0.044	26.1	0.01122
11.4	0.04141	26.2	0.01122
11.5	0.04141	26.3	0.01122
11.6	0.03969	26.4	0.01122
11.7	0.03969	26.5	0.01208
11.8	0.03796	26.6	0.01122
11.9	0.0371	26.7	0.01122
12.	0.03796	26.8	0.01035
12.1	0.0371	26.9	0.00949
12.2	0.03623	27.	0.00949
12.3	0.03623	27.1	0.00949
12.4	0.03537	27.2	0.00949
12.5	0.03451	27.3	0.00949
12.6	0.03365	27.4	0.00863
12.7	0.03365	27.5	0.00949
12.8	0.03192	27.6	0.00949
12.9	0.03278	27.7	0.00949
13.	0.03106	27.8	0.00949
13.1	0.03106	27.9	0.00949
13.2	0.0302	28.	0.00949
13.3	0.02933	28.1	0.00949
13.4	0.0302	28.2	0.00949
13.5	0.02847	28.3	0.00863
13.6	0.02847	28.4	0.00863
13.7	0.02675	28.5	0.00949
13.8	0.02675	28.6	0.01035
13.9	0.02675	28.7	0.00949
14.	0.02675	28.8	0.00949
14.1	0.02675	28.9	0.00949
14.2	0.02675	29.	0.00863
14.3	0.02588	29.1	0.00863
14.4	0.02502	29.2	0.00863
14.5	0.02416	29.3	0.00863
14.6	0.02416	29.4	0.00863
14.7	0.02502	29.5	0.00949
14.8	0.02588	29.6	0.00777

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.728

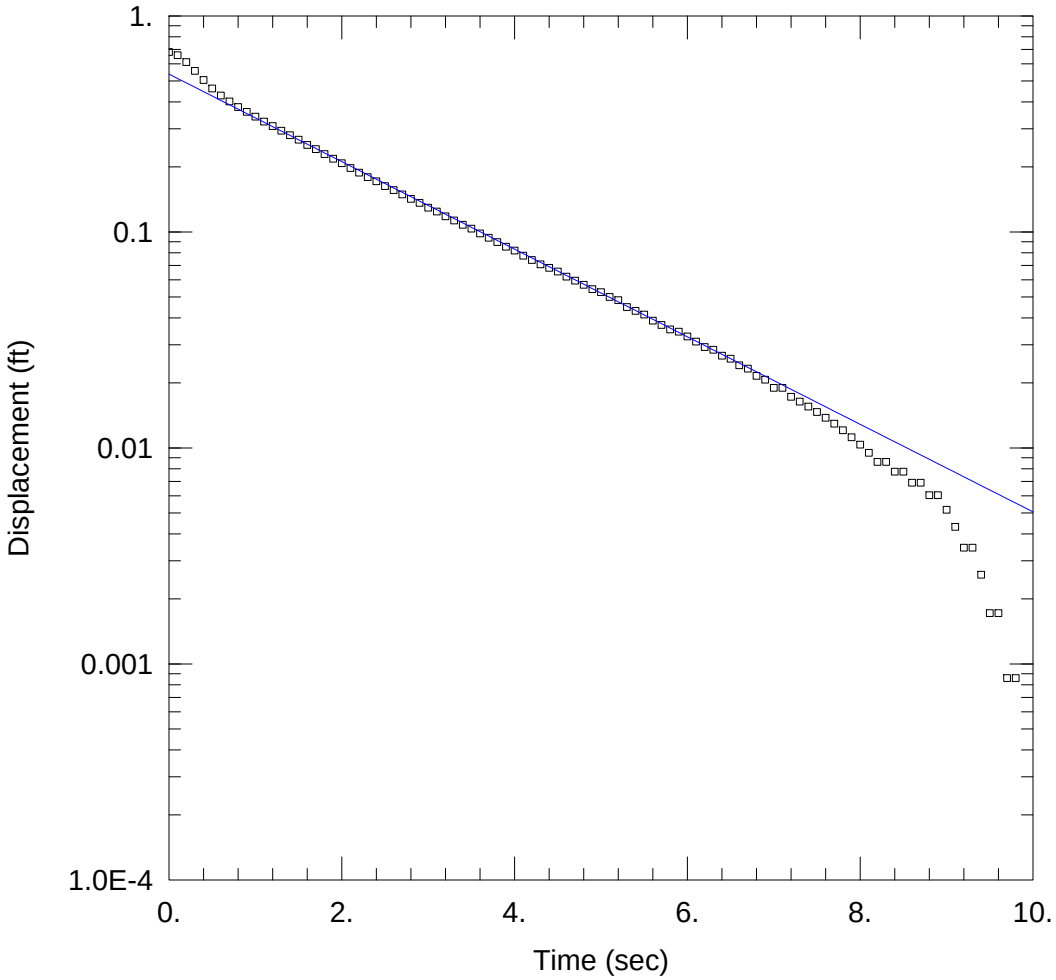
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.01449	cm/sec

y0	1.861	ft

T = K*b = 50.8 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-2A_TEST6.aqt
Date: 11/03/15 Time: 07:49:12

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-2A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2A)

Initial Displacement: 0.6806 ft Static Water Column Height: 10.29 ft
Total Well Penetration Depth: 10.29 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.0168 cm/sec y0 = 0.5376 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-2A\MW-2A_TES
Date: 11/03/15
Time: 07:49:36

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-2A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-2A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.6806 ft
Static Water Column Height: 10.29 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.29 ft

No. of Observations: 99

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.6582	5.1	0.05003
0.2	0.6116	5.2	0.04831
0.3	0.5564	5.3	0.04486
0.4	0.5047	5.4	0.04313
0.5	0.4615	5.5	0.04141
0.6	0.4279	5.6	0.03882
0.7	0.402	5.7	0.03709
0.8	0.3787	5.8	0.03537
0.9	0.3597	5.9	0.0345
1.	0.3416	6.	0.03278
1.1	0.3244	6.1	0.03105
1.2	0.3088	6.2	0.02933
1.3	0.2942	6.3	0.02847
1.4	0.2804	6.4	0.02674
1.5	0.2674	6.5	0.02588
1.6	0.2528	6.6	0.02415
1.7	0.2415	6.7	0.02329
1.8	0.2295	6.8	0.02156
1.9	0.2183	6.9	0.0207
2.	0.2079	7.	0.01898
2.1	0.1976	7.1	0.01898
2.2	0.1881	7.2	0.01725
2.3	0.1794	7.3	0.01639
2.4	0.1717	7.4	0.01553
2.5	0.163	7.5	0.01466
2.6	0.1561	7.6	0.0138
2.7	0.1492	7.7	0.01294
2.8	0.1423	7.8	0.01208
2.9	0.1363	7.9	0.01121
3.	0.1294	8.	0.01035

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.1242	8.1	0.00949
3.2	0.1182	8.2	0.00862
3.3	0.113	8.3	0.00862
3.4	0.1078	8.4	0.00776
3.5	0.1035	8.5	0.00776
3.6	0.09834	8.6	0.0069
3.7	0.09403	8.7	0.0069
3.8	0.08972	8.8	0.00604
3.9	0.0854	8.9	0.00604
4.	0.08195	9.	0.00517
4.1	0.07764	9.1	0.00431
4.2	0.07419	9.2	0.00345
4.3	0.07074	9.3	0.00345
4.4	0.06815	9.4	0.00259
4.5	0.06556	9.5	0.00172
4.6	0.06211	9.6	0.00172
4.7	0.05952	9.7	0.00086
4.8	0.05693	9.8	0.00086
4.9	0.05435	9.9	0.
5.	0.05262		

SOLUTION

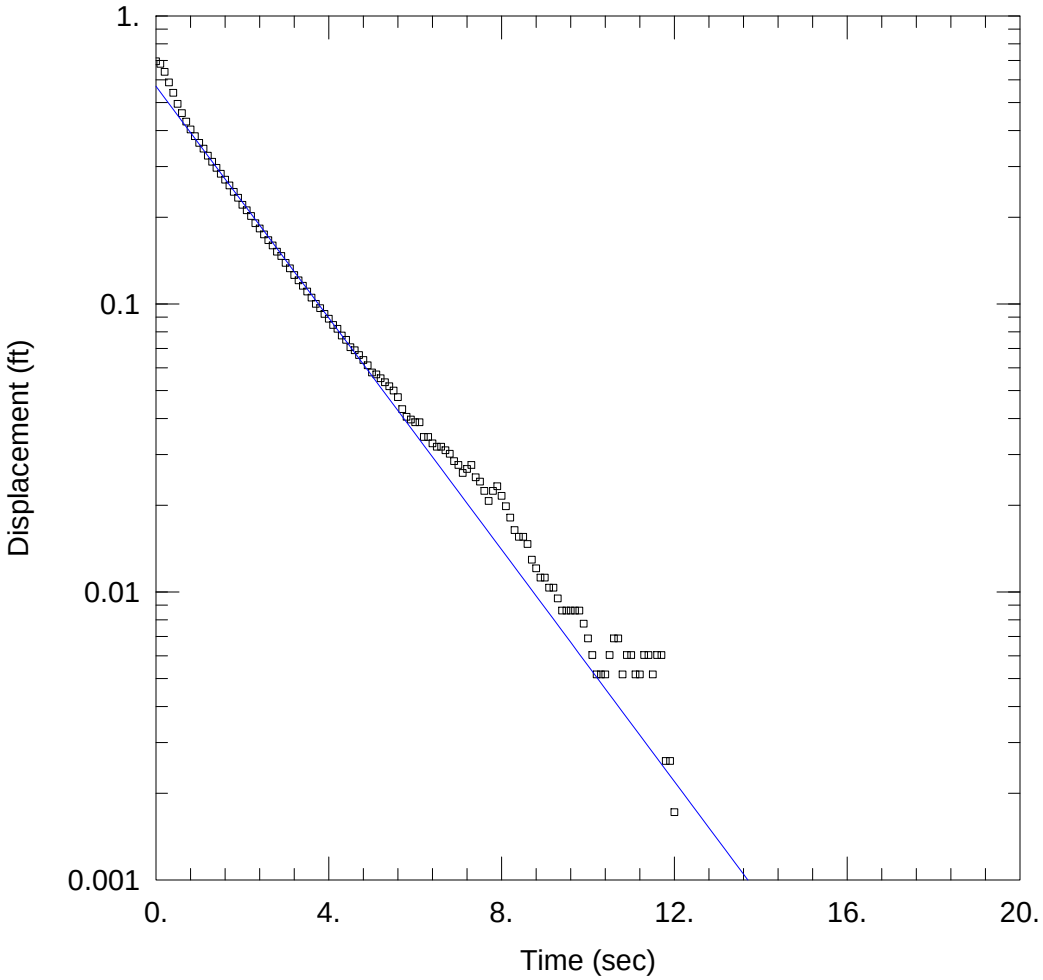
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.728

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0168	cm/sec
y0	0.5376	ft

$T = K*b = 58.9\ cm^2/sec$



WELL TEST ANALYSIS

Data Set: Z:\...\MW-2A_TEST7.aqt
Date: 11/03/15 Time: 07:52:32

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-2A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2A)

Initial Displacement: 0.6962 ft Static Water Column Height: 10.29 ft
Total Well Penetration Depth: 10.29 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01668 cm/sec y0 = 0.5697 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-2A\MW-2A_TES
Date: 11/03/15
Time: 07:53:52

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-2A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-2A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.6962 ft
Static Water Column Height: 10.29 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.29 ft

No. of Observations: 134

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.6815	6.8	0.03019
0.2	0.6392	6.9	0.02847
0.3	0.5875	7.	0.0276
0.4	0.5409	7.1	0.02588
0.5	0.4952	7.2	0.02674
0.6	0.4598	7.3	0.0276
0.7	0.4296	7.4	0.02502
0.8	0.4037	7.5	0.02415
0.9	0.3822	7.6	0.02243
1.	0.3623	7.7	0.0207
1.1	0.3459	7.8	0.02243
1.2	0.327	7.9	0.02329
1.3	0.3114	8.	0.02156
1.4	0.2968	8.1	0.01984
1.5	0.283	8.2	0.01811
1.6	0.27	8.3	0.01639
1.7	0.2579	8.4	0.01553
1.8	0.245	8.5	0.01553
1.9	0.2338	8.6	0.01466
2.	0.2208	8.7	0.01294
2.1	0.2114	8.8	0.01208
2.2	0.2019	8.9	0.01121
2.3	0.1906	9.	0.01121
2.4	0.1829	9.1	0.01035
2.5	0.1743	9.2	0.01035
2.6	0.1665	9.3	0.00949
2.7	0.1596	9.4	0.00862
2.8	0.1518	9.5	0.00862
2.9	0.1467	9.6	0.00862
3.	0.1389	9.7	0.00862

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.1329	9.8	0.00862
3.2	0.126	9.9	0.00776
3.3	0.1208	10.	0.0069
3.4	0.1156	10.1	0.00604
3.5	0.1104	10.2	0.00517
3.6	0.1052	10.3	0.00517
3.7	0.1001	10.4	0.00517
3.8	0.09662	10.5	0.00604
3.9	0.0923	10.6	0.0069
4.	0.08885	10.7	0.0069
4.1	0.08454	10.8	0.00517
4.2	0.08195	10.9	0.00604
4.3	0.07764	11.	0.00604
4.4	0.07505	11.1	0.00517
4.5	0.07074	11.2	0.00517
4.6	0.06901	11.3	0.00604
4.7	0.06642	11.4	0.00604
4.8	0.06384	11.5	0.00517
4.9	0.06125	11.6	0.00604
5.	0.0578	11.7	0.00604
5.1	0.05693	11.8	0.00259
5.2	0.05521	11.9	0.00259
5.3	0.05348	12.	0.00172
5.4	0.05176	12.1	-0.00086
5.5	0.05003	12.2	-0.00173
5.6	0.04745	12.3	-0.00259
5.7	0.04313	12.4	-0.00259
5.8	0.04054	12.5	-0.00086
5.9	0.03968	12.6	-0.00259
6.	0.03882	12.7	-0.00259
6.1	0.03882	12.8	-0.00173
6.2	0.0345	12.9	-0.00259
6.3	0.0345	13.	-0.00345
6.4	0.03278	13.1	-0.00345
6.5	0.03192	13.2	-0.00518
6.6	0.03192	13.3	-0.00259
6.7	0.03105	13.4	0.

SOLUTION

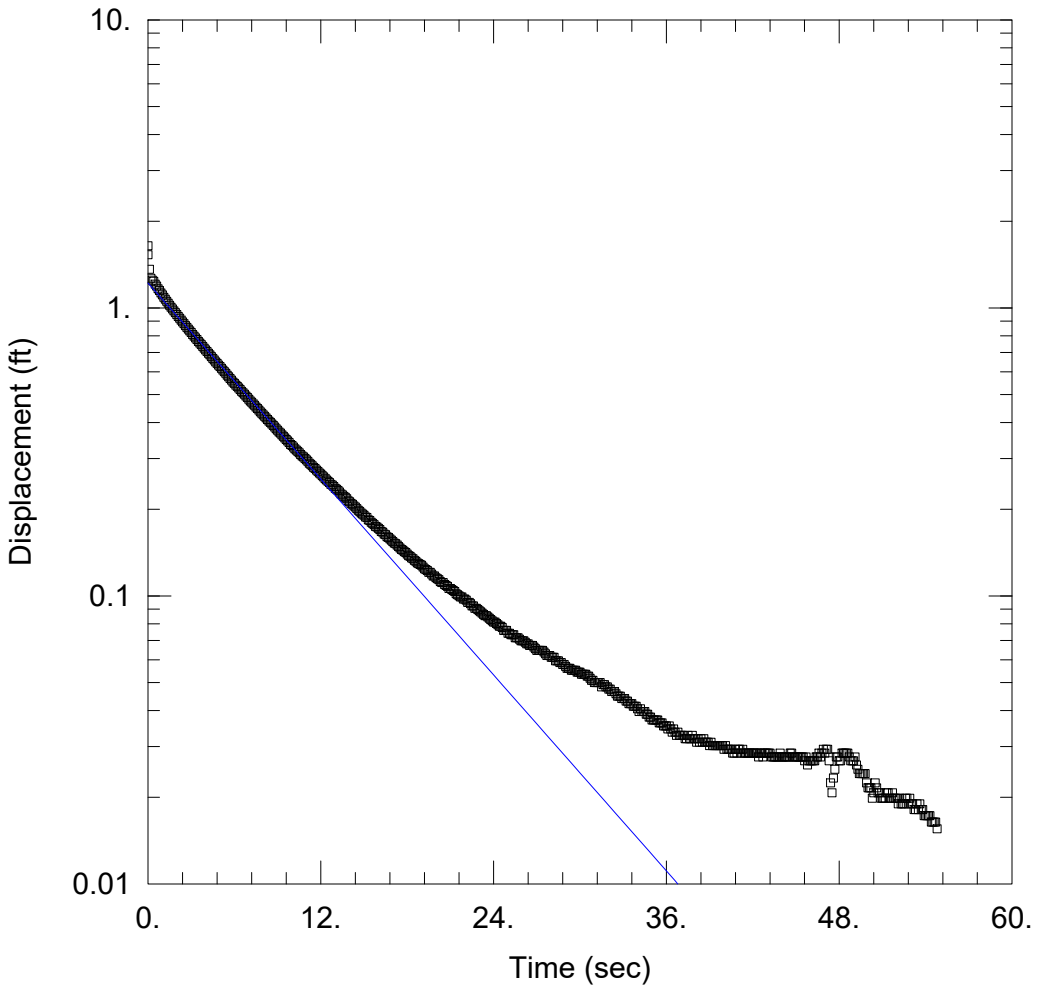
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.728

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.01668	cm/sec
y0	0.5697	ft

$T = K*b = 58.45$ cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-8A_TEST1.aqt
Date: 01/26/18 Time: 09:10:31

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-8A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8A)

Initial Displacement: 1.643 ft
Total Well Penetration Depth: 10.7 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.7 ft
Screen Length: 5. ft
Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.004732 cm/sec y0 = 1.22 ft

Data Set: Z:\Clients\ENS\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-8A\MW-8A_
Date: 01/26/18
Time: 09:00:39

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-8A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.643 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.7 ft

No. of Observations: 549

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	1.53	27.5	0.06384
0.1	1.361	27.6	0.06298
0.2	1.267	27.7	0.06212
0.3	1.248	27.8	0.06212
0.4	1.237	27.9	0.06212
0.5	1.209	28.	0.06125
0.6	1.19	28.1	0.06125
0.7	1.165	28.2	0.06125
0.8	1.148	28.3	0.05953
0.9	1.127	28.4	0.05953
1.	1.109	28.5	0.05953
1.1	1.089	28.6	0.05867
1.2	1.072	28.7	0.05867
1.3	1.055	28.8	0.0578
1.4	1.039	28.9	0.0578
1.5	1.021	29.	0.05694
1.6	1.006	29.1	0.05608
1.7	0.9912	29.2	0.05608
1.8	0.9766	29.3	0.05608
1.9	0.9627	29.4	0.05521
2.	0.9481	29.5	0.05521
2.1	0.9343	29.6	0.05521
2.2	0.9214	29.7	0.05521
2.3	0.9067	29.8	0.05435
2.4	0.8937	29.9	0.05435
2.5	0.8817	30.	0.05435
2.6	0.8687	30.1	0.05349
2.7	0.8558	30.2	0.05349
2.8	0.8446	30.3	0.05349
2.9	0.8325	30.4	0.05349

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.	0.8213	30.5	0.05263
3.1	0.8083	30.6	0.05263
3.2	0.798	30.7	0.05176
3.3	0.7868	30.8	0.0509
3.4	0.7764	30.9	0.0509
3.5	0.7652	31.	0.05004
3.6	0.7549	31.1	0.05004
3.7	0.7454	31.2	0.05004
3.8	0.735	31.3	0.05004
3.9	0.7247	31.4	0.05004
4.	0.7152	31.5	0.04831
4.1	0.7057	31.6	0.04918
4.2	0.6962	31.7	0.04918
4.3	0.6867	31.8	0.04831
4.4	0.6772	31.9	0.04831
4.5	0.6677	32.	0.04745
4.6	0.6591	32.1	0.04745
4.7	0.6496	32.2	0.04659
4.8	0.6418	32.3	0.04659
4.9	0.6332	32.4	0.04659
5.	0.6254	32.5	0.04573
5.1	0.6168	32.6	0.04486
5.2	0.6082	32.7	0.04486
5.3	0.6004	32.8	0.04486
5.4	0.5927	32.9	0.044
5.5	0.584	33.	0.044
5.6	0.5763	33.1	0.044
5.7	0.5685	33.2	0.04314
5.8	0.5616	33.3	0.04314
5.9	0.553	33.4	0.04227
6.	0.5469	33.5	0.04227
6.1	0.5392	33.6	0.04227
6.2	0.534	33.7	0.04141
6.3	0.5271	33.8	0.04141
6.4	0.5202	33.9	0.04141
6.5	0.5133	34.	0.04055
6.6	0.5073	34.1	0.03969
6.7	0.5012	34.2	0.04055
6.8	0.4943	34.3	0.03969
6.9	0.4891	34.4	0.03969
7.	0.4822	34.5	0.03969
7.1	0.4753	34.6	0.03882
7.2	0.4702	34.7	0.03882
7.3	0.4641	34.8	0.03796
7.4	0.459	34.9	0.03796
7.5	0.4529	35.	0.0371
7.6	0.4477	35.1	0.0371
7.7	0.4417	35.2	0.0371
7.8	0.4357	35.3	0.0371
7.9	0.4305	35.4	0.0371
8.	0.4253	35.5	0.03624
8.1	0.4201	35.6	0.03624
8.2	0.4149	35.7	0.03624
8.3	0.4098	35.8	0.03537
8.4	0.4046	35.9	0.03537
8.5	0.4003	36.	0.03537
8.6	0.3951	36.1	0.03451
8.7	0.3908	36.2	0.03537
8.8	0.3856	36.3	0.03451
8.9	0.3805	36.4	0.03365
9.	0.3761	36.5	0.03451
9.1	0.371	36.6	0.03365
9.2	0.3675	36.7	0.03279
9.3	0.3623	36.8	0.03365
9.4	0.358	36.9	0.03279
9.5	0.3537	37.	0.03279

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.6	0.3494	37.1	0.03279
9.7	0.3451	37.2	0.03279
9.8	0.3408	37.3	0.03192
9.9	0.3356	37.4	0.03192
10.	0.333	37.5	0.03279
10.1	0.3287	37.6	0.03192
10.2	0.3244	37.7	0.03192
10.3	0.3209	37.8	0.03279
10.4	0.3175	37.9	0.03192
10.5	0.314	38.	0.03192
10.6	0.3097	38.1	0.03106
10.7	0.3063	38.2	0.03192
10.8	0.3037	38.3	0.03106
10.9	0.3002	38.4	0.03192
11.	0.2968	38.5	0.03106
11.1	0.2933	38.6	0.03192
11.2	0.289	38.7	0.03106
11.3	0.2864	38.8	0.03106
11.4	0.283	38.9	0.03106
11.5	0.2795	39.	0.0302
11.6	0.2769	39.1	0.03106
11.7	0.2735	39.2	0.0302
11.8	0.2709	39.3	0.0302
11.9	0.2674	39.4	0.0302
12.	0.2648	39.5	0.0302
12.1	0.2614	39.6	0.0302
12.2	0.2588	39.7	0.0302
12.3	0.2554	39.8	0.0302
12.4	0.2528	39.9	0.0302
12.5	0.2502	40.	0.02933
12.6	0.2476	40.1	0.0302
12.7	0.2441	40.2	0.02933
12.8	0.2424	40.3	0.02933
12.9	0.2398	40.4	0.02933
13.	0.2364	40.5	0.02933
13.1	0.2347	40.6	0.02847
13.2	0.2321	40.7	0.02847
13.3	0.2295	40.8	0.02933
13.4	0.226	40.9	0.02847
13.5	0.2243	41.	0.02933
13.6	0.2217	41.1	0.02933
13.7	0.22	41.2	0.02847
13.8	0.2174	41.3	0.02933
13.9	0.214	41.4	0.02847
14.	0.2122	41.5	0.02847
14.1	0.2096	41.6	0.02847
14.2	0.2079	41.7	0.02847
14.3	0.2053	41.8	0.02847
14.4	0.2036	41.9	0.02847
14.5	0.201	42.	0.02847
14.6	0.1984	42.1	0.02847
14.7	0.1967	42.2	0.02847
14.8	0.1941	42.3	0.02847
14.9	0.1924	42.4	0.02761
15.	0.1907	42.5	0.02847
15.1	0.1881	42.6	0.02847
15.2	0.1872	42.7	0.02761
15.3	0.1838	42.8	0.02847
15.4	0.1829	42.9	0.02847
15.5	0.1803	43.	0.02847
15.6	0.1786	43.1	0.02847
15.7	0.1769	43.2	0.02847
15.8	0.1743	43.3	0.02761
15.9	0.1734	43.4	0.02761
16.	0.1717	43.5	0.02761
16.1	0.1699	43.6	0.02761

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.2	0.1674	43.7	0.02761
16.3	0.1665	43.8	0.02761
16.4	0.1639	43.9	0.02847
16.5	0.1631	44.	0.02761
16.6	0.1605	44.1	0.02761
16.7	0.1596	44.2	0.02761
16.8	0.1579	44.3	0.02761
16.9	0.1562	44.4	0.02761
17.	0.1544	44.5	0.02761
17.1	0.1527	44.6	0.02847
17.2	0.1518	44.7	0.02847
17.3	0.1501	44.8	0.02761
17.4	0.1484	44.9	0.02761
17.5	0.1467	45.	0.02761
17.6	0.1449	45.1	0.02761
17.7	0.1441	45.2	0.02761
17.8	0.1424	45.3	0.02761
17.9	0.1415	45.4	0.02761
18.	0.1398	45.5	0.02761
18.1	0.138	45.6	0.02675
18.2	0.1372	45.7	0.02761
18.3	0.1354	45.8	0.02588
18.4	0.1346	45.9	0.02675
18.5	0.1329	46.	0.02675
18.6	0.132	46.1	0.02675
18.7	0.1303	46.2	0.02675
18.8	0.1294	46.3	0.02675
18.9	0.1285	46.4	0.02761
19.	0.1277	46.5	0.02761
19.1	0.126	46.6	0.02847
19.2	0.1242	46.7	0.02761
19.3	0.1234	46.8	0.02847
19.4	0.1225	46.9	0.02933
19.5	0.1208	47.	0.02847
19.6	0.1208	47.1	0.02933
19.7	0.1191	47.2	0.02933
19.8	0.1173	47.3	0.02675
19.9	0.1173	47.4	0.02243
20.	0.1156	47.5	0.02071
20.1	0.1147	47.6	0.0233
20.2	0.1139	47.7	0.02502
20.3	0.1122	47.8	0.02761
20.4	0.1113	47.9	0.02761
20.5	0.1113	48.	0.02675
20.6	0.1096	48.1	0.02675
20.7	0.1087	48.2	0.02847
20.8	0.1078	48.3	0.02847
20.9	0.1061	48.4	0.02847
21.	0.1061	48.5	0.02847
21.1	0.1053	48.6	0.02847
21.2	0.1044	48.7	0.02761
21.3	0.1035	48.8	0.02675
21.4	0.1018	48.9	0.02675
21.5	0.1009	49.	0.02675
21.6	0.1001	49.1	0.02761
21.7	0.09921	49.2	0.02588
21.8	0.09921	49.3	0.02502
21.9	0.09749	49.4	0.02416
22.	0.09749	49.5	0.02416
22.1	0.09662	49.6	0.02416
22.2	0.0949	49.7	0.02416
22.3	0.0949	49.8	0.02416
22.4	0.09404	49.9	0.02243
22.5	0.09231	50.	0.02157
22.6	0.09231	50.1	0.02157
22.7	0.09058	50.2	0.02157

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.8	0.09058	50.3	0.01984
22.9	0.08972	50.4	0.02071
23.	0.08886	50.5	0.02243
23.1	0.088	50.6	0.02157
23.2	0.08713	50.7	0.02071
23.3	0.08627	50.8	0.02071
23.4	0.08541	50.9	0.01984
23.5	0.08541	51.	0.01984
23.6	0.08455	51.1	0.01984
23.7	0.08368	51.2	0.01984
23.8	0.08282	51.3	0.02071
23.9	0.08196	51.4	0.02071
24.	0.0811	51.5	0.01984
24.1	0.0811	51.6	0.01984
24.2	0.08023	51.7	0.02071
24.3	0.07937	51.8	0.01984
24.4	0.07851	51.9	0.01984
24.5	0.07851	52.	0.01984
24.6	0.07764	52.1	0.01898
24.7	0.07592	52.2	0.01984
24.8	0.07592	52.3	0.01898
24.9	0.07592	52.4	0.01898
25.	0.07419	52.5	0.01898
25.1	0.07419	52.6	0.01984
25.2	0.07333	52.7	0.01984
25.3	0.07333	52.8	0.01898
25.4	0.07333	52.9	0.01984
25.5	0.07161	53.	0.01898
25.6	0.07161	53.1	0.01898
25.7	0.07161	53.2	0.01812
25.8	0.07074	53.3	0.01812
25.9	0.06988	53.4	0.01898
26.	0.06988	53.5	0.01812
26.1	0.06988	53.6	0.01898
26.2	0.06902	53.7	0.01812
26.3	0.06815	53.8	0.01812
26.4	0.06815	53.9	0.01726
26.5	0.06729	54.	0.01726
26.6	0.06729	54.1	0.01726
26.7	0.06729	54.2	0.01726
26.8	0.06643	54.3	0.01726
26.9	0.06557	54.4	0.01639
27.	0.0647	54.5	0.01639
27.1	0.0647	54.6	0.01639
27.2	0.0647	54.7	0.01639
27.3	0.0647	54.8	0.01553
27.4	0.0647		

SOLUTION

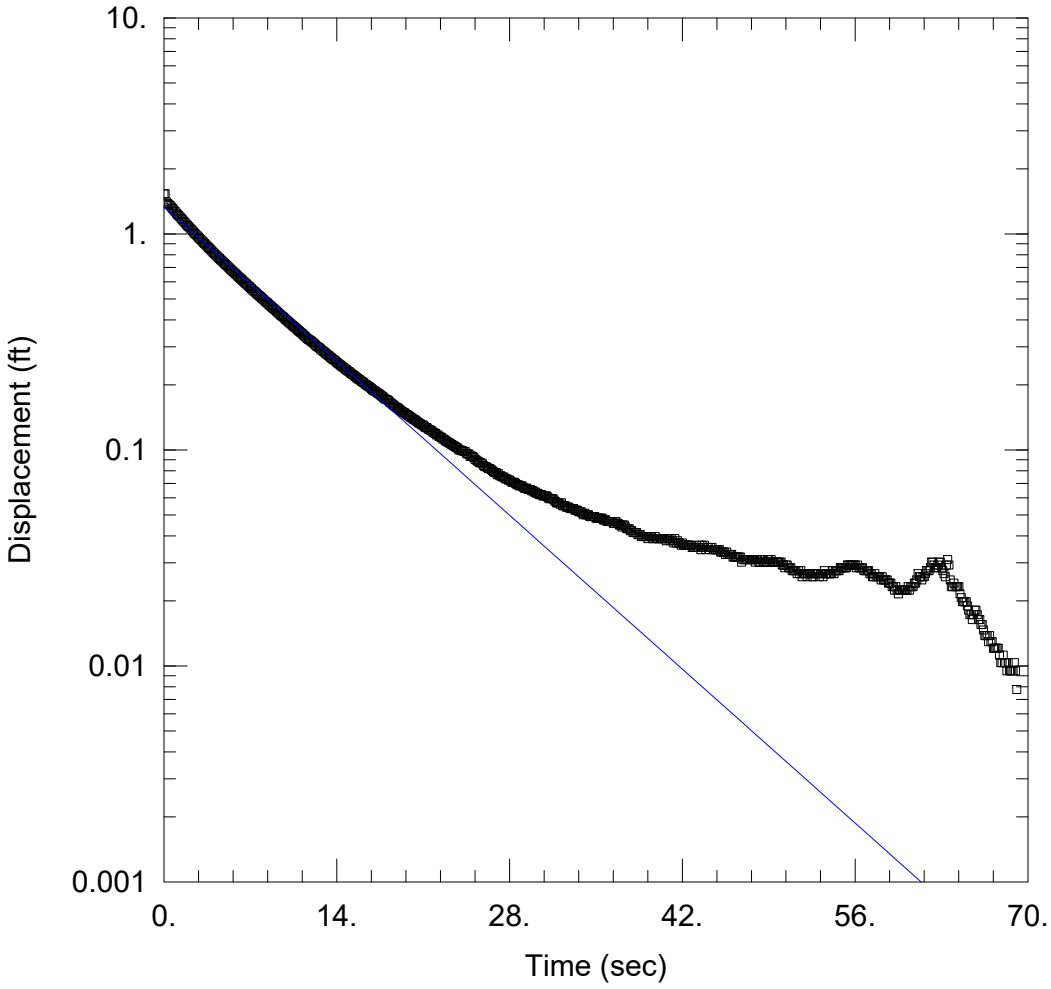
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.739

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.004732	cm/sec
y0	1.22	ft

T = K*b = 16.59 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-8A_TEST2.aqt
Date: 01/26/18 Time: 09:09:49

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-8A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8A)

Initial Displacement: 1.53 ft
Total Well Penetration Depth: 10.7 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.7 ft
Screen Length: 5. ft
Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.004251 cm/sec y0 = 1.33 ft

Data Set: Z:\Clients\ENS\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-8A\MW-8A_
Date: 01/26/18
Time: 08:59:18

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-8A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.53 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.7 ft

No. of Observations: 691

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	1.536	34.7	0.04918
0.2	1.404	34.8	0.04918
0.3	1.381	34.9	0.04918
0.4	1.37	35.	0.04831
0.5	1.354	35.1	0.04831
0.6	1.331	35.2	0.04831
0.7	1.312	35.3	0.04831
0.8	1.291	35.4	0.04831
0.9	1.272	35.5	0.04831
1.	1.249	35.6	0.04745
1.1	1.233	35.7	0.04745
1.2	1.215	35.8	0.04745
1.3	1.198	35.9	0.04659
1.4	1.179	36.	0.04659
1.5	1.162	36.1	0.04659
1.6	1.146	36.2	0.04659
1.7	1.129	36.3	0.04659
1.8	1.111	36.4	0.04573
1.9	1.096	36.5	0.04573
2.	1.08	36.6	0.04659
2.1	1.065	36.7	0.04573
2.2	1.051	36.8	0.04573
2.3	1.035	36.9	0.04486
2.4	1.021	37.	0.04486
2.5	1.006	37.1	0.044
2.6	0.9921	37.2	0.04486
2.7	0.9791	37.3	0.04486
2.8	0.9662	37.4	0.044
2.9	0.9524	37.5	0.04314
3.	0.9395	37.6	0.04314

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.9265	37.7	0.04314
3.2	0.9144	37.8	0.04227
3.3	0.9015	37.9	0.04227
3.4	0.8903	38.	0.04141
3.5	0.8773	38.1	0.04141
3.6	0.8661	38.2	0.04141
3.7	0.8541	38.3	0.04141
3.8	0.8437	38.4	0.04055
3.9	0.8325	38.5	0.04055
4.	0.8213	38.6	0.04055
4.1	0.8092	38.7	0.03969
4.2	0.7997	38.8	0.03969
4.3	0.7894	38.9	0.03969
4.4	0.779	39.	0.03969
4.5	0.7695	39.1	0.03969
4.6	0.7592	39.2	0.03882
4.7	0.7505	39.3	0.03969
4.8	0.741	39.4	0.03969
4.9	0.7307	39.5	0.03969
5.	0.7221	39.6	0.03882
5.1	0.7134	39.7	0.03882
5.2	0.7039	39.8	0.03969
5.3	0.6953	39.9	0.03882
5.4	0.6867	40.	0.03882
5.5	0.6772	40.1	0.03882
5.6	0.6694	40.2	0.03882
5.7	0.6608	40.3	0.03882
5.8	0.6531	40.4	0.03882
5.9	0.6453	40.5	0.03882
6.	0.6367	40.6	0.03882
6.1	0.6298	40.7	0.03796
6.2	0.6211	40.8	0.03882
6.3	0.6142	40.9	0.03882
6.4	0.6065	41.	0.03796
6.5	0.5987	41.1	0.03882
6.6	0.5918	41.2	0.03796
6.7	0.5858	41.3	0.0371
6.8	0.578	41.4	0.03882
6.9	0.5711	41.5	0.0371
7.	0.5633	41.6	0.03796
7.1	0.5573	41.7	0.0371
7.2	0.5495	41.8	0.0371
7.3	0.5435	41.9	0.03624
7.4	0.5383	42.	0.0371
7.5	0.5314	42.1	0.03624
7.6	0.5245	42.2	0.03624
7.7	0.5185	42.3	0.03624
7.8	0.5133	42.4	0.03624
7.9	0.5064	42.5	0.03624
8.	0.5004	42.6	0.03624
8.1	0.4952	42.7	0.03624
8.2	0.4883	42.8	0.03537
8.3	0.4831	42.9	0.03537
8.4	0.4779	43.	0.03537
8.5	0.4719	43.1	0.03537
8.6	0.4667	43.2	0.03537
8.7	0.4607	43.3	0.03537
8.8	0.4555	43.4	0.03624
8.9	0.4503	43.5	0.03451
9.	0.4451	43.6	0.03624
9.1	0.44	43.7	0.03537
9.2	0.4348	43.8	0.03624
9.3	0.4296	43.9	0.03451
9.4	0.4244	44.	0.03537
9.5	0.4193	44.1	0.03537
9.6	0.4149	44.2	0.03451

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.4106	44.3	0.03537
9.8	0.4046	44.4	0.03537
9.9	0.4003	44.5	0.03451
10.	0.396	44.6	0.03451
10.1	0.3908	44.7	0.03451
10.2	0.3874	44.8	0.03451
10.3	0.3822	44.9	0.03451
10.4	0.3779	45.	0.03451
10.5	0.3735	45.1	0.03365
10.6	0.3701	45.2	0.03365
10.7	0.3658	45.3	0.03365
10.8	0.3615	45.4	0.03365
10.9	0.3572	45.5	0.03279
11.	0.3528	45.6	0.03365
11.1	0.3485	45.7	0.03279
11.2	0.3451	45.8	0.03279
11.3	0.3408	45.9	0.03279
11.4	0.3373	46.	0.03279
11.5	0.333	46.1	0.03192
11.6	0.3287	46.2	0.03192
11.7	0.3252	46.3	0.03192
11.8	0.3226	46.4	0.03192
11.9	0.3192	46.5	0.03192
12.	0.3166	46.6	0.03192
12.1	0.3132	46.7	0.03192
12.2	0.3097	46.8	0.0302
12.3	0.3054	46.9	0.03106
12.4	0.3019	47.	0.03106
12.5	0.2994	47.1	0.03106
12.6	0.2968	47.2	0.03106
12.7	0.2933	47.3	0.03106
12.8	0.289	47.4	0.03106
12.9	0.2864	47.5	0.03106
13.	0.2838	47.6	0.03106
13.1	0.2804	47.7	0.03106
13.2	0.2769	47.8	0.03106
13.3	0.2743	47.9	0.0302
13.4	0.2717	48.	0.03106
13.5	0.2683	48.1	0.03106
13.6	0.2657	48.2	0.0302
13.7	0.2623	48.3	0.0302
13.8	0.2605	48.4	0.03106
13.9	0.2579	48.5	0.03106
14.	0.2545	48.6	0.0302
14.1	0.2519	48.7	0.0302
14.2	0.2493	48.8	0.0302
14.3	0.2467	48.9	0.03106
14.4	0.2441	49.	0.03106
14.5	0.2415	49.1	0.0302
14.6	0.2398	49.2	0.03106
14.7	0.2364	49.3	0.0302
14.8	0.2347	49.4	0.0302
14.9	0.2321	49.5	0.0302
15.	0.2303	49.6	0.0302
15.1	0.2278	49.7	0.0302
15.2	0.2252	49.8	0.0302
15.3	0.2234	49.9	0.0302
15.4	0.2208	50.	0.0302
15.5	0.2191	50.1	0.02933
15.6	0.2165	50.2	0.02933
15.7	0.214	50.3	0.02847
15.8	0.2122	50.4	0.02933
15.9	0.2105	50.5	0.02933
16.	0.2079	50.6	0.02847
16.1	0.2062	50.7	0.02847
16.2	0.2045	50.8	0.02847

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.2019	50.9	0.02761
16.4	0.2001	51.	0.02761
16.5	0.1984	51.1	0.02761
16.6	0.1967	51.2	0.02761
16.7	0.195	51.3	0.02675
16.8	0.1924	51.4	0.02761
16.9	0.1898	51.5	0.02675
17.	0.1881	51.6	0.02761
17.1	0.1872	51.7	0.02588
17.2	0.1855	51.8	0.02675
17.3	0.1838	51.9	0.02675
17.4	0.182	52.	0.02675
17.5	0.1803	52.1	0.02588
17.6	0.1786	52.2	0.02675
17.7	0.1769	52.3	0.02675
17.8	0.1743	52.4	0.02675
17.9	0.1725	52.5	0.02588
18.	0.1717	52.6	0.02588
18.1	0.1708	52.7	0.02675
18.2	0.1691	52.8	0.02675
18.3	0.1665	52.9	0.02675
18.4	0.1648	53.	0.02675
18.5	0.1631	53.1	0.02588
18.6	0.1613	53.2	0.02675
18.7	0.1596	53.3	0.02675
18.8	0.1579	53.4	0.02588
18.9	0.157	53.5	0.02761
19.	0.1553	53.6	0.02675
19.1	0.1536	53.7	0.02675
19.2	0.1518	53.8	0.02675
19.3	0.151	53.9	0.02675
19.4	0.1492	54.	0.02675
19.5	0.1484	54.1	0.02675
19.6	0.1467	54.2	0.02761
19.7	0.1458	54.3	0.02675
19.8	0.1441	54.4	0.02761
19.9	0.1432	54.5	0.02761
20.	0.1415	54.6	0.02761
20.1	0.1406	54.7	0.02761
20.2	0.1389	54.8	0.02847
20.3	0.138	54.9	0.02847
20.4	0.1372	55.	0.02847
20.5	0.1354	55.1	0.02847
20.6	0.1337	55.2	0.02847
20.7	0.1329	55.3	0.02847
20.8	0.132	55.4	0.02933
20.9	0.1303	55.5	0.02933
21.	0.1303	55.6	0.02933
21.1	0.1285	55.7	0.02933
21.2	0.1268	55.8	0.02933
21.3	0.1268	55.9	0.02933
21.4	0.1251	56.	0.02933
21.5	0.1242	56.1	0.02847
21.6	0.1234	56.2	0.02933
21.7	0.1225	56.3	0.02847
21.8	0.1208	56.4	0.02847
21.9	0.1199	56.5	0.02847
22.	0.1191	56.6	0.02847
22.1	0.1173	56.7	0.02761
22.2	0.1173	56.8	0.02761
22.3	0.1156	56.9	0.02761
22.4	0.1147	57.	0.02761
22.5	0.1139	57.1	0.02761
22.6	0.1122	57.2	0.02675
22.7	0.1122	57.3	0.02675
22.8	0.1104	57.4	0.02588

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.9	0.1096	57.5	0.02588
23.	0.1087	57.6	0.02675
23.1	0.1078	57.7	0.02588
23.2	0.107	57.8	0.02588
23.3	0.1061	57.9	0.02588
23.4	0.1053	58.	0.02588
23.5	0.1044	58.1	0.02502
23.6	0.1035	58.2	0.02588
23.7	0.1027	58.3	0.02502
23.8	0.1018	58.4	0.02502
23.9	0.1001	58.5	0.02502
24.	0.1001	58.6	0.02502
24.1	0.09921	58.7	0.02416
24.2	0.09921	58.8	0.02416
24.3	0.09835	58.9	0.02416
24.4	0.09835	59.	0.0233
24.5	0.09662	59.1	0.0233
24.6	0.09576	59.2	0.02243
24.7	0.09576	59.3	0.0233
24.8	0.09317	59.4	0.02243
24.9	0.09404	59.5	0.02157
25.	0.09317	59.6	0.02243
25.1	0.09231	59.7	0.02243
25.2	0.09058	59.8	0.02243
25.3	0.08972	59.9	0.02243
25.4	0.08886	60.	0.02243
25.5	0.088	60.1	0.02243
25.6	0.08713	60.2	0.02243
25.7	0.08713	60.3	0.0233
25.8	0.08627	60.4	0.02243
25.9	0.08455	60.5	0.0233
26.	0.08368	60.6	0.0233
26.1	0.08368	60.7	0.0233
26.2	0.08282	60.8	0.02416
26.3	0.08196	60.9	0.02416
26.4	0.08196	61.	0.02502
26.5	0.0811	61.1	0.02675
26.6	0.08023	61.2	0.02588
26.7	0.07937	61.3	0.02588
26.8	0.07851	61.4	0.02502
26.9	0.07851	61.5	0.02588
27.	0.07678	61.6	0.02588
27.1	0.07764	61.7	0.02675
27.2	0.07592	61.8	0.02761
27.3	0.07592	61.9	0.02761
27.4	0.07506	62.	0.02761
27.5	0.07506	62.1	0.02847
27.6	0.07419	62.2	0.0302
27.7	0.07333	62.3	0.0302
27.8	0.07333	62.4	0.02933
27.9	0.07247	62.5	0.02847
28.	0.07247	62.6	0.02847
28.1	0.07161	62.7	0.02933
28.2	0.07074	62.8	0.0302
28.3	0.07074	62.9	0.0302
28.4	0.07074	63.	0.02847
28.5	0.06988	63.1	0.02761
28.6	0.06902	63.2	0.02675
28.7	0.06902	63.3	0.02588
28.8	0.06815	63.4	0.02933
28.9	0.06815	63.5	0.03106
29.	0.06815	63.6	0.02933
29.1	0.06729	63.7	0.02502
29.2	0.06643	63.8	0.0233
29.3	0.06643	63.9	0.0233
29.4	0.06643	64.	0.02416

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
29.5	0.06557	64.1	0.0233
29.6	0.06557	64.2	0.0233
29.7	0.06557	64.3	0.0233
29.8	0.0647	64.4	0.0233
29.9	0.0647	64.5	0.02157
30.	0.06384	64.6	0.02071
30.1	0.06384	64.7	0.01984
30.2	0.06298	64.8	0.01984
30.3	0.06298	64.9	0.01984
30.4	0.06212	65.	0.01984
30.5	0.06212	65.1	0.01898
30.6	0.06212	65.2	0.01812
30.7	0.06125	65.3	0.01726
30.8	0.06125	65.4	0.01726
30.9	0.06125	65.5	0.01639
31.	0.06125	65.6	0.01726
31.1	0.06039	65.7	0.01812
31.2	0.05953	65.8	0.01812
31.3	0.05953	65.9	0.01726
31.4	0.05953	66.	0.01639
31.5	0.05953	66.1	0.01639
31.6	0.05867	66.2	0.01553
31.7	0.0578	66.3	0.01553
31.8	0.05694	66.4	0.01467
31.9	0.05694	66.5	0.01381
32.	0.05694	66.6	0.01381
32.1	0.05608	66.7	0.01381
32.2	0.05694	66.8	0.01294
32.3	0.05521	66.9	0.01381
32.4	0.05521	67.	0.01294
32.5	0.05521	67.1	0.01294
32.6	0.05435	67.2	0.01208
32.7	0.05435	67.3	0.01208
32.8	0.05435	67.4	0.01208
32.9	0.05349	67.5	0.01208
33.	0.05349	67.6	0.01208
33.1	0.05349	67.7	0.01122
33.2	0.05349	67.8	0.01036
33.3	0.05263	67.9	0.01036
33.4	0.05263	68.	0.01122
33.5	0.05263	68.1	0.01036
33.6	0.05176	68.2	0.01036
33.7	0.05176	68.3	0.00949
33.8	0.05176	68.4	0.01036
33.9	0.0509	68.5	0.00949
34.	0.05004	68.6	0.00949
34.1	0.0509	68.7	0.00949
34.2	0.05004	68.8	0.00949
34.3	0.05004	68.9	0.01036
34.4	0.05004	69.	0.00949
34.5	0.04918	69.1	0.00777
34.6	0.04918		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.739

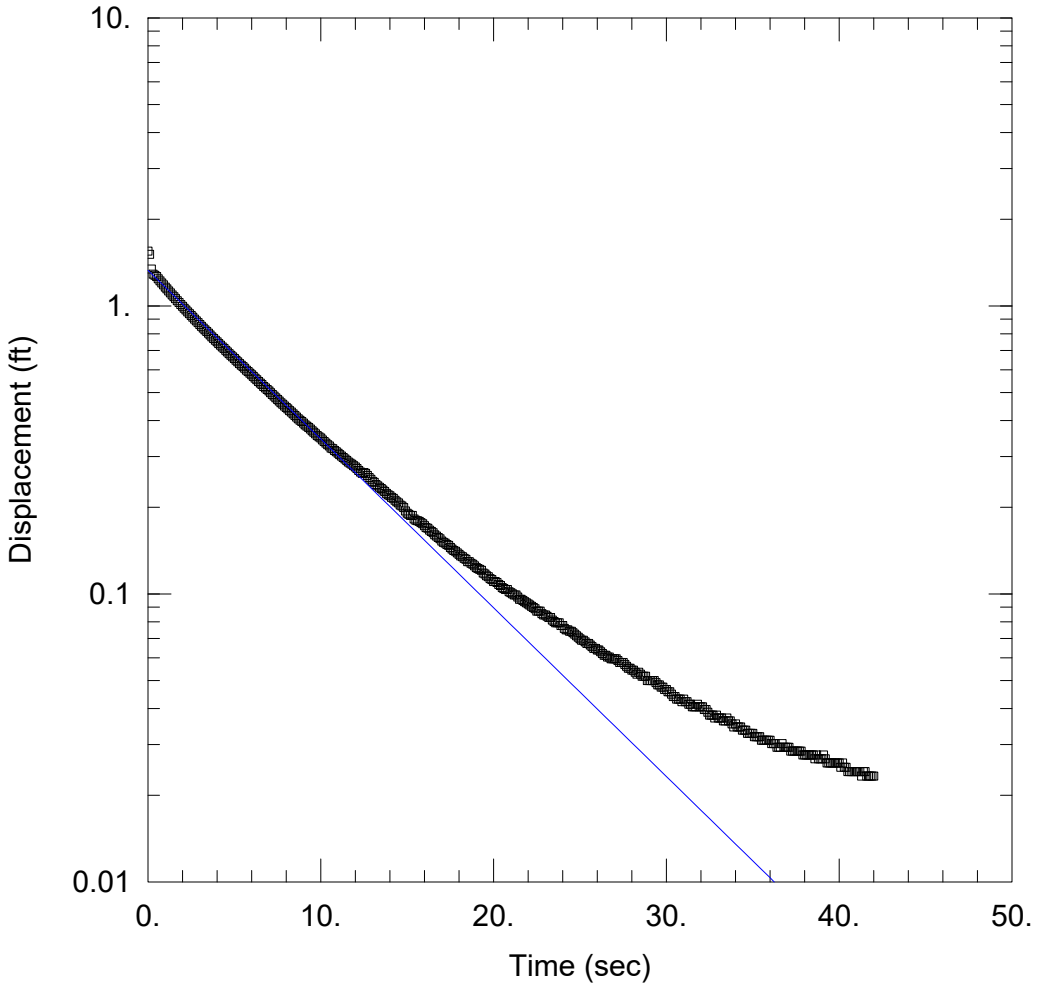
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.004251	cm/sec

y0	1.33	ft

T = K*b = 14.9 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-8A_TEST3.aqt
Date: 01/26/18 Time: 09:09:13

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-8A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8A)

Initial Displacement: 1.549 ft Static Water Column Height: 10.7 ft
Total Well Penetration Depth: 10.7 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.004891 cm/sec y0 = 1.33 ft

Data Set: Z:\Clients\ENS\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-8A\MW-8A_
Date: 01/26/18
Time: 09:01:33

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-8A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.549 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.7 ft

No. of Observations: 420

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	1.511	21.1	0.1001
0.2	1.343	21.2	0.09921
0.3	1.289	21.3	0.09921
0.4	1.278	21.4	0.09749
0.5	1.265	21.5	0.09576
0.6	1.242	21.6	0.09576
0.7	1.222	21.7	0.0949
0.8	1.202	21.8	0.09404
0.9	1.184	21.9	0.09317
1.	1.163	22.	0.09231
1.1	1.146	22.1	0.09145
1.2	1.128	22.2	0.09058
1.3	1.11	22.3	0.08972
1.4	1.092	22.4	0.08886
1.5	1.076	22.5	0.08713
1.6	1.059	22.6	0.08713
1.7	1.043	22.7	0.08713
1.8	1.027	22.8	0.08541
1.9	1.011	22.9	0.08455
2.	0.9964	23.	0.08455
2.1	0.9817	23.1	0.08368
2.2	0.9679	23.2	0.08282
2.3	0.9533	23.3	0.08282
2.4	0.9403	23.4	0.0811
2.5	0.9265	23.5	0.08023
2.6	0.9136	23.6	0.07937
2.7	0.8998	23.7	0.07937
2.8	0.8868	23.8	0.07937
2.9	0.8748	23.9	0.07764
3.	0.8618	24.	0.07764

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.8497	24.1	0.07592
3.2	0.8377	24.2	0.07506
3.3	0.8265	24.3	0.07506
3.4	0.8152	24.4	0.07419
3.5	0.804	24.5	0.07419
3.6	0.7928	24.6	0.07333
3.7	0.7807	24.7	0.07247
3.8	0.7712	24.8	0.07161
3.9	0.76	24.9	0.07074
4.	0.7505	25.	0.06988
4.1	0.7402	25.1	0.06902
4.2	0.7307	25.2	0.06902
4.3	0.7203	25.3	0.06815
4.4	0.7117	25.4	0.06729
4.5	0.7014	25.5	0.06729
4.6	0.6919	25.6	0.06643
4.7	0.6824	25.7	0.06557
4.8	0.6738	25.8	0.0647
4.9	0.6651	25.9	0.0647
5.	0.6565	26.	0.06384
5.1	0.6479	26.1	0.06384
5.2	0.6392	26.2	0.06298
5.3	0.6306	26.3	0.06212
5.4	0.6229	26.4	0.06125
5.5	0.6151	26.5	0.06125
5.6	0.6073	26.6	0.06039
5.7	0.5987	26.7	0.06039
5.8	0.5918	26.8	0.05953
5.9	0.584	26.9	0.05953
6.	0.5763	27.	0.05953
6.1	0.5694	27.1	0.05953
6.2	0.5616	27.2	0.05867
6.3	0.5538	27.3	0.0578
6.4	0.5461	27.4	0.0578
6.5	0.5392	27.5	0.0578
6.6	0.5331	27.6	0.05694
6.7	0.5254	27.7	0.05608
6.8	0.5193	27.8	0.05521
6.9	0.5124	27.9	0.05521
7.	0.5064	28.	0.05435
7.1	0.4995	28.1	0.05435
7.2	0.4926	28.2	0.05349
7.3	0.4865	28.3	0.05263
7.4	0.4797	28.4	0.05349
7.5	0.4736	28.5	0.05263
7.6	0.4676	28.6	0.05176
7.7	0.4607	28.7	0.05176
7.8	0.4555	28.8	0.05176
7.9	0.4495	28.9	0.05004
8.	0.4443	29.	0.05004
8.1	0.4391	29.1	0.05004
8.2	0.4331	29.2	0.05004
8.3	0.4279	29.3	0.05004
8.4	0.4219	29.4	0.04918
8.5	0.4167	29.5	0.04831
8.6	0.4115	29.6	0.04831
8.7	0.4055	29.7	0.04745
8.8	0.4012	29.8	0.04745
8.9	0.3968	29.9	0.04659
9.	0.3917	30.	0.04659
9.1	0.3865	30.1	0.04573
9.2	0.3822	30.2	0.04573
9.3	0.3787	30.3	0.04486
9.4	0.3735	30.4	0.044
9.5	0.3684	30.5	0.044
9.6	0.364	30.6	0.04314

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.3597	30.7	0.04314
9.8	0.3546	30.8	0.04314
9.9	0.3511	30.9	0.04227
10.	0.3477	31.	0.04314
10.1	0.3425	31.1	0.04227
10.2	0.3382	31.2	0.04227
10.3	0.3339	31.3	0.04141
10.4	0.3296	31.4	0.04141
10.5	0.3261	31.5	0.04055
10.6	0.3209	31.6	0.04055
10.7	0.3192	31.7	0.04055
10.8	0.3149	31.8	0.04141
10.9	0.3114	31.9	0.04055
11.	0.308	32.	0.04055
11.1	0.3045	32.1	0.04055
11.2	0.3011	32.2	0.03969
11.3	0.2976	32.3	0.03969
11.4	0.2942	32.4	0.03882
11.5	0.2907	32.5	0.03796
11.6	0.2873	32.6	0.03796
11.7	0.2847	32.7	0.03796
11.8	0.2821	32.8	0.0371
11.9	0.2787	32.9	0.03796
12.	0.2761	33.	0.0371
12.1	0.2726	33.1	0.0371
12.2	0.2683	33.2	0.0371
12.3	0.2648	33.3	0.03624
12.4	0.2623	33.4	0.03624
12.5	0.264	33.5	0.0371
12.6	0.2623	33.6	0.03624
12.7	0.2579	33.7	0.03624
12.8	0.2536	33.8	0.03537
12.9	0.2502	33.9	0.03451
13.	0.2459	34.	0.03537
13.1	0.2441	34.1	0.03451
13.2	0.2398	34.2	0.03451
13.3	0.2372	34.3	0.03451
13.4	0.2347	34.4	0.03365
13.5	0.2321	34.5	0.03365
13.6	0.2295	34.6	0.03365
13.7	0.2269	34.7	0.03279
13.8	0.2234	34.8	0.03279
13.9	0.2208	34.9	0.03279
14.	0.2191	35.	0.03279
14.1	0.2165	35.1	0.03192
14.2	0.2148	35.2	0.03192
14.3	0.2114	35.3	0.03192
14.4	0.2088	35.4	0.03192
14.5	0.2071	35.5	0.03106
14.6	0.2036	35.6	0.03106
14.7	0.2019	35.7	0.03106
14.8	0.1993	35.8	0.03106
14.9	0.1941	35.9	0.03106
15.	0.1907	36.	0.03106
15.1	0.1889	36.1	0.0302
15.2	0.1872	36.2	0.0302
15.3	0.1872	36.3	0.0302
15.4	0.182	36.4	0.02933
15.5	0.1803	36.5	0.02933
15.6	0.1794	36.6	0.02933
15.7	0.1786	36.7	0.0302
15.8	0.1769	36.8	0.02933
15.9	0.1751	36.9	0.02933
16.	0.1725	37.	0.02933
16.1	0.1699	37.1	0.02933
16.2	0.1691	37.2	0.02847

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.1665	37.3	0.02847
16.4	0.1648	37.4	0.02847
16.5	0.1631	37.5	0.02847
16.6	0.1605	37.6	0.02847
16.7	0.1587	37.7	0.02847
16.8	0.157	37.8	0.02847
16.9	0.1553	37.9	0.02761
17.	0.1527	38.	0.02761
17.1	0.151	38.1	0.02761
17.2	0.1501	38.2	0.02761
17.3	0.1484	38.3	0.02761
17.4	0.1475	38.4	0.02761
17.5	0.1449	38.5	0.02761
17.6	0.1432	38.6	0.02675
17.7	0.1415	38.7	0.02761
17.8	0.1406	38.8	0.02675
17.9	0.1389	38.9	0.02675
18.	0.1372	39.	0.02675
18.1	0.1354	39.1	0.02761
18.2	0.1346	39.2	0.02675
18.3	0.1329	39.3	0.02588
18.4	0.132	39.4	0.02588
18.5	0.1294	39.5	0.02588
18.6	0.1294	39.6	0.02588
18.7	0.1277	39.7	0.02588
18.8	0.1268	39.8	0.02588
18.9	0.1251	39.9	0.02588
19.	0.1234	40.	0.02588
19.1	0.1225	40.1	0.02502
19.2	0.1216	40.2	0.02588
19.3	0.1208	40.3	0.02502
19.4	0.1182	40.4	0.02502
19.5	0.1173	40.5	0.02416
19.6	0.1156	40.6	0.02416
19.7	0.1147	40.7	0.02416
19.8	0.113	40.8	0.02416
19.9	0.1122	40.9	0.02416
20.	0.1104	41.	0.02416
20.1	0.1104	41.1	0.02416
20.2	0.1096	41.2	0.02416
20.3	0.1078	41.3	0.0233
20.4	0.107	41.4	0.02416
20.5	0.1053	41.5	0.02416
20.6	0.1044	41.6	0.0233
20.7	0.1035	41.7	0.0233
20.8	0.1035	41.8	0.0233
20.9	0.1018	41.9	0.0233
21.	0.1009	42.	0.0233

SOLUTION

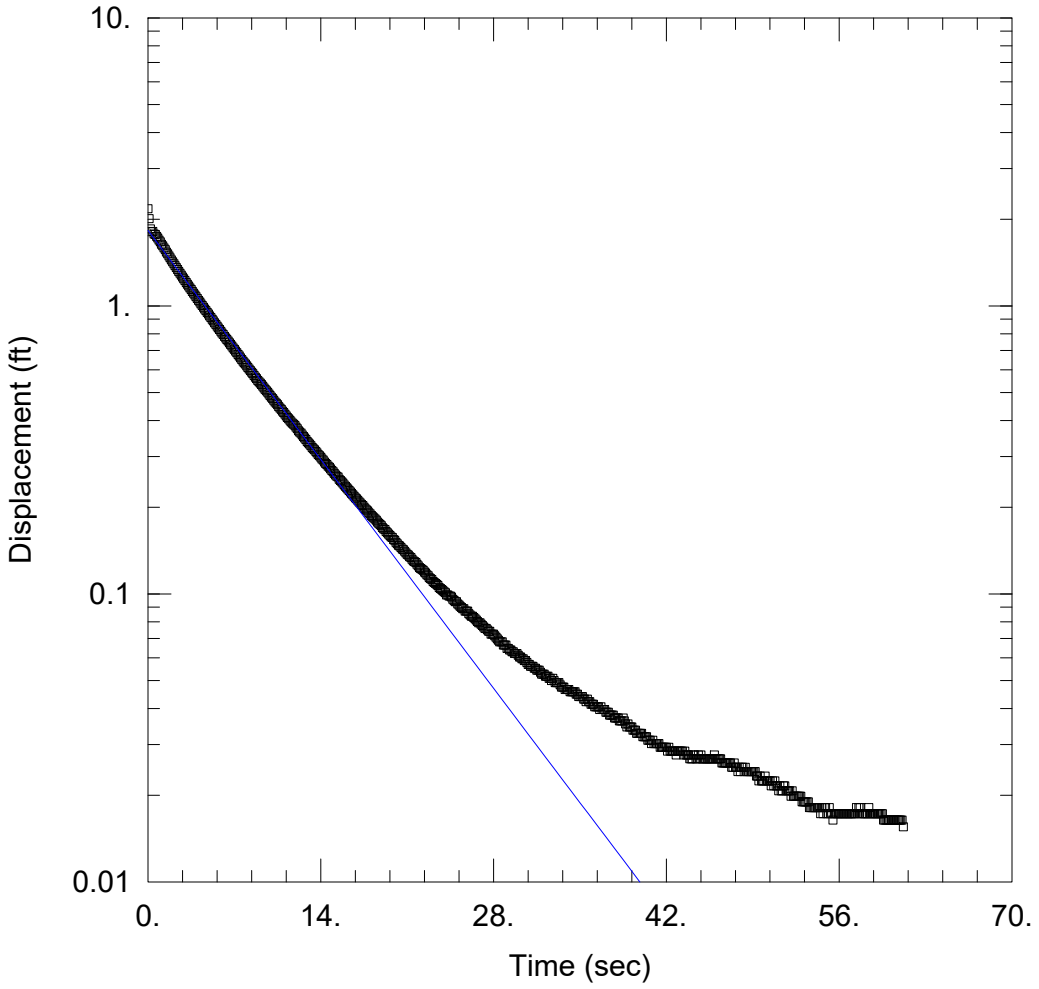
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.739

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.004891	cm/sec
y0	1.33	ft

T = K*b = 17.14 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-8A_TEST4.aqt
Date: 01/26/18 Time: 09:08:28

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-8A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8A)

Initial Displacement: 2.174 ft Static Water Column Height: 10.7 ft
Total Well Penetration Depth: 10.7 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.004737 cm/sec y0 = 1.828 ft

Data Set: Z:\Clients\ENS\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-8A\MW-8A_
Date: 01/26/18
Time: 09:02:24

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-8A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.174 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.7 ft

No. of Observations: 612

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	2.009	30.7	0.0578
0.2	1.851	30.8	0.05694
0.3	1.81	30.9	0.05694
0.4	1.814	31.	0.05608
0.5	1.776	31.1	0.05608
0.6	1.769	31.2	0.05608
0.7	1.743	31.3	0.05521
0.8	1.721	31.4	0.05521
0.9	1.693	31.5	0.05435
1.	1.669	31.6	0.05435
1.1	1.637	31.7	0.05435
1.2	1.617	31.8	0.05349
1.3	1.591	31.9	0.05263
1.4	1.567	32.	0.05263
1.5	1.538	32.1	0.05263
1.6	1.516	32.2	0.05176
1.7	1.491	32.3	0.05176
1.8	1.468	32.4	0.05176
1.9	1.444	32.5	0.0509
2.	1.423	32.6	0.0509
2.1	1.401	32.7	0.05004
2.2	1.38	32.8	0.0509
2.3	1.359	32.9	0.05004
2.4	1.337	33.	0.04918
2.5	1.318	33.1	0.04918
2.6	1.298	33.2	0.04918
2.7	1.279	33.3	0.04918
2.8	1.26	33.4	0.04831
2.9	1.241	33.5	0.04745
3.	1.224	33.6	0.04745

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	1.206	33.7	0.04745
3.2	1.19	33.8	0.04659
3.3	1.172	33.9	0.04659
3.4	1.155	34.	0.04659
3.5	1.14	34.1	0.04659
3.6	1.122	34.2	0.04573
3.7	1.107	34.3	0.04573
3.8	1.091	34.4	0.04573
3.9	1.077	34.5	0.04573
4.	1.061	34.6	0.04573
4.1	1.046	34.7	0.04486
4.2	1.032	34.8	0.04486
4.3	1.016	34.9	0.044
4.4	1.003	35.	0.044
4.5	0.9886	35.1	0.044
4.6	0.9757	35.2	0.044
4.7	0.9627	35.3	0.04314
4.8	0.9498	35.4	0.04314
4.9	0.9369	35.5	0.04227
5.	0.9231	35.6	0.04314
5.1	0.911	35.7	0.04227
5.2	0.8989	35.8	0.04227
5.3	0.8868	35.9	0.04141
5.4	0.8739	36.	0.04141
5.5	0.8627	36.1	0.04141
5.6	0.8506	36.2	0.04055
5.7	0.8385	36.3	0.04055
5.8	0.8282	36.4	0.04055
5.9	0.8161	36.5	0.04055
6.	0.8049	36.6	0.03969
6.1	0.7954	36.7	0.04055
6.2	0.7842	36.8	0.03969
6.3	0.7738	36.9	0.03969
6.4	0.7635	37.	0.03969
6.5	0.7549	37.1	0.03882
6.6	0.7445	37.2	0.03882
6.7	0.735	37.3	0.03882
6.8	0.7255	37.4	0.03796
6.9	0.7152	37.5	0.03796
7.	0.7065	37.6	0.03796
7.1	0.697	37.7	0.03796
7.2	0.6876	37.8	0.0371
7.3	0.6781	37.9	0.0371
7.4	0.6694	38.	0.0371
7.5	0.66	38.1	0.0371
7.6	0.6513	38.2	0.03624
7.7	0.6427	38.3	0.03624
7.8	0.6349	38.4	0.03624
7.9	0.628	38.5	0.0371
8.	0.6194	38.6	0.03624
8.1	0.6116	38.7	0.03537
8.2	0.6039	38.8	0.03451
8.3	0.5961	38.9	0.03537
8.4	0.5884	39.	0.03451
8.5	0.5815	39.1	0.03451
8.6	0.5737	39.2	0.03451
8.7	0.5659	39.3	0.03365
8.8	0.559	39.4	0.03365
8.9	0.5513	39.5	0.03365
9.	0.5452	39.6	0.03279
9.1	0.5392	39.7	0.03279
9.2	0.5331	39.8	0.03279
9.3	0.5262	39.9	0.03279
9.4	0.5193	40.	0.03279
9.5	0.5133	40.1	0.03192
9.6	0.5073	40.2	0.03192

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.5012	40.3	0.03192
9.8	0.4943	40.4	0.03192
9.9	0.4883	40.5	0.03106
10.	0.4822	40.6	0.03106
10.1	0.4762	40.7	0.03106
10.2	0.4702	40.8	0.0302
10.3	0.4641	40.9	0.03106
10.4	0.459	41.	0.0302
10.5	0.4538	41.1	0.0302
10.6	0.4469	41.2	0.0302
10.7	0.4417	41.3	0.0302
10.8	0.4374	41.4	0.0302
10.9	0.4313	41.5	0.02933
11.	0.4262	41.6	0.02933
11.1	0.421	41.7	0.02933
11.2	0.4149	41.8	0.02933
11.3	0.4098	41.9	0.02933
11.4	0.4055	42.	0.02933
11.5	0.4012	42.1	0.02847
11.6	0.396	42.2	0.02933
11.7	0.3917	42.3	0.02847
11.8	0.3882	42.4	0.02847
11.9	0.3848	42.5	0.02847
12.	0.3796	42.6	0.02847
12.1	0.3744	42.7	0.02847
12.2	0.3684	42.8	0.02761
12.3	0.3649	42.9	0.02847
12.4	0.3615	43.	0.02847
12.5	0.3563	43.1	0.02847
12.6	0.352	43.2	0.02847
12.7	0.3477	43.3	0.02847
12.8	0.3433	43.4	0.02761
12.9	0.3382	43.5	0.02847
13.	0.3347	43.6	0.02761
13.1	0.3313	43.7	0.02761
13.2	0.327	43.8	0.02761
13.3	0.3226	43.9	0.02675
13.4	0.3192	44.	0.02675
13.5	0.3166	44.1	0.02675
13.6	0.3123	44.2	0.02761
13.7	0.3088	44.3	0.02761
13.8	0.3045	44.4	0.02675
13.9	0.3019	44.5	0.02675
14.	0.2985	44.6	0.02761
14.1	0.2942	44.7	0.02675
14.2	0.2916	44.8	0.02761
14.3	0.2873	44.9	0.02675
14.4	0.2838	45.	0.02675
14.5	0.2812	45.1	0.02675
14.6	0.2778	45.2	0.02675
14.7	0.2752	45.3	0.02675
14.8	0.2717	45.4	0.02675
14.9	0.2683	45.5	0.02675
15.	0.2657	45.6	0.02675
15.1	0.2623	45.7	0.02675
15.2	0.2588	45.8	0.02675
15.3	0.2562	45.9	0.02761
15.4	0.2545	46.	0.02675
15.5	0.2502	46.1	0.02675
15.6	0.2476	46.2	0.02675
15.7	0.245	46.3	0.02675
15.8	0.2424	46.4	0.02675
15.9	0.239	46.5	0.02588
16.	0.2364	46.6	0.02588
16.1	0.2338	46.7	0.02588
16.2	0.2312	46.8	0.02588

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.2286	46.9	0.02588
16.4	0.226	47.	0.02588
16.5	0.2234	47.1	0.02588
16.6	0.2208	47.2	0.02588
16.7	0.2183	47.3	0.02502
16.8	0.2157	47.4	0.02502
16.9	0.214	47.5	0.02588
17.	0.2114	47.6	0.02502
17.1	0.2088	47.7	0.02502
17.2	0.2071	47.8	0.02416
17.3	0.2045	47.9	0.02502
17.4	0.2027	48.	0.02416
17.5	0.2001	48.1	0.02502
17.6	0.1976	48.2	0.02502
17.7	0.1958	48.3	0.02416
17.8	0.1941	48.4	0.02502
17.9	0.1915	48.5	0.02416
18.	0.1898	48.6	0.02416
18.1	0.1872	48.7	0.02416
18.2	0.1855	48.8	0.02416
18.3	0.1838	48.9	0.02416
18.4	0.182	49.	0.02416
18.5	0.1803	49.1	0.02416
18.6	0.1777	49.2	0.02416
18.7	0.176	49.3	0.0233
18.8	0.1743	49.4	0.0233
18.9	0.1725	49.5	0.02243
19.	0.1699	49.6	0.0233
19.1	0.1682	49.7	0.02243
19.2	0.1674	49.8	0.02243
19.3	0.1648	49.9	0.02243
19.4	0.1631	50.	0.0233
19.5	0.1613	50.1	0.02243
19.6	0.1596	50.2	0.02243
19.7	0.1579	50.3	0.02243
19.8	0.157	50.4	0.02243
19.9	0.1544	50.5	0.02157
20.	0.1536	50.6	0.02243
20.1	0.151	50.7	0.02157
20.2	0.1492	50.8	0.02243
20.3	0.1475	50.9	0.02157
20.4	0.1467	51.	0.02157
20.5	0.1449	51.1	0.02071
20.6	0.1432	51.2	0.02157
20.7	0.1424	51.3	0.02071
20.8	0.1406	51.4	0.02071
20.9	0.1389	51.5	0.02157
21.	0.1372	51.6	0.02157
21.1	0.1363	51.7	0.02071
21.2	0.1346	51.8	0.02071
21.3	0.1337	51.9	0.02071
21.4	0.132	52.	0.02071
21.5	0.1303	52.1	0.01984
21.6	0.1294	52.2	0.02071
21.7	0.1285	52.3	0.01984
21.8	0.1268	52.4	0.01984
21.9	0.1251	52.5	0.01984
22.	0.1234	52.6	0.01984
22.1	0.1225	52.7	0.01984
22.2	0.1216	52.8	0.01984
22.3	0.1208	52.9	0.01984
22.4	0.1191	53.	0.01898
22.5	0.1182	53.1	0.01898
22.6	0.1165	53.2	0.01898
22.7	0.1156	53.3	0.01898
22.8	0.1139	53.4	0.01898

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.9	0.113	53.5	0.01898
23.	0.1122	53.6	0.01812
23.1	0.1104	53.7	0.01812
23.2	0.1096	53.8	0.01812
23.3	0.1087	53.9	0.01812
23.4	0.1078	54.	0.01812
23.5	0.107	54.1	0.01812
23.6	0.1053	54.2	0.01812
23.7	0.1044	54.3	0.01812
23.8	0.1035	54.4	0.01812
23.9	0.1027	54.5	0.01726
24.	0.1018	54.6	0.01812
24.1	0.1009	54.7	0.01726
24.2	0.09921	54.8	0.01812
24.3	0.09921	54.9	0.01812
24.4	0.09835	55.	0.01726
24.5	0.09835	55.1	0.01726
24.6	0.09749	55.2	0.01812
24.7	0.09576	55.3	0.01726
24.8	0.0949	55.4	0.01726
24.9	0.09404	55.5	0.01639
25.	0.09404	55.6	0.01726
25.1	0.09231	55.7	0.01726
25.2	0.09145	55.8	0.01726
25.3	0.09058	55.9	0.01726
25.4	0.08972	56.	0.01726
25.5	0.08886	56.1	0.01726
25.6	0.08886	56.2	0.01726
25.7	0.08713	56.3	0.01726
25.8	0.08713	56.4	0.01726
25.9	0.08713	56.5	0.01726
26.	0.08541	56.6	0.01726
26.1	0.08455	56.7	0.01726
26.2	0.08368	56.8	0.01726
26.3	0.08368	56.9	0.01726
26.4	0.08282	57.	0.01726
26.5	0.08196	57.1	0.01726
26.6	0.0811	57.2	0.01726
26.7	0.08023	57.3	0.01726
26.8	0.07937	57.4	0.01812
26.9	0.07937	57.5	0.01726
27.	0.07851	57.6	0.01812
27.1	0.07764	57.7	0.01812
27.2	0.07678	57.8	0.01726
27.3	0.07592	57.9	0.01726
27.4	0.07592	58.	0.01726
27.5	0.07506	58.1	0.01726
27.6	0.07419	58.2	0.01726
27.7	0.07419	58.3	0.01726
27.8	0.07247	58.4	0.01812
27.9	0.07247	58.5	0.01726
28.	0.07247	58.6	0.01726
28.1	0.07161	58.7	0.01726
28.2	0.07074	58.8	0.01726
28.3	0.06988	58.9	0.01726
28.4	0.06902	59.	0.01726
28.5	0.06815	59.1	0.01726
28.6	0.06815	59.2	0.01726
28.7	0.06815	59.3	0.01726
28.8	0.06643	59.4	0.01726
28.9	0.06643	59.5	0.01726
29.	0.06643	59.6	0.01639
29.1	0.0647	59.7	0.01639
29.2	0.0647	59.8	0.01639
29.3	0.06384	59.9	0.01639
29.4	0.06384	60.	0.01639

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
29.5	0.06298	60.1	0.01639
29.6	0.06298	60.2	0.01639
29.7	0.06212	60.3	0.01639
29.8	0.06212	60.4	0.01639
29.9	0.06212	60.5	0.01639
30.	0.06125	60.6	0.01639
30.1	0.06039	60.7	0.01639
30.2	0.06039	60.8	0.01639
30.3	0.05953	60.9	0.01639
30.4	0.05953	61.	0.01639
30.5	0.05867	61.1	0.01639
30.6	0.05867	61.2	0.01553

SOLUTION

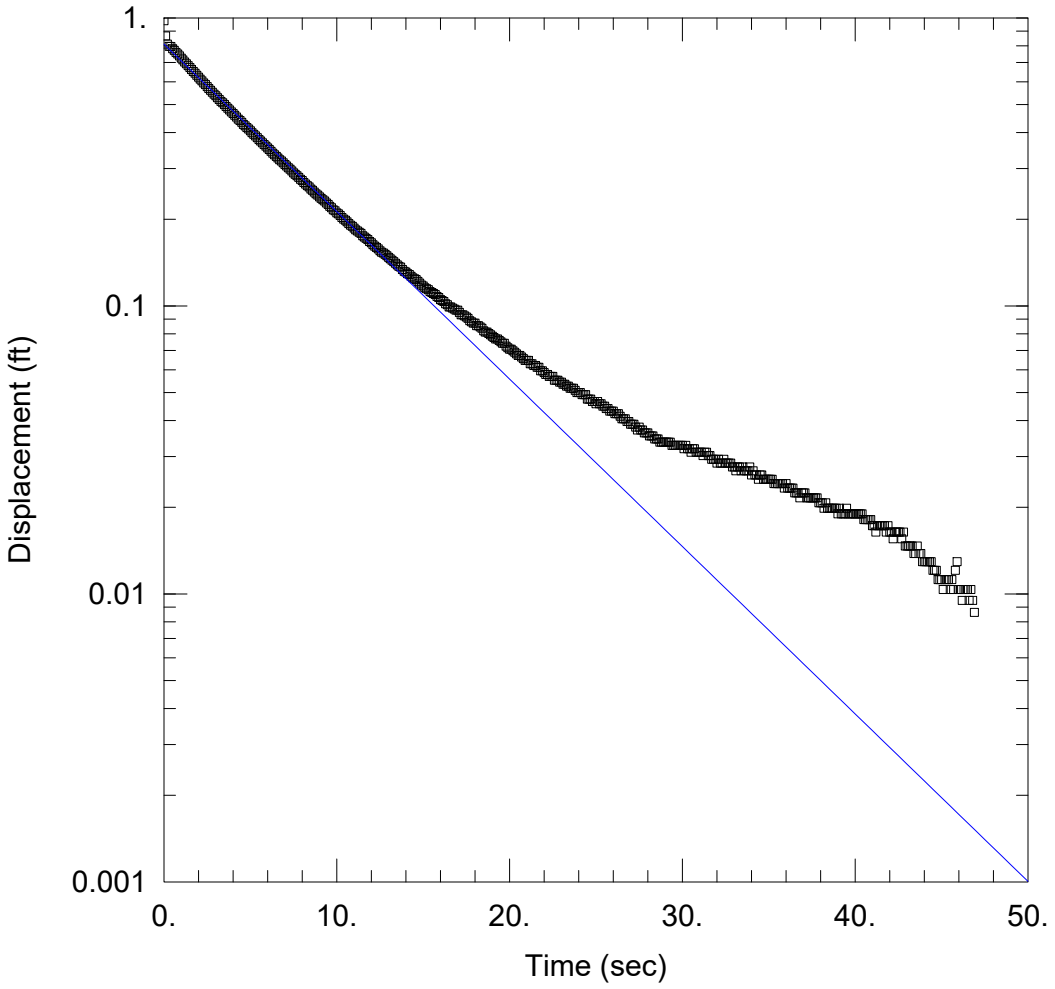
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.739

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.004737	cm/sec
y0	1.828	ft

T = K*b = 16.61 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-8A_TEST5.aqt
Date: 01/26/18 Time: 09:07:36

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-8A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8A)

Initial Displacement: 0.9774 ft Static Water Column Height: 10.7 ft
Total Well Penetration Depth: 10.7 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.004853 cm/sec y0 = 0.8108 ft

Data Set: Z:\Clients\ENS\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-8A\MW-8A_
Date: 01/26/18
Time: 09:03:03

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-8A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.9774 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.7 ft

No. of Observations: 469

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.8661	23.6	0.05176
0.2	0.8109	23.7	0.05176
0.3	0.7971	23.8	0.0509
0.4	0.7963	23.9	0.05004
0.5	0.7816	24.	0.05004
0.6	0.7721	24.1	0.05004
0.7	0.7592	24.2	0.04918
0.8	0.7497	24.3	0.04918
0.9	0.7376	24.4	0.04918
1.	0.7247	24.5	0.04745
1.1	0.7152	24.6	0.04745
1.2	0.7031	24.7	0.04745
1.3	0.6936	24.8	0.04659
1.4	0.6824	24.9	0.04659
1.5	0.672	25.	0.04573
1.6	0.6617	25.1	0.04659
1.7	0.6522	25.2	0.04573
1.8	0.6427	25.3	0.04573
1.9	0.6323	25.4	0.04486
2.	0.6229	25.5	0.04486
2.1	0.6134	25.6	0.044
2.2	0.6047	25.7	0.044
2.3	0.5944	25.8	0.04314
2.4	0.5866	25.9	0.04314
2.5	0.5771	26.	0.04314
2.6	0.5685	26.1	0.04227
2.7	0.5607	26.2	0.04227
2.8	0.5521	26.3	0.04227
2.9	0.5435	26.4	0.04141
3.	0.5366	26.5	0.04055

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.5288	26.6	0.04055
3.2	0.5211	26.7	0.04055
3.3	0.5133	26.8	0.03969
3.4	0.5073	26.9	0.03969
3.5	0.5004	27.	0.03882
3.6	0.4926	27.1	0.03882
3.7	0.4857	27.2	0.03882
3.8	0.4788	27.3	0.03796
3.9	0.4719	27.4	0.0371
4.	0.4658	27.5	0.03796
4.1	0.459	27.6	0.0371
4.2	0.4529	27.7	0.0371
4.3	0.4451	27.8	0.03624
4.4	0.44	27.9	0.03624
4.5	0.4339	28.	0.03624
4.6	0.427	28.1	0.03537
4.7	0.4219	28.2	0.03537
4.8	0.4158	28.3	0.03537
4.9	0.4115	28.4	0.03451
5.	0.4055	28.5	0.03451
5.1	0.3994	28.6	0.03451
5.2	0.3942	28.7	0.03365
5.3	0.3891	28.8	0.03365
5.4	0.3839	28.9	0.03365
5.5	0.3779	29.	0.03365
5.6	0.3735	29.1	0.03365
5.7	0.3684	29.2	0.03365
5.8	0.3632	29.3	0.03365
5.9	0.3589	29.4	0.03279
6.	0.3537	29.5	0.03279
6.1	0.3494	29.6	0.03279
6.2	0.3442	29.7	0.03279
6.3	0.339	29.8	0.03279
6.4	0.3347	29.9	0.03279
6.5	0.3304	30.	0.03279
6.6	0.3261	30.1	0.03192
6.7	0.3218	30.2	0.03279
6.8	0.3183	30.3	0.03192
6.9	0.314	30.4	0.03192
7.	0.3097	30.5	0.03106
7.1	0.3063	30.6	0.03192
7.2	0.3019	30.7	0.03192
7.3	0.2985	30.8	0.03106
7.4	0.2942	30.9	0.03106
7.5	0.2899	31.	0.03106
7.6	0.2864	31.1	0.03106
7.7	0.283	31.2	0.0302
7.8	0.2795	31.3	0.03106
7.9	0.2752	31.4	0.03106
8.	0.2726	31.5	0.0302
8.1	0.2683	31.6	0.0302
8.2	0.2648	31.7	0.02933
8.3	0.2614	31.8	0.02933
8.4	0.2588	31.9	0.02933
8.5	0.2545	32.	0.02847
8.6	0.2519	32.1	0.02933
8.7	0.2485	32.2	0.02847
8.8	0.245	32.3	0.02847
8.9	0.2424	32.4	0.02933
9.	0.239	32.5	0.02847
9.1	0.2364	32.6	0.02847
9.2	0.2338	32.7	0.02847
9.3	0.2312	32.8	0.02847
9.4	0.2278	32.9	0.02761
9.5	0.2252	33.	0.02761
9.6	0.2217	33.1	0.02675

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.2191	33.2	0.02761
9.8	0.2157	33.3	0.02761
9.9	0.214	33.4	0.02675
10.	0.2105	33.5	0.02761
10.1	0.2088	33.6	0.02675
10.2	0.2062	33.7	0.02675
10.3	0.2027	33.8	0.02675
10.4	0.2001	33.9	0.02761
10.5	0.1984	34.	0.02588
10.6	0.1958	34.1	0.02675
10.7	0.1932	34.2	0.02588
10.8	0.1907	34.3	0.02588
10.9	0.1889	34.4	0.02502
11.	0.1863	34.5	0.02588
11.1	0.1838	34.6	0.02588
11.2	0.182	34.7	0.02502
11.3	0.1803	34.8	0.02502
11.4	0.1786	34.9	0.02502
11.5	0.1751	35.	0.02502
11.6	0.1734	35.1	0.02502
11.7	0.1717	35.2	0.02502
11.8	0.1699	35.3	0.02416
11.9	0.1674	35.4	0.02416
12.	0.1656	35.5	0.02416
12.1	0.1631	35.6	0.02416
12.2	0.1613	35.7	0.02416
12.3	0.1596	35.8	0.02416
12.4	0.1579	35.9	0.0233
12.5	0.1553	36.	0.02416
12.6	0.1536	36.1	0.0233
12.7	0.1527	36.2	0.0233
12.8	0.151	36.3	0.0233
12.9	0.1492	36.4	0.0233
13.	0.1475	36.5	0.02243
13.1	0.1458	36.6	0.02243
13.2	0.1441	36.7	0.02243
13.3	0.1424	36.8	0.02157
13.4	0.1406	36.9	0.02243
13.5	0.1389	37.	0.02243
13.6	0.1372	37.1	0.02243
13.7	0.1363	37.2	0.02157
13.8	0.1337	37.3	0.02157
13.9	0.132	37.4	0.02157
14.	0.1311	37.5	0.02157
14.1	0.1294	37.6	0.02157
14.2	0.1285	37.7	0.02157
14.3	0.1268	37.8	0.02157
14.4	0.1251	37.9	0.02071
14.5	0.1242	38.	0.02071
14.6	0.1234	38.1	0.02071
14.7	0.1216	38.2	0.01984
14.8	0.1199	38.3	0.02071
14.9	0.1182	38.4	0.01984
15.	0.1173	38.5	0.01984
15.1	0.1156	38.6	0.01984
15.2	0.1147	38.7	0.01984
15.3	0.1139	38.8	0.01984
15.4	0.1122	38.9	0.01984
15.5	0.1113	39.	0.01898
15.6	0.1104	39.1	0.01984
15.7	0.1096	39.2	0.01898
15.8	0.1078	39.3	0.01898
15.9	0.107	39.4	0.01898
16.	0.1053	39.5	0.01984
16.1	0.1044	39.6	0.01898
16.2	0.1035	39.7	0.01898

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.1018	39.8	0.01898
16.4	0.1009	39.9	0.01898
16.5	0.09921	40.	0.01898
16.6	0.09921	40.1	0.01898
16.7	0.09835	40.2	0.01898
16.8	0.09749	40.3	0.01898
16.9	0.09662	40.4	0.01898
17.	0.09662	40.5	0.01812
17.1	0.0949	40.6	0.01812
17.2	0.09317	40.7	0.01812
17.3	0.09317	40.8	0.01812
17.4	0.09231	40.9	0.01812
17.5	0.09145	41.	0.01726
17.6	0.09058	41.1	0.01726
17.7	0.08886	41.2	0.01639
17.8	0.088	41.3	0.01726
17.9	0.08713	41.4	0.01726
18.	0.08713	41.5	0.01726
18.1	0.08541	41.6	0.01726
18.2	0.08541	41.7	0.01726
18.3	0.08455	41.8	0.01639
18.4	0.08368	41.9	0.01726
18.5	0.08196	42.	0.01639
18.6	0.0811	42.1	0.01639
18.7	0.0811	42.2	0.01553
18.8	0.08023	42.3	0.01639
18.9	0.07937	42.4	0.01639
19.	0.07851	42.5	0.01639
19.1	0.07764	42.6	0.01639
19.2	0.07678	42.7	0.01553
19.3	0.07678	42.8	0.01639
19.4	0.07592	42.9	0.01467
19.5	0.07506	43.	0.01467
19.6	0.07419	43.1	0.01467
19.7	0.07419	43.2	0.01467
19.8	0.07247	43.3	0.01467
19.9	0.07161	43.4	0.01381
20.	0.07074	43.5	0.01381
20.1	0.07074	43.6	0.01467
20.2	0.06988	43.7	0.01381
20.3	0.06902	43.8	0.01381
20.4	0.06815	43.9	0.01294
20.5	0.06729	44.	0.01294
20.6	0.06729	44.1	0.01294
20.7	0.06643	44.2	0.01294
20.8	0.06557	44.3	0.01294
20.9	0.0647	44.4	0.01294
21.	0.0647	44.5	0.01208
21.1	0.0647	44.6	0.01208
21.2	0.06298	44.7	0.01208
21.3	0.06298	44.8	0.01122
21.4	0.06212	44.9	0.01122
21.5	0.06212	45.	0.01122
21.6	0.06125	45.1	0.01036
21.7	0.06125	45.2	0.01122
21.8	0.05953	45.3	0.01122
21.9	0.05953	45.4	0.01122
22.	0.05867	45.5	0.01036
22.1	0.0578	45.6	0.01122
22.2	0.0578	45.7	0.01036
22.3	0.05694	45.8	0.01208
22.4	0.05694	45.9	0.01294
22.5	0.05694	46.	0.01036
22.6	0.05521	46.1	0.01036
22.7	0.05521	46.2	0.00949
22.8	0.05521	46.3	0.01036

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.9	0.05435	46.4	0.01036
23.	0.05435	46.5	0.01036
23.1	0.05349	46.6	0.00949
23.2	0.05349	46.7	0.01036
23.3	0.05263	46.8	0.00949
23.4	0.05263	46.9	0.00863
23.5	0.05176		

SOLUTION

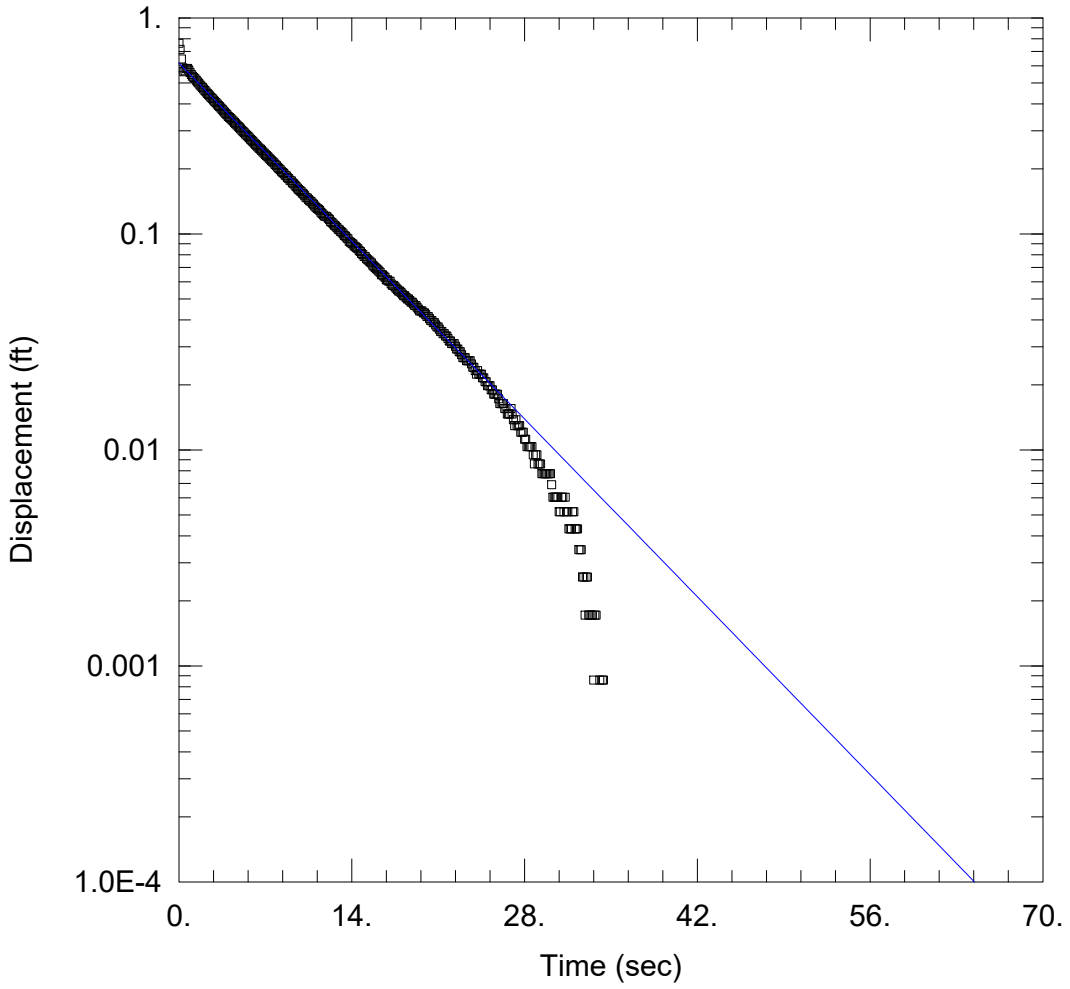
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.739

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.004853	cm/sec
y0	0.8108	ft

T = K*b = 17.01 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-8A_TEST6.aqt
Date: 01/26/18 Time: 09:06:55

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-8A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8A)

Initial Displacement: 0.7626 ft Static Water Column Height: 10.7 ft
Total Well Penetration Depth: 10.7 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.007572 cm/sec y0 = 0.6175 ft

Data Set: Z:\Clients\ENS\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-8A\MW-8A_
Date: 01/26/18
Time: 09:03:47

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-8A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.7626 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.7 ft

No. of Observations: 670

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.7152	33.6	0.00086
0.2	0.6461	33.7	0.00172
0.3	0.5883	33.8	0.00172
0.4	0.5633	33.9	0.
0.5	0.5694	34.	0.
0.6	0.5823	34.1	0.00086
0.7	0.584	34.2	0.
0.8	0.5737	34.3	0.00086
0.9	0.559	34.4	0.00086
1.	0.5469	34.5	-0.00087
1.1	0.5374	34.6	-0.00087
1.2	0.5297	34.7	-0.00087
1.3	0.5228	34.8	-0.00173
1.4	0.515	34.9	-0.00173
1.5	0.5055	35.	-0.00173
1.6	0.4986	35.1	-0.00259
1.7	0.49	35.2	-0.00259
1.8	0.4831	35.3	-0.00345
1.9	0.4762	35.4	-0.00345
2.	0.4684	35.5	-0.00259
2.1	0.4615	35.6	-0.00345
2.2	0.4546	35.7	-0.00345
2.3	0.4477	35.8	-0.00259
2.4	0.4417	35.9	-0.00345
2.5	0.4356	36.	-0.00345
2.6	0.4288	36.1	-0.00345
2.7	0.4227	36.2	-0.00259
2.8	0.4167	36.3	-0.00345
2.9	0.4106	36.4	-0.00345
3.	0.4055	36.5	-0.00345

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.3994	36.6	-0.00259
3.2	0.3934	36.7	-0.00259
3.3	0.3882	36.8	-0.00259
3.4	0.3822	36.9	-0.00259
3.5	0.377	37.	-0.00259
3.6	0.3718	37.1	-0.00259
3.7	0.3658	37.2	-0.00259
3.8	0.3606	37.3	-0.00173
3.9	0.3563	37.4	-0.00259
4.	0.3502	37.5	-0.00259
4.1	0.3459	37.6	-0.00259
4.2	0.3416	37.7	-0.00173
4.3	0.3373	37.8	-0.00173
4.4	0.333	37.9	-0.00173
4.5	0.3278	38.	-0.00173
4.6	0.3235	38.1	-0.00173
4.7	0.3192	38.2	-0.00087
4.8	0.3149	38.3	-0.00173
4.9	0.3106	38.4	-0.00259
5.	0.3063	38.5	-0.00345
5.1	0.3019	38.6	-0.00173
5.2	0.2976	38.7	-0.00345
5.3	0.2942	38.8	-0.00345
5.4	0.2899	38.9	-0.00345
5.5	0.2864	39.	-0.00345
5.6	0.2821	39.1	-0.00259
5.7	0.2786	39.2	-0.00432
5.8	0.2743	39.3	-0.00432
5.9	0.2709	39.4	-0.00345
6.	0.2674	39.5	-0.00345
6.1	0.2631	39.6	-0.00345
6.2	0.2597	39.7	-0.00345
6.3	0.2562	39.8	-0.00259
6.4	0.2528	39.9	-0.00259
6.5	0.2493	40.	-0.00259
6.6	0.2467	40.1	-0.00173
6.7	0.2433	40.2	-0.00259
6.8	0.2398	40.3	-0.00259
6.9	0.2364	40.4	-0.00173
7.	0.2329	40.5	-0.00173
7.1	0.2303	40.6	-0.00173
7.2	0.2277	40.7	-0.00259
7.3	0.2243	40.8	-0.00345
7.4	0.2217	40.9	-0.00259
7.5	0.2183	41.	-0.00259
7.6	0.2157	41.1	-0.00259
7.7	0.2131	41.2	-0.00259
7.8	0.2096	41.3	-0.00259
7.9	0.207	41.4	-0.00345
8.	0.2036	41.5	-0.00259
8.1	0.201	41.6	-0.00345
8.2	0.1984	41.7	-0.00173
8.3	0.195	41.8	-0.00173
8.4	0.1924	41.9	-0.00259
8.5	0.1906	42.	-0.00259
8.6	0.1872	42.1	-0.00173
8.7	0.1855	42.2	-0.00173
8.8	0.182	42.3	-0.00173
8.9	0.1803	42.4	-0.00173
9.	0.1769	42.5	-0.00173
9.1	0.176	42.6	-0.00259
9.2	0.1725	42.7	-0.00259
9.3	0.1708	42.8	-0.00173
9.4	0.1682	42.9	-0.00173
9.5	0.1656	43.	-0.00173
9.6	0.163	43.1	-0.00173

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.1605	43.2	-0.00173
9.8	0.1587	43.3	-0.00173
9.9	0.157	43.4	-0.00173
10.	0.1544	43.5	-0.00173
10.1	0.1527	43.6	-0.00259
10.2	0.1501	43.7	-0.00259
10.3	0.1475	43.8	-0.00259
10.4	0.1467	43.9	-0.00173
10.5	0.1441	44.	-0.00259
10.6	0.1423	44.1	-0.00259
10.7	0.1415	44.2	-0.00259
10.8	0.1389	44.3	-0.00259
10.9	0.1372	44.4	-0.00259
11.	0.1346	44.5	-0.00259
11.1	0.1329	44.6	-0.00173
11.2	0.1311	44.7	-0.00173
11.3	0.1303	44.8	-0.00173
11.4	0.1285	44.9	-0.00259
11.5	0.126	45.	-0.00173
11.6	0.1242	45.1	-0.00173
11.7	0.1225	45.2	-0.00173
11.8	0.1208	45.3	-0.00173
11.9	0.1208	45.4	-0.00173
12.	0.1199	45.5	-0.00087
12.1	0.1182	45.6	-0.00087
12.2	0.1165	45.7	-0.00087
12.3	0.1139	45.8	-0.00087
12.4	0.113	45.9	-0.00087
12.5	0.1113	46.	-0.00087
12.6	0.1096	46.1	-0.00087
12.7	0.1087	46.2	-0.00087
12.8	0.107	46.3	-0.00087
12.9	0.1052	46.4	-0.00087
13.	0.1044	46.5	0.
13.1	0.1027	46.6	-0.00087
13.2	0.1018	46.7	-0.00087
13.3	0.1001	46.8	-0.00173
13.4	0.09834	46.9	-0.00173
13.5	0.09748	47.	-0.00173
13.6	0.09575	47.1	-0.00087
13.7	0.09489	47.2	-0.00173
13.8	0.0923	47.3	-0.00087
13.9	0.09144	47.4	-0.00087
14.	0.09058	47.5	0.
14.1	0.08972	47.6	-0.00087
14.2	0.08799	47.7	-0.00087
14.3	0.08713	47.8	-0.00087
14.4	0.08626	47.9	0.
14.5	0.0854	48.	-0.00087
14.6	0.08368	48.1	-0.00087
14.7	0.08281	48.2	-0.00087
14.8	0.08109	48.3	-0.00087
14.9	0.08023	48.4	-0.00087
15.	0.0785	48.5	-0.00087
15.1	0.0785	48.6	-0.00087
15.2	0.07678	48.7	-0.00087
15.3	0.07591	48.8	-0.00087
15.4	0.07505	48.9	-0.00087
15.5	0.07419	49.	-0.00087
15.6	0.07332	49.1	-0.00173
15.7	0.0716	49.2	-0.00087
15.8	0.07074	49.3	-0.00173
15.9	0.06987	49.4	-0.00087
16.	0.06901	49.5	-0.00173
16.1	0.06815	49.6	-0.00173
16.2	0.06729	49.7	-0.00173

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.06642	49.8	-0.00087
16.4	0.0647	49.9	-0.00087
16.5	0.0647	50.	-0.00173
16.6	0.06384	50.1	-0.00173
16.7	0.06297	50.2	-0.00259
16.8	0.06125	50.3	-0.00173
16.9	0.06125	50.4	-0.00259
17.	0.06038	50.5	-0.00259
17.1	0.06038	50.6	-0.00173
17.2	0.05866	50.7	-0.00173
17.3	0.0578	50.8	-0.00173
17.4	0.0578	50.9	-0.00259
17.5	0.05693	51.	-0.00259
17.6	0.05607	51.1	-0.00259
17.7	0.05521	51.2	-0.00259
17.8	0.05435	51.3	-0.00259
17.9	0.05435	51.4	-0.00173
18.	0.05348	51.5	-0.00259
18.1	0.05262	51.6	-0.00259
18.2	0.05176	51.7	-0.00259
18.3	0.05176	51.8	-0.00345
18.4	0.05089	51.9	-0.00259
18.5	0.05003	52.	-0.00345
18.6	0.05003	52.1	-0.00259
18.7	0.04917	52.2	-0.00345
18.8	0.04831	52.3	-0.00345
18.9	0.04831	52.4	-0.00345
19.	0.04744	52.5	-0.00259
19.1	0.04658	52.6	-0.00259
19.2	0.04658	52.7	-0.00345
19.3	0.04572	52.8	-0.00345
19.4	0.04486	52.9	-0.00345
19.5	0.04399	53.	-0.00259
19.6	0.04399	53.1	-0.00345
19.7	0.04399	53.2	-0.00345
19.8	0.04313	53.3	-0.00345
19.9	0.04313	53.4	-0.00345
20.	0.04227	53.5	-0.00345
20.1	0.04141	53.6	-0.00345
20.2	0.04141	53.7	-0.00345
20.3	0.04054	53.8	-0.00432
20.4	0.03968	53.9	-0.00345
20.5	0.03968	54.	-0.00432
20.6	0.03882	54.1	-0.00432
20.7	0.03882	54.2	-0.00345
20.8	0.03795	54.3	-0.00432
20.9	0.03709	54.4	-0.00432
21.	0.03709	54.5	-0.00432
21.1	0.03623	54.6	-0.00345
21.2	0.03537	54.7	-0.00432
21.3	0.03537	54.8	-0.00518
21.4	0.0345	54.9	-0.00432
21.5	0.0345	55.	-0.00432
21.6	0.03364	55.1	-0.00432
21.7	0.03364	55.2	-0.00432
21.8	0.03278	55.3	-0.00432
21.9	0.03192	55.4	-0.00432
22.	0.03192	55.5	-0.00432
22.1	0.03105	55.6	-0.00432
22.2	0.03105	55.7	-0.00432
22.3	0.03105	55.8	-0.00432
22.4	0.03019	55.9	-0.00518
22.5	0.02933	56.	-0.00518
22.6	0.02933	56.1	-0.00518
22.7	0.02847	56.2	-0.00518
22.8	0.02847	56.3	-0.00518

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.9	0.0276	56.4	-0.00432
23.	0.02674	56.5	-0.00518
23.1	0.02674	56.6	-0.00518
23.2	0.02674	56.7	-0.00518
23.3	0.02588	56.8	-0.00432
23.4	0.02588	56.9	-0.00518
23.5	0.02588	57.	-0.00432
23.6	0.02588	57.1	-0.00518
23.7	0.02501	57.2	-0.00518
23.8	0.02415	57.3	-0.00432
23.9	0.02415	57.4	-0.00518
24.	0.02329	57.5	-0.00518
24.1	0.02243	57.6	-0.00518
24.2	0.02329	57.7	-0.00518
24.3	0.02243	57.8	-0.00518
24.4	0.02243	57.9	-0.00604
24.5	0.02243	58.	-0.00949
24.6	0.02156	58.1	-0.00604
24.7	0.02156	58.2	-0.00777
24.8	0.0207	58.3	-0.00604
24.9	0.0207	58.4	-0.00604
25.	0.01984	58.5	-0.00604
25.1	0.01984	58.6	-0.00604
25.2	0.01984	58.7	-0.00604
25.3	0.01898	58.8	-0.00604
25.4	0.01898	58.9	-0.00949
25.5	0.01811	59.	-0.0069
25.6	0.01811	59.1	-0.00863
25.7	0.01811	59.2	-0.0069
25.8	0.01811	59.3	-0.00949
25.9	0.01725	59.4	-0.0069
26.	0.01639	59.5	-0.00604
26.1	0.01639	59.6	-0.0069
26.2	0.01639	59.7	-0.00949
26.3	0.01639	59.8	-0.00777
26.4	0.01553	59.9	-0.01208
26.5	0.01553	60.	-0.0069
26.6	0.01466	60.1	-0.0069
26.7	0.01466	60.2	-0.0069
26.8	0.01466	60.3	-0.0069
26.9	0.01553	60.4	-0.01381
27.	0.01466	60.5	-0.00777
27.1	0.0138	60.6	-0.0069
27.2	0.01294	60.7	-0.00777
27.3	0.0138	60.8	-0.00777
27.4	0.01294	60.9	-0.00777
27.5	0.01294	61.	-0.00777
27.6	0.01294	61.1	-0.00777
27.7	0.01207	61.2	-0.0069
27.8	0.01207	61.3	-0.00777
27.9	0.01207	61.4	-0.0069
28.	0.01121	61.5	-0.00863
28.1	0.01121	61.6	-0.00777
28.2	0.01035	61.7	-0.00777
28.3	0.01035	61.8	-0.00777
28.4	0.01035	61.9	-0.00863
28.5	0.01035	62.	-0.00863
28.6	0.01035	62.1	-0.00863
28.7	0.00949	62.2	-0.00863
28.8	0.00862	62.3	-0.00863
28.9	0.00949	62.4	-0.00863
29.	0.00949	62.5	-0.00863
29.1	0.00862	62.6	-0.00777
29.2	0.00862	62.7	-0.00863
29.3	0.00862	62.8	-0.00949
29.4	0.00776	62.9	-0.00863

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
29.5	0.00776	63.	-0.00863
29.6	0.00776	63.1	-0.00863
29.7	0.00776	63.2	-0.00863
29.8	0.00776	63.3	-0.00863
29.9	0.00776	63.4	-0.00949
30.	0.00776	63.5	-0.00949
30.1	0.00776	63.6	-0.00863
30.2	0.0069	63.7	-0.00949
30.3	0.00604	63.8	-0.00863
30.4	0.00604	63.9	-0.00863
30.5	0.00604	64.	-0.00949
30.6	0.00604	64.1	-0.00949
30.7	0.00604	64.2	-0.00863
30.8	0.00517	64.3	-0.00863
30.9	0.00517	64.4	-0.00863
31.	0.00604	64.5	-0.00949
31.1	0.00604	64.6	-0.00949
31.2	0.00517	64.7	-0.00949
31.3	0.00604	64.8	-0.00949
31.4	0.00517	64.9	-0.00949
31.5	0.00517	65.	-0.00949
31.6	0.00431	65.1	-0.00949
31.7	0.00431	65.2	-0.00949
31.8	0.00431	65.3	-0.01036
31.9	0.00517	65.4	-0.00949
32.	0.00517	65.5	-0.00949
32.1	0.00431	65.6	-0.01036
32.2	0.00431	65.7	-0.00949
32.3	0.00431	65.8	-0.00949
32.4	0.00345	65.9	-0.00949
32.5	0.00345	66.	-0.00949
32.6	0.00345	66.1	-0.00949
32.7	0.00258	66.2	-0.00949
32.8	0.00258	66.3	-0.00949
32.9	0.00172	66.4	-0.00949
33.	0.00258	66.5	-0.00949
33.1	0.00258	66.6	-0.00949
33.2	0.00172	66.7	-0.00949
33.3	0.00172	66.8	-0.00949
33.4	0.00172	66.9	-0.00949
33.5	0.00172	67.	-0.00863

SOLUTION

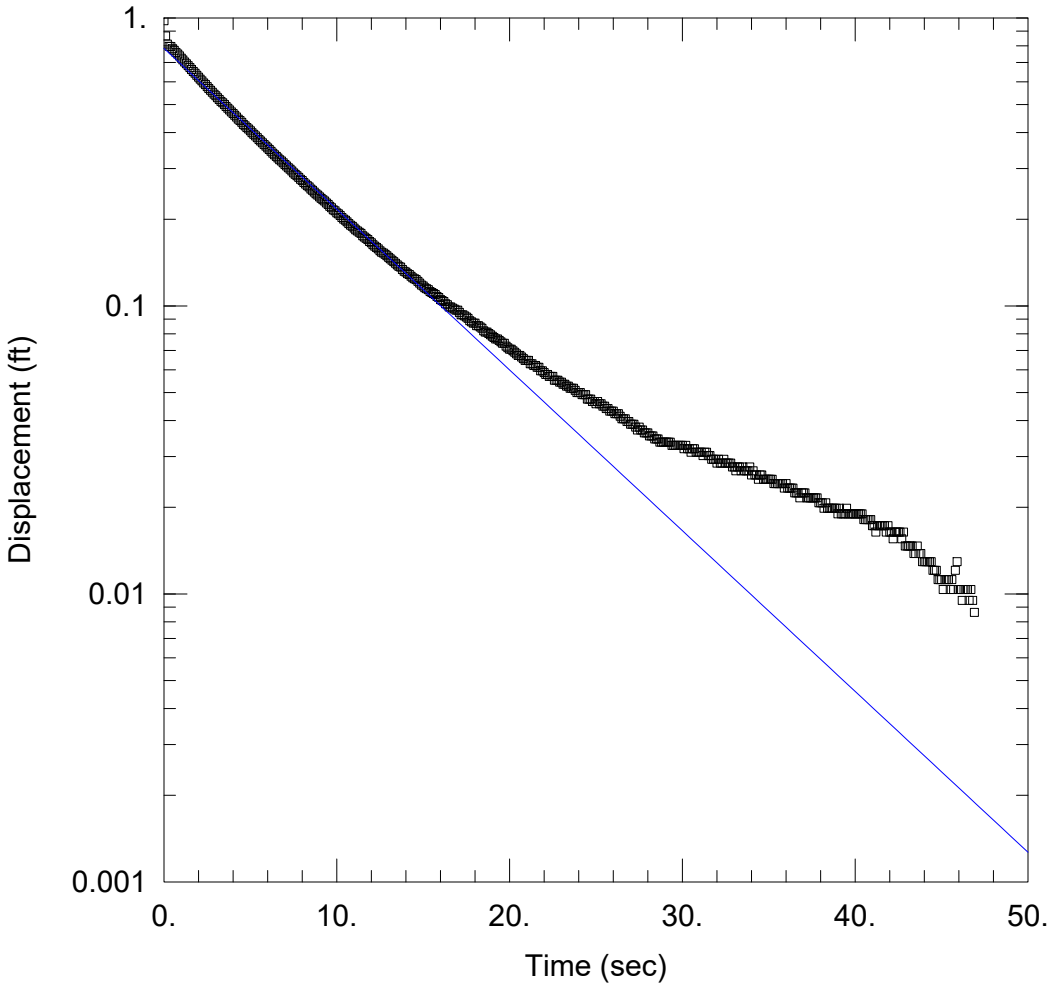
Slug Test
Aquifer Model: Unconfined
Solution Method: Hvorslev
Log Factor: 0.3729

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007572	cm/sec
y0	0.6175	ft

T = K*b = 26.54 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-8A_TEST7.aqt
Date: 01/26/18 Time: 09:06:18

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-8A
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8A)

Initial Displacement: 0.9774 ft
Total Well Penetration Depth: 10.7 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.7 ft
Screen Length: 5. ft
Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.007186 cm/sec y0 = 0.7839 ft

Data Set: Z:\Clients\ENS\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-8A\MW-8A_
Date: 01/26/18
Time: 09:04:23

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-8A

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8A

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.9774 ft
Static Water Column Height: 10.7 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.7 ft

No. of Observations: 469

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.8661	23.6	0.05176
0.2	0.8109	23.7	0.05176
0.3	0.7971	23.8	0.0509
0.4	0.7963	23.9	0.05004
0.5	0.7816	24.	0.05004
0.6	0.7721	24.1	0.05004
0.7	0.7592	24.2	0.04918
0.8	0.7497	24.3	0.04918
0.9	0.7376	24.4	0.04918
1.	0.7247	24.5	0.04745
1.1	0.7152	24.6	0.04745
1.2	0.7031	24.7	0.04745
1.3	0.6936	24.8	0.04659
1.4	0.6824	24.9	0.04659
1.5	0.672	25.	0.04573
1.6	0.6617	25.1	0.04659
1.7	0.6522	25.2	0.04573
1.8	0.6427	25.3	0.04573
1.9	0.6323	25.4	0.04486
2.	0.6229	25.5	0.04486
2.1	0.6134	25.6	0.044
2.2	0.6047	25.7	0.044
2.3	0.5944	25.8	0.04314
2.4	0.5866	25.9	0.04314
2.5	0.5771	26.	0.04314
2.6	0.5685	26.1	0.04227
2.7	0.5607	26.2	0.04227
2.8	0.5521	26.3	0.04227
2.9	0.5435	26.4	0.04141
3.	0.5366	26.5	0.04055

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.5288	26.6	0.04055
3.2	0.5211	26.7	0.04055
3.3	0.5133	26.8	0.03969
3.4	0.5073	26.9	0.03969
3.5	0.5004	27.	0.03882
3.6	0.4926	27.1	0.03882
3.7	0.4857	27.2	0.03882
3.8	0.4788	27.3	0.03796
3.9	0.4719	27.4	0.0371
4.	0.4658	27.5	0.03796
4.1	0.459	27.6	0.0371
4.2	0.4529	27.7	0.0371
4.3	0.4451	27.8	0.03624
4.4	0.44	27.9	0.03624
4.5	0.4339	28.	0.03624
4.6	0.427	28.1	0.03537
4.7	0.4219	28.2	0.03537
4.8	0.4158	28.3	0.03537
4.9	0.4115	28.4	0.03451
5.	0.4055	28.5	0.03451
5.1	0.3994	28.6	0.03451
5.2	0.3942	28.7	0.03365
5.3	0.3891	28.8	0.03365
5.4	0.3839	28.9	0.03365
5.5	0.3779	29.	0.03365
5.6	0.3735	29.1	0.03365
5.7	0.3684	29.2	0.03365
5.8	0.3632	29.3	0.03365
5.9	0.3589	29.4	0.03279
6.	0.3537	29.5	0.03279
6.1	0.3494	29.6	0.03279
6.2	0.3442	29.7	0.03279
6.3	0.339	29.8	0.03279
6.4	0.3347	29.9	0.03279
6.5	0.3304	30.	0.03279
6.6	0.3261	30.1	0.03192
6.7	0.3218	30.2	0.03279
6.8	0.3183	30.3	0.03192
6.9	0.314	30.4	0.03192
7.	0.3097	30.5	0.03106
7.1	0.3063	30.6	0.03192
7.2	0.3019	30.7	0.03192
7.3	0.2985	30.8	0.03106
7.4	0.2942	30.9	0.03106
7.5	0.2899	31.	0.03106
7.6	0.2864	31.1	0.03106
7.7	0.283	31.2	0.0302
7.8	0.2795	31.3	0.03106
7.9	0.2752	31.4	0.03106
8.	0.2726	31.5	0.0302
8.1	0.2683	31.6	0.0302
8.2	0.2648	31.7	0.02933
8.3	0.2614	31.8	0.02933
8.4	0.2588	31.9	0.02933
8.5	0.2545	32.	0.02847
8.6	0.2519	32.1	0.02933
8.7	0.2485	32.2	0.02847
8.8	0.245	32.3	0.02847
8.9	0.2424	32.4	0.02933
9.	0.239	32.5	0.02847
9.1	0.2364	32.6	0.02847
9.2	0.2338	32.7	0.02847
9.3	0.2312	32.8	0.02847
9.4	0.2278	32.9	0.02761
9.5	0.2252	33.	0.02761
9.6	0.2217	33.1	0.02675

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.2191	33.2	0.02761
9.8	0.2157	33.3	0.02761
9.9	0.214	33.4	0.02675
10.	0.2105	33.5	0.02761
10.1	0.2088	33.6	0.02675
10.2	0.2062	33.7	0.02675
10.3	0.2027	33.8	0.02675
10.4	0.2001	33.9	0.02761
10.5	0.1984	34.	0.02588
10.6	0.1958	34.1	0.02675
10.7	0.1932	34.2	0.02588
10.8	0.1907	34.3	0.02588
10.9	0.1889	34.4	0.02502
11.	0.1863	34.5	0.02588
11.1	0.1838	34.6	0.02588
11.2	0.182	34.7	0.02502
11.3	0.1803	34.8	0.02502
11.4	0.1786	34.9	0.02502
11.5	0.1751	35.	0.02502
11.6	0.1734	35.1	0.02502
11.7	0.1717	35.2	0.02502
11.8	0.1699	35.3	0.02416
11.9	0.1674	35.4	0.02416
12.	0.1656	35.5	0.02416
12.1	0.1631	35.6	0.02416
12.2	0.1613	35.7	0.02416
12.3	0.1596	35.8	0.02416
12.4	0.1579	35.9	0.0233
12.5	0.1553	36.	0.02416
12.6	0.1536	36.1	0.0233
12.7	0.1527	36.2	0.0233
12.8	0.151	36.3	0.0233
12.9	0.1492	36.4	0.0233
13.	0.1475	36.5	0.02243
13.1	0.1458	36.6	0.02243
13.2	0.1441	36.7	0.02243
13.3	0.1424	36.8	0.02157
13.4	0.1406	36.9	0.02243
13.5	0.1389	37.	0.02243
13.6	0.1372	37.1	0.02243
13.7	0.1363	37.2	0.02157
13.8	0.1337	37.3	0.02157
13.9	0.132	37.4	0.02157
14.	0.1311	37.5	0.02157
14.1	0.1294	37.6	0.02157
14.2	0.1285	37.7	0.02157
14.3	0.1268	37.8	0.02157
14.4	0.1251	37.9	0.02071
14.5	0.1242	38.	0.02071
14.6	0.1234	38.1	0.02071
14.7	0.1216	38.2	0.01984
14.8	0.1199	38.3	0.02071
14.9	0.1182	38.4	0.01984
15.	0.1173	38.5	0.01984
15.1	0.1156	38.6	0.01984
15.2	0.1147	38.7	0.01984
15.3	0.1139	38.8	0.01984
15.4	0.1122	38.9	0.01984
15.5	0.1113	39.	0.01898
15.6	0.1104	39.1	0.01984
15.7	0.1096	39.2	0.01898
15.8	0.1078	39.3	0.01898
15.9	0.107	39.4	0.01898
16.	0.1053	39.5	0.01984
16.1	0.1044	39.6	0.01898
16.2	0.1035	39.7	0.01898

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.1018	39.8	0.01898
16.4	0.1009	39.9	0.01898
16.5	0.09921	40.	0.01898
16.6	0.09921	40.1	0.01898
16.7	0.09835	40.2	0.01898
16.8	0.09749	40.3	0.01898
16.9	0.09662	40.4	0.01898
17.	0.09662	40.5	0.01812
17.1	0.0949	40.6	0.01812
17.2	0.09317	40.7	0.01812
17.3	0.09317	40.8	0.01812
17.4	0.09231	40.9	0.01812
17.5	0.09145	41.	0.01726
17.6	0.09058	41.1	0.01726
17.7	0.08886	41.2	0.01639
17.8	0.088	41.3	0.01726
17.9	0.08713	41.4	0.01726
18.	0.08713	41.5	0.01726
18.1	0.08541	41.6	0.01726
18.2	0.08541	41.7	0.01726
18.3	0.08455	41.8	0.01639
18.4	0.08368	41.9	0.01726
18.5	0.08196	42.	0.01639
18.6	0.0811	42.1	0.01639
18.7	0.0811	42.2	0.01553
18.8	0.08023	42.3	0.01639
18.9	0.07937	42.4	0.01639
19.	0.07851	42.5	0.01639
19.1	0.07764	42.6	0.01639
19.2	0.07678	42.7	0.01553
19.3	0.07678	42.8	0.01639
19.4	0.07592	42.9	0.01467
19.5	0.07506	43.	0.01467
19.6	0.07419	43.1	0.01467
19.7	0.07419	43.2	0.01467
19.8	0.07247	43.3	0.01467
19.9	0.07161	43.4	0.01381
20.	0.07074	43.5	0.01381
20.1	0.07074	43.6	0.01467
20.2	0.06988	43.7	0.01381
20.3	0.06902	43.8	0.01381
20.4	0.06815	43.9	0.01294
20.5	0.06729	44.	0.01294
20.6	0.06729	44.1	0.01294
20.7	0.06643	44.2	0.01294
20.8	0.06557	44.3	0.01294
20.9	0.0647	44.4	0.01294
21.	0.0647	44.5	0.01208
21.1	0.0647	44.6	0.01208
21.2	0.06298	44.7	0.01208
21.3	0.06298	44.8	0.01122
21.4	0.06212	44.9	0.01122
21.5	0.06212	45.	0.01122
21.6	0.06125	45.1	0.01036
21.7	0.06125	45.2	0.01122
21.8	0.05953	45.3	0.01122
21.9	0.05953	45.4	0.01122
22.	0.05867	45.5	0.01036
22.1	0.0578	45.6	0.01122
22.2	0.0578	45.7	0.01036
22.3	0.05694	45.8	0.01208
22.4	0.05694	45.9	0.01294
22.5	0.05694	46.	0.01036
22.6	0.05521	46.1	0.01036
22.7	0.05521	46.2	0.00949
22.8	0.05521	46.3	0.01036

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.9	0.05435	46.4	0.01036
23.	0.05435	46.5	0.01036
23.1	0.05349	46.6	0.00949
23.2	0.05349	46.7	0.01036
23.3	0.05263	46.8	0.00949
23.4	0.05263	46.9	0.00863
23.5	0.05176		

SOLUTION

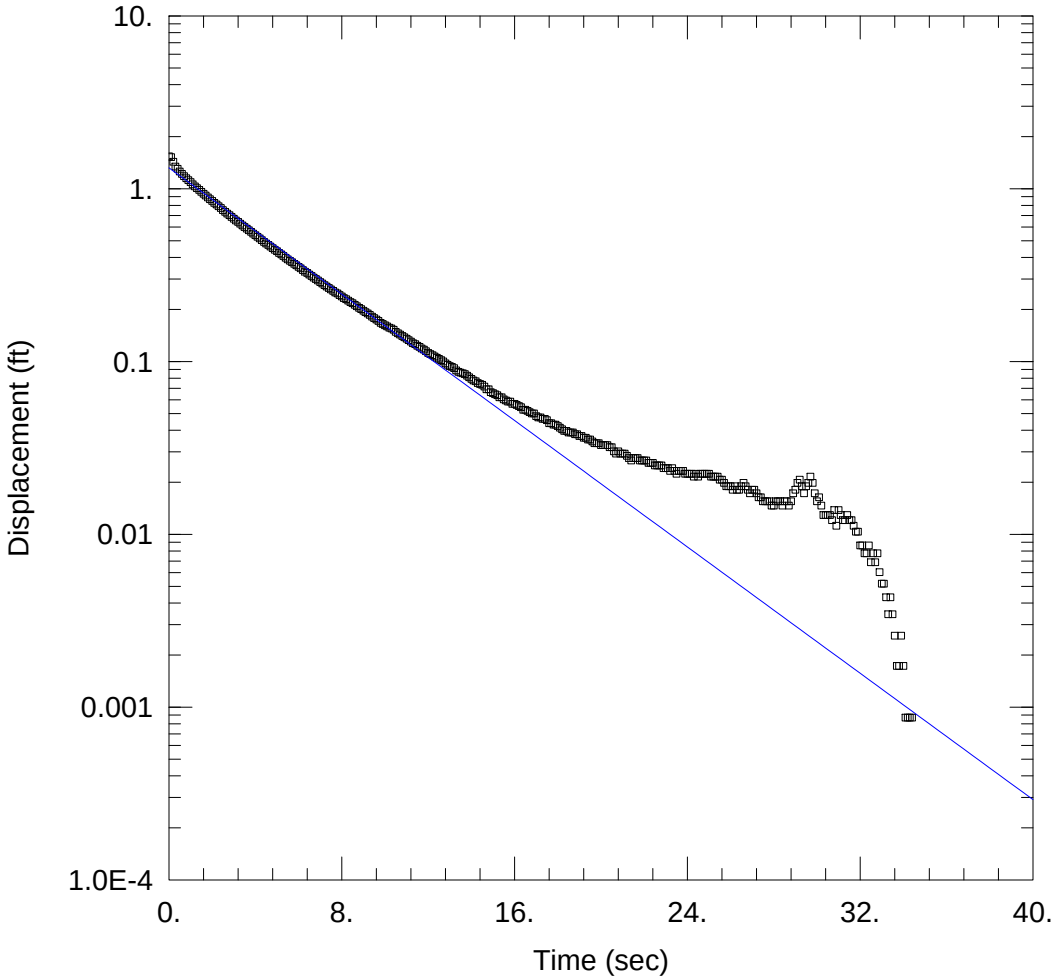
Slug Test
Aquifer Model: Unconfined
Solution Method: Hvorslev
Log Factor: 0.3729

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007186	cm/sec
y0	0.7839	ft

$T = K*b = 25.19$ cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-10_TEST1.aqt
Date: 11/04/15 Time: 09:03:07

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-10
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 1.541 ft Static Water Column Height: 10.25 ft
Total Well Penetration Depth: 10.25 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.007573 cm/sec y0 = 1.32 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-10\MW-10_TES
Date: 11/04/15
Time: 09:03:25

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-10

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.541 ft
Static Water Column Height: 10.25 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.25 ft

No. of Observations: 691

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	1.524	34.7	-0.00086
0.2	1.433	34.8	-0.00172
0.3	1.343	34.9	-0.00172
0.4	1.304	35.	-0.00258
0.5	1.259	35.1	-0.00172
0.6	1.217	35.2	-0.00258
0.7	1.181	35.3	-0.00345
0.8	1.149	35.4	-0.00345
0.9	1.12	35.5	-0.00258
1.	1.093	35.6	-0.00345
1.1	1.06	35.7	-0.00431
1.2	1.032	35.8	-0.00431
1.3	1.008	35.9	-0.00345
1.4	0.9843	36.	-0.00345
1.5	0.9602	36.1	-0.00431
1.6	0.9343	36.2	-0.00517
1.7	0.9127	36.3	-0.00517
1.8	0.8912	36.4	-0.00517
1.9	0.8704	36.5	-0.00517
2.	0.8497	36.6	-0.00431
2.1	0.8282	36.7	-0.00431
2.2	0.8101	36.8	-0.00431
2.3	0.7911	36.9	-0.00431
2.4	0.773	37.	-0.00517
2.5	0.7523	37.1	-0.00604
2.6	0.735	37.2	-0.0069
2.7	0.7178	168.4	-0.1225
2.8	0.7022	168.5	-0.1234
2.9	0.6858	168.6	-0.1242
3.	0.6703	168.7	-0.1242

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.6556	168.8	-0.1242
3.2	0.6418	168.9	-0.1251
3.3	0.628	169.	-0.1251
3.4	0.6134	169.1	-0.126
3.5	0.5996	169.2	-0.126
3.6	0.5875	169.3	-0.126
3.7	0.5754	169.4	-0.126
3.8	0.5625	169.5	-0.1268
3.9	0.5504	169.6	-0.1268
4.	0.5383	169.7	-0.1268
4.1	0.5271	169.8	-0.1277
4.2	0.5159	169.9	-0.1277
4.3	0.5038	170.	-0.1277
4.4	0.4926	170.1	-0.1277
4.5	0.4822	170.2	-0.1277
4.6	0.4728	170.3	-0.1285
4.7	0.4624	170.4	-0.1277
4.8	0.4529	170.5	-0.1277
4.9	0.4434	170.6	-0.1277
5.	0.4348	170.7	-0.1285
5.1	0.4244	170.8	-0.1285
5.2	0.4167	170.9	-0.1277
5.3	0.4081	171.	-0.1285
5.4	0.3986	171.1	-0.1285
5.5	0.3899	171.2	-0.1285
5.6	0.383	171.3	-0.1285
5.7	0.3753	171.4	-0.1285
5.8	0.3675	171.5	-0.1285
5.9	0.3606	171.6	-0.1285
6.	0.3528	171.7	-0.1285
6.1	0.3459	171.8	-0.1294
6.2	0.3382	171.9	-0.1285
6.3	0.3313	172.	-0.1285
6.4	0.3252	172.1	-0.1294
6.5	0.3183	172.2	-0.1285
6.6	0.3123	172.3	-0.1294
6.7	0.3063	172.4	-0.1303
6.8	0.3002	172.5	-0.1285
6.9	0.2942	172.6	-0.1303
7.	0.2881	172.7	-0.1294
7.1	0.283	172.8	-0.1303
7.2	0.2769	172.9	-0.1303
7.3	0.2717	173.	-0.1311
7.4	0.2666	173.1	-0.1303
7.5	0.2614	173.2	-0.1311
7.6	0.2562	173.3	-0.1311
7.7	0.251	173.4	-0.1311
7.8	0.2476	173.5	-0.1311
7.9	0.2424	173.6	-0.1311
8.	0.2381	173.7	-0.1311
8.1	0.2329	173.8	-0.1311
8.2	0.2295	173.9	-0.132
8.3	0.2252	174.	-0.132
8.4	0.2208	174.1	-0.132
8.5	0.2174	174.2	-0.132
8.6	0.2131	174.3	-0.132
8.7	0.2088	174.4	-0.132
8.8	0.2045	174.5	-0.1311
8.9	0.201	174.6	-0.1329
9.	0.1967	174.7	-0.1311
9.1	0.1932	174.8	-0.132
9.2	0.1898	174.9	-0.1311
9.3	0.1863	175.	-0.1329
9.4	0.182	175.1	-0.132
9.5	0.1786	175.2	-0.132
9.6	0.1751	175.3	-0.1329

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.1717	175.4	-0.132
9.8	0.1674	175.5	-0.132
9.9	0.1648	175.6	-0.1329
10.	0.1622	175.7	-0.1329
10.1	0.1596	175.8	-0.1329
10.2	0.157	175.9	-0.1329
10.3	0.1553	176.	-0.1329
10.4	0.1527	176.1	-0.1329
10.5	0.1484	176.2	-0.1337
10.6	0.1458	176.3	-0.1337
10.7	0.1432	176.4	-0.1337
10.8	0.1406	176.5	-0.1337
10.9	0.138	176.6	-0.1346
11.	0.1354	176.7	-0.1337
11.1	0.1329	176.8	-0.1346
11.2	0.1303	176.9	-0.1346
11.3	0.1277	177.	-0.1346
11.4	0.126	177.1	-0.1346
11.5	0.1234	177.2	-0.1354
11.6	0.1216	177.3	-0.1354
11.7	0.1191	177.4	-0.1354
11.8	0.1173	177.5	-0.1354
11.9	0.1147	177.6	-0.1354
12.	0.1122	177.7	-0.1354
12.1	0.1104	177.8	-0.1354
12.2	0.1087	177.9	-0.1372
12.3	0.107	178.	-0.1363
12.4	0.1053	178.1	-0.1363
12.5	0.1035	178.2	-0.1363
12.6	0.1018	178.3	-0.1363
12.7	0.1001	178.4	-0.1363
12.8	0.09749	178.5	-0.1363
12.9	0.09576	178.6	-0.1363
13.	0.09404	178.7	-0.1363
13.1	0.09317	178.8	-0.1363
13.2	0.09145	178.9	-0.1363
13.3	0.08886	179.	-0.1372
13.4	0.08713	179.1	-0.1363
13.5	0.08627	179.2	-0.1363
13.6	0.08541	179.3	-0.1372
13.7	0.08455	179.4	-0.1372
13.8	0.08282	179.5	-0.1363
13.9	0.0811	179.6	-0.1363
14.	0.07937	179.7	-0.1372
14.1	0.07764	179.8	-0.1372
14.2	0.07678	179.9	-0.1372
14.3	0.07506	180.	-0.1363
14.4	0.07419	180.1	-0.1363
14.5	0.07333	180.2	-0.1372
14.6	0.07161	180.3	-0.1363
14.7	0.06902	180.4	-0.1372
14.8	0.06902	180.5	-0.1372
14.9	0.06643	180.6	-0.1372
15.	0.06557	180.7	-0.1372
15.1	0.0647	180.8	-0.1372
15.2	0.06384	180.9	-0.1372
15.3	0.06212	181.	-0.1372
15.4	0.06212	181.1	-0.1372
15.5	0.06039	181.2	-0.138
15.6	0.05953	181.3	-0.138
15.7	0.05867	181.4	-0.1389
15.8	0.05867	181.5	-0.138
15.9	0.05694	181.6	-0.138
16.	0.05694	181.7	-0.1389
16.1	0.05608	181.8	-0.1389
16.2	0.05521	181.9	-0.1389

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.05435	182.	-0.1398
16.4	0.05263	182.1	-0.1398
16.5	0.05263	182.2	-0.1398
16.6	0.05176	182.3	-0.1398
16.7	0.0509	182.4	-0.1406
16.8	0.05004	182.5	-0.1398
16.9	0.05004	182.6	-0.1406
17.	0.04831	182.7	-0.1398
17.1	0.04745	182.8	-0.1415
17.2	0.04745	182.9	-0.1406
17.3	0.04659	183.	-0.1406
17.4	0.04659	183.1	-0.1406
17.5	0.04573	183.2	-0.1415
17.6	0.044	183.3	-0.1406
17.7	0.044	183.4	-0.1406
17.8	0.04314	183.5	-0.1406
17.9	0.04314	183.6	-0.1415
18.	0.04227	183.7	-0.1415
18.1	0.04141	183.8	-0.1406
18.2	0.04055	183.9	-0.1406
18.3	0.03969	184.	-0.1406
18.4	0.03969	184.1	-0.1406
18.5	0.03882	184.2	-0.1415
18.6	0.03882	184.3	-0.1406
18.7	0.03882	184.4	-0.1406
18.8	0.03796	184.5	-0.1415
18.9	0.03796	184.6	-0.1398
19.	0.0371	184.7	-0.1406
19.1	0.0371	184.8	-0.1406
19.2	0.03624	184.9	-0.1406
19.3	0.03624	185.	-0.1406
19.4	0.03537	185.1	-0.1406
19.5	0.03537	185.2	-0.1406
19.6	0.03451	185.3	-0.1398
19.7	0.03365	185.4	-0.1406
19.8	0.03365	185.5	-0.1398
19.9	0.03365	185.6	-0.1398
20.	0.03279	185.7	-0.1398
20.1	0.03279	185.8	-0.1398
20.2	0.03279	185.9	-0.1389
20.3	0.03279	186.	-0.1389
20.4	0.03192	186.1	-0.1389
20.5	0.03192	186.2	-0.1389
20.6	0.0302	186.3	-0.1389
20.7	0.02933	186.4	-0.1389
20.8	0.0302	186.5	-0.138
20.9	0.02933	186.6	-0.138
21.	0.02933	186.7	-0.138
21.1	0.02933	186.8	-0.138
21.2	0.02847	186.9	-0.138
21.3	0.02761	187.	-0.138
21.4	0.02675	187.1	-0.138
21.5	0.02761	187.2	-0.1389
21.6	0.02761	187.3	-0.138
21.7	0.02761	187.4	-0.1389
21.8	0.02675	187.5	-0.1389
21.9	0.02675	187.6	-0.1389
22.	0.02675	187.7	-0.1389
22.1	0.02675	187.8	-0.1398
22.2	0.02588	187.9	-0.1398
22.3	0.02588	188.	-0.1398
22.4	0.02588	188.1	-0.1398
22.5	0.02502	188.2	-0.1398
22.6	0.02502	188.3	-0.1406
22.7	0.02502	188.4	-0.1406
22.8	0.02502	188.5	-0.1415

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.9	0.02416	188.6	-0.1415
23.	0.02416	188.7	-0.1406
23.1	0.02416	188.8	-0.1415
23.2	0.0233	188.9	-0.1415
23.3	0.02416	189.	-0.1415
23.4	0.0233	189.1	-0.1415
23.5	0.02243	189.2	-0.1423
23.6	0.0233	189.3	-0.1415
23.7	0.0233	189.4	-0.1423
23.8	0.0233	189.5	-0.1423
23.9	0.02243	189.6	-0.1423
24.	0.02243	189.7	-0.1423
24.1	0.02243	189.8	-0.1432
24.2	0.02243	189.9	-0.1432
24.3	0.02157	190.	-0.1432
24.4	0.02243	190.1	-0.1441
24.5	0.02157	190.2	-0.1441
24.6	0.02243	190.3	-0.1449
24.7	0.02243	190.4	-0.1441
24.8	0.02243	190.5	-0.1449
24.9	0.02243	190.6	-0.1458
25.	0.02243	190.7	-0.1449
25.1	0.02157	190.8	-0.1449
25.2	0.02157	190.9	-0.1449
25.3	0.02157	191.	-0.1449
25.4	0.02157	191.1	-0.1449
25.5	0.02071	191.2	-0.1449
25.6	0.02071	191.3	-0.1449
25.7	0.01984	191.4	-0.1441
25.8	0.01898	191.5	-0.1449
25.9	0.01898	191.6	-0.1441
26.	0.01898	191.7	-0.1441
26.1	0.01812	191.8	-0.1441
26.2	0.01898	191.9	-0.1432
26.3	0.01812	192.	-0.1432
26.4	0.01812	192.1	-0.1423
26.5	0.01898	192.2	-0.1406
26.6	0.01984	192.3	-0.1415
26.7	0.01898	192.4	-0.1415
26.8	0.01812	192.5	-0.1423
26.9	0.01726	192.6	-0.1415
27.	0.01812	192.7	-0.1415
27.1	0.01812	192.8	-0.1406
27.2	0.01726	192.9	-0.1398
27.3	0.01639	193.	-0.1398
27.4	0.01639	193.1	-0.1398
27.5	0.01553	193.2	-0.1389
27.6	0.01553	193.3	-0.1372
27.7	0.01553	193.4	-0.1372
27.8	0.01553	193.5	-0.138
27.9	0.01467	193.6	-0.1389
28.	0.01467	193.7	-0.1389
28.1	0.01553	193.8	-0.138
28.2	0.01553	193.9	-0.1372
28.3	0.01553	194.	-0.1372
28.4	0.01467	194.1	-0.1389
28.5	0.01553	194.2	-0.1398
28.6	0.01553	194.3	-0.1406
28.7	0.01467	194.4	-0.1415
28.8	0.01553	194.5	-0.138
28.9	0.01726	194.6	-0.1363
29.	0.01812	194.7	-0.138
29.1	0.01984	194.8	-0.1423
29.2	0.02071	194.9	-0.1441
29.3	0.01898	195.	-0.1441
29.4	0.01726	195.1	-0.1432

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
29.5	0.01898	195.2	-0.1441
29.6	0.01984	195.3	-0.1441
29.7	0.02157	195.4	-0.1441
29.8	0.01984	195.5	-0.1441
29.9	0.01726	195.6	-0.1458
30.	0.01553	195.7	-0.1467
30.1	0.01639	195.8	-0.1475
30.2	0.01467	195.9	-0.1475
30.3	0.01294	196.	-0.1475
30.4	0.01294	196.1	-0.1475
30.5	0.01294	196.2	-0.1484
30.6	0.01294	196.3	-0.1492
30.7	0.01208	196.4	-0.1501
30.8	0.01381	196.5	-0.1501
30.9	0.01122	196.6	-0.151
31.	0.01381	196.7	-0.1501
31.1	0.01294	196.8	-0.1492
31.2	0.01208	196.9	-0.1492
31.3	0.01208	197.	-0.1501
31.4	0.01294	197.1	-0.151
31.5	0.01208	197.2	-0.151
31.6	0.01208	197.3	-0.1518
31.7	0.01122	197.4	-0.1518
31.8	0.01036	197.5	-0.1527
31.9	0.01036	197.6	-0.1535
32.	0.00863	197.7	-0.1535
32.1	0.00863	197.8	-0.1535
32.2	0.00777	197.9	-0.1544
32.3	0.00777	198.	-0.1535
32.4	0.00863	198.1	-0.1544
32.5	0.0069	198.2	-0.1544
32.6	0.00777	198.3	-0.1553
32.7	0.0069	198.4	-0.1553
32.8	0.00777	198.5	-0.1553
32.9	0.00604	198.6	-0.1553
33.	0.00518	198.7	-0.1553
33.1	0.00518	198.8	-0.1561
33.2	0.00432	198.9	-0.157
33.3	0.00345	199.	-0.157
33.4	0.00432	199.1	-0.1561
33.5	0.00345	199.2	-0.157
33.6	0.00259	199.3	-0.157
33.7	0.00173	199.4	-0.1579
33.8	0.00173	199.5	-0.157
33.9	0.00259	199.6	-0.1579
34.	0.00173	199.7	-0.1579
34.1	0.00087	199.8	-0.1579
34.2	0.00087	199.9	-0.1579
34.3	0.00087	200.	-0.157
34.4	0.00087	200.1	-0.1579
34.5	-0.00086	200.2	-0.1596
34.6	0.		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.727

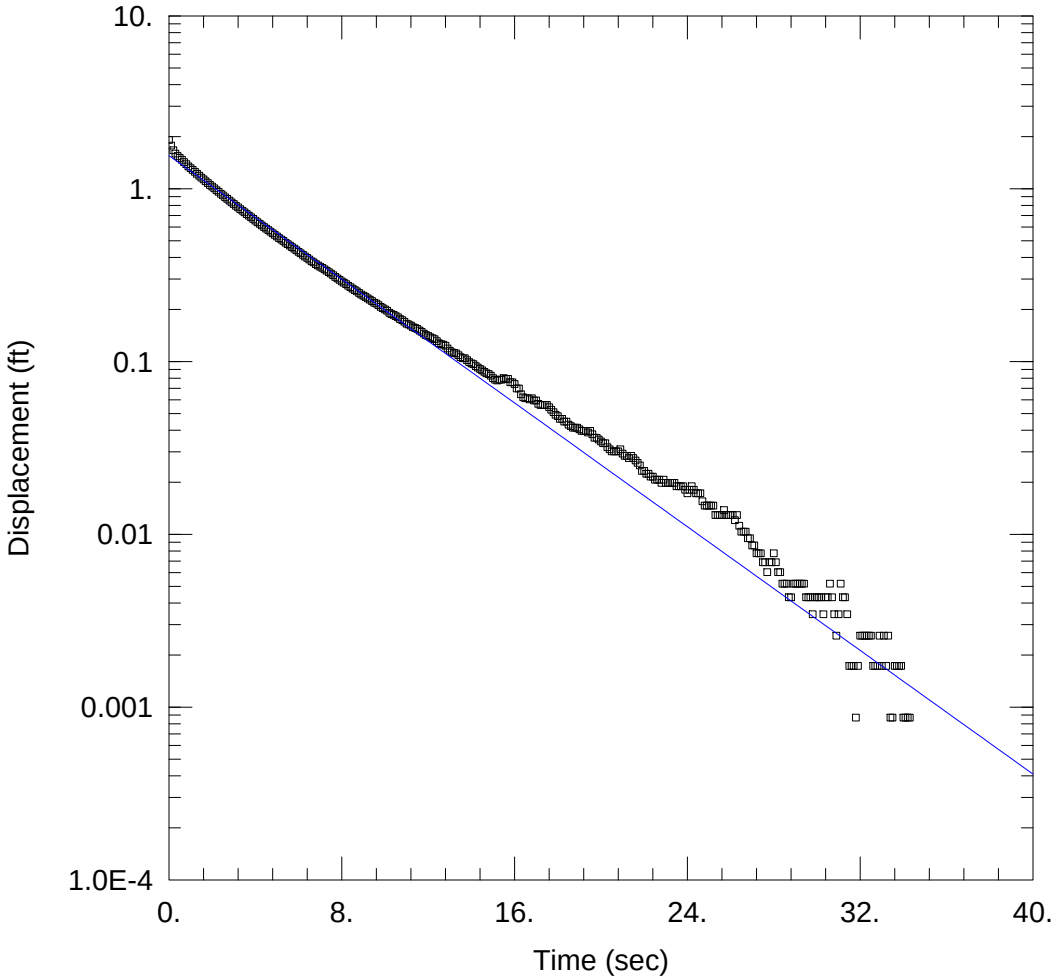
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007573	cm/sec

y0	1.32	ft

T = K*b = 26.55 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-10_TEST2.aqt
Date: 11/09/15 Time: 09:41:02

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-10
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 1.913 ft Static Water Column Height: 10.25 ft
Total Well Penetration Depth: 10.25 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.007414 cm/sec y0 = 1.555 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-10\MW-10_TES
Date: 11/09/15
Time: 09:41:16

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-10

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.913 ft
Static Water Column Height: 10.25 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.25 ft

No. of Observations: 346

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	1.775	17.4	0.05608
0.2	1.668	17.5	0.05608
0.3	1.595	17.6	0.05435
0.4	1.548	17.7	0.05263
0.5	1.509	17.8	0.0509
0.6	1.47	17.9	0.04918
0.7	1.425	18.	0.04831
0.8	1.386	18.1	0.04659
0.9	1.348	18.2	0.04659
1.	1.316	18.3	0.04486
1.1	1.284	18.4	0.04486
1.2	1.252	18.5	0.04314
1.3	1.22	18.6	0.04227
1.4	1.189	18.7	0.04141
1.5	1.159	18.8	0.04141
1.6	1.132	18.9	0.04141
1.7	1.104	19.	0.04055
1.8	1.077	19.1	0.03969
1.9	1.052	19.2	0.03969
2.	1.029	19.3	0.03969
2.1	1.005	19.4	0.03882
2.2	0.9809	19.5	0.03969
2.3	0.9584	19.6	0.03796
2.4	0.936	19.7	0.03624
2.5	0.9144	19.8	0.03624
2.6	0.8929	19.9	0.03537
2.7	0.873	20.	0.03451
2.8	0.8532	20.1	0.03365
2.9	0.8342	20.2	0.03365
3.	0.8161	20.3	0.03192

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.7971	20.4	0.03106
3.2	0.7799	20.5	0.0302
3.3	0.7626	20.6	0.0302
3.4	0.7462	20.7	0.0302
3.5	0.7298	20.8	0.0302
3.6	0.7134	20.9	0.03106
3.7	0.6988	21.	0.02933
3.8	0.6833	21.1	0.02847
3.9	0.6686	21.2	0.02847
4.	0.6539	21.3	0.02761
4.1	0.6401	21.4	0.02847
4.2	0.6263	21.5	0.02761
4.3	0.6125	21.6	0.02675
4.4	0.5996	21.7	0.02588
4.5	0.5875	21.8	0.02502
4.6	0.5763	21.9	0.0233
4.7	0.5642	22.	0.0233
4.8	0.5521	22.1	0.02243
4.9	0.5409	22.2	0.02243
5.	0.5297	22.3	0.02157
5.1	0.5185	22.4	0.02157
5.2	0.5081	22.5	0.02071
5.3	0.4986	22.6	0.02071
5.4	0.4874	22.7	0.02071
5.5	0.4779	22.8	0.01984
5.6	0.4684	22.9	0.02071
5.7	0.459	23.	0.01984
5.8	0.4503	23.1	0.01984
5.9	0.4408	23.2	0.01984
6.	0.4313	23.3	0.01984
6.1	0.4227	23.4	0.01984
6.2	0.4141	23.5	0.01898
6.3	0.4055	23.6	0.01898
6.4	0.3977	23.7	0.01898
6.5	0.3891	23.8	0.01898
6.6	0.3805	23.9	0.01812
6.7	0.3744	24.	0.01726
6.8	0.3658	24.1	0.01812
6.9	0.3597	24.2	0.01898
7.	0.3537	24.3	0.01812
7.1	0.3485	24.4	0.01726
7.2	0.3416	24.5	0.01726
7.3	0.3356	24.6	0.01726
7.4	0.3287	24.7	0.01553
7.5	0.3226	24.8	0.01467
7.6	0.3157	24.9	0.01467
7.7	0.3088	25.	0.01467
7.8	0.3028	25.1	0.01467
7.9	0.2968	25.2	0.01467
8.	0.2907	25.3	0.01294
8.1	0.2856	25.4	0.01294
8.2	0.2804	25.5	0.01294
8.3	0.2743	25.6	0.01294
8.4	0.2692	25.7	0.01381
8.5	0.264	25.8	0.01294
8.6	0.2588	25.9	0.01294
8.7	0.2545	26.	0.01294
8.8	0.2493	26.1	0.01294
8.9	0.2441	26.2	0.01208
9.	0.2407	26.3	0.01294
9.1	0.2364	26.4	0.01122
9.2	0.2321	26.5	0.01036
9.3	0.2278	26.6	0.01036
9.4	0.2234	26.7	0.01036
9.5	0.2191	26.8	0.00949
9.6	0.2165	26.9	0.00949

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.2122	27.	0.00863
9.8	0.2071	27.1	0.00863
9.9	0.2036	27.2	0.00777
10.	0.2001	27.3	0.00777
10.1	0.1967	27.4	0.00777
10.2	0.1915	27.5	0.0069
10.3	0.1881	27.6	0.0069
10.4	0.1863	27.7	0.00604
10.5	0.1829	27.8	0.0069
10.6	0.1803	27.9	0.0069
10.7	0.176	28.	0.00777
10.8	0.1734	28.1	0.0069
10.9	0.1699	28.2	0.00604
11.	0.1656	28.3	0.00604
11.1	0.1639	28.4	0.00518
11.2	0.1613	28.5	0.00518
11.3	0.1579	28.6	0.00518
11.4	0.1562	28.7	0.00432
11.5	0.1544	28.8	0.00432
11.6	0.151	28.9	0.00518
11.7	0.1484	29.	0.00518
11.8	0.1449	29.1	0.00518
11.9	0.1424	29.2	0.00518
12.	0.1406	29.3	0.00518
12.1	0.138	29.4	0.00518
12.2	0.1363	29.5	0.00432
12.3	0.1346	29.6	0.00432
12.4	0.1311	29.7	0.00432
12.5	0.1277	29.8	0.00345
12.6	0.126	29.9	0.00432
12.7	0.1251	30.	0.00432
12.8	0.1234	30.1	0.00432
12.9	0.1191	30.2	0.00432
13.	0.1156	30.3	0.00345
13.1	0.113	30.4	0.00432
13.2	0.1122	30.5	0.00432
13.3	0.1113	30.6	0.00518
13.4	0.1087	30.7	0.00432
13.5	0.1061	30.8	0.00345
13.6	0.1044	30.9	0.00259
13.7	0.1044	31.	0.00345
13.8	0.1018	31.1	0.00518
13.9	0.09921	31.2	0.00432
14.	0.09749	31.3	0.00432
14.1	0.09662	31.4	0.00345
14.2	0.09404	31.5	0.00173
14.3	0.09231	31.6	0.00173
14.4	0.09058	31.7	0.00173
14.5	0.08886	31.8	0.00087
14.6	0.08713	31.9	0.00173
14.7	0.08541	32.	0.00259
14.8	0.08455	32.1	0.00259
14.9	0.08282	32.2	0.00259
15.	0.08023	32.3	0.00259
15.1	0.07851	32.4	0.00259
15.2	0.07764	32.5	0.00259
15.3	0.07851	32.6	0.00173
15.4	0.07851	32.7	0.00173
15.5	0.08023	32.8	0.00173
15.6	0.07937	32.9	0.00259
15.7	0.07937	33.	0.00173
15.8	0.07592	33.1	0.00259
15.9	0.07592	33.2	0.00173
16.	0.07419	33.3	0.00259
16.1	0.06988	33.4	0.00087
16.2	0.06988	33.5	0.00087

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.0647	33.6	0.00173
16.4	0.06212	33.7	0.00173
16.5	0.06125	33.8	0.00173
16.6	0.06125	33.9	0.00173
16.7	0.06039	34.	0.00087
16.8	0.06125	34.1	0.00087
16.9	0.05953	34.2	0.00087
17.	0.05953	34.3	0.00087
17.1	0.05694	34.4	0.
17.2	0.05608	34.5	0.
17.3	0.05608	34.6	-0.00086

SOLUTION

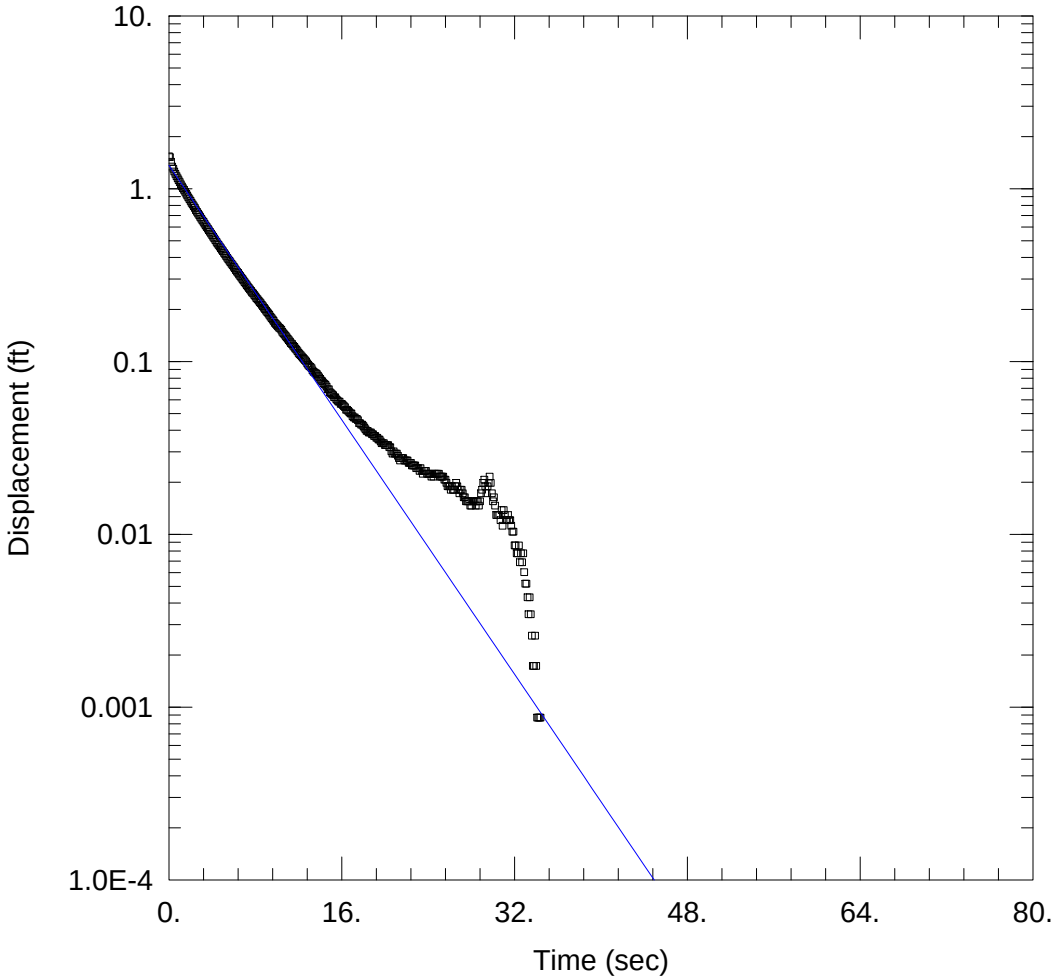
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.727

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007414	cm/sec
y0	1.555	ft

$T = K*b = 25.99$ cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-10_TEST3.aqt
Date: 11/09/15 Time: 09:42:38

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-10
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 1.541 ft Static Water Column Height: 10.25 ft
Total Well Penetration Depth: 10.25 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.007625 cm/sec y0 = 1.363 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-10\MW-10_TES
Date: 11/09/15
Time: 09:42:53

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-10

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.541 ft
Static Water Column Height: 10.25 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.25 ft

No. of Observations: 691

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	1.524	34.7	-0.00086
0.2	1.433	34.8	-0.00172
0.3	1.343	34.9	-0.00172
0.4	1.304	35.	-0.00258
0.5	1.259	35.1	-0.00172
0.6	1.217	35.2	-0.00258
0.7	1.181	35.3	-0.00345
0.8	1.149	35.4	-0.00345
0.9	1.12	35.5	-0.00258
1.	1.093	35.6	-0.00345
1.1	1.06	35.7	-0.00431
1.2	1.032	35.8	-0.00431
1.3	1.008	35.9	-0.00345
1.4	0.9843	36.	-0.00345
1.5	0.9602	36.1	-0.00431
1.6	0.9343	36.2	-0.00517
1.7	0.9127	36.3	-0.00517
1.8	0.8912	36.4	-0.00517
1.9	0.8704	36.5	-0.00517
2.	0.8497	36.6	-0.00431
2.1	0.8282	36.7	-0.00431
2.2	0.8101	36.8	-0.00431
2.3	0.7911	36.9	-0.00431
2.4	0.773	37.	-0.00517
2.5	0.7523	37.1	-0.00604
2.6	0.735	37.2	-0.0069
2.7	0.7178	168.4	-0.1225
2.8	0.7022	168.5	-0.1234
2.9	0.6858	168.6	-0.1242
3.	0.6703	168.7	-0.1242

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.6556	168.8	-0.1242
3.2	0.6418	168.9	-0.1251
3.3	0.628	169.	-0.1251
3.4	0.6134	169.1	-0.126
3.5	0.5996	169.2	-0.126
3.6	0.5875	169.3	-0.126
3.7	0.5754	169.4	-0.126
3.8	0.5625	169.5	-0.1268
3.9	0.5504	169.6	-0.1268
4.	0.5383	169.7	-0.1268
4.1	0.5271	169.8	-0.1277
4.2	0.5159	169.9	-0.1277
4.3	0.5038	170.	-0.1277
4.4	0.4926	170.1	-0.1277
4.5	0.4822	170.2	-0.1277
4.6	0.4728	170.3	-0.1285
4.7	0.4624	170.4	-0.1277
4.8	0.4529	170.5	-0.1277
4.9	0.4434	170.6	-0.1277
5.	0.4348	170.7	-0.1285
5.1	0.4244	170.8	-0.1285
5.2	0.4167	170.9	-0.1277
5.3	0.4081	171.	-0.1285
5.4	0.3986	171.1	-0.1285
5.5	0.3899	171.2	-0.1285
5.6	0.383	171.3	-0.1285
5.7	0.3753	171.4	-0.1285
5.8	0.3675	171.5	-0.1285
5.9	0.3606	171.6	-0.1285
6.	0.3528	171.7	-0.1285
6.1	0.3459	171.8	-0.1294
6.2	0.3382	171.9	-0.1285
6.3	0.3313	172.	-0.1285
6.4	0.3252	172.1	-0.1294
6.5	0.3183	172.2	-0.1285
6.6	0.3123	172.3	-0.1294
6.7	0.3063	172.4	-0.1303
6.8	0.3002	172.5	-0.1285
6.9	0.2942	172.6	-0.1303
7.	0.2881	172.7	-0.1294
7.1	0.283	172.8	-0.1303
7.2	0.2769	172.9	-0.1303
7.3	0.2717	173.	-0.1311
7.4	0.2666	173.1	-0.1303
7.5	0.2614	173.2	-0.1311
7.6	0.2562	173.3	-0.1311
7.7	0.251	173.4	-0.1311
7.8	0.2476	173.5	-0.1311
7.9	0.2424	173.6	-0.1311
8.	0.2381	173.7	-0.1311
8.1	0.2329	173.8	-0.1311
8.2	0.2295	173.9	-0.132
8.3	0.2252	174.	-0.132
8.4	0.2208	174.1	-0.132
8.5	0.2174	174.2	-0.132
8.6	0.2131	174.3	-0.132
8.7	0.2088	174.4	-0.132
8.8	0.2045	174.5	-0.1311
8.9	0.201	174.6	-0.1329
9.	0.1967	174.7	-0.1311
9.1	0.1932	174.8	-0.132
9.2	0.1898	174.9	-0.1311
9.3	0.1863	175.	-0.1329
9.4	0.182	175.1	-0.132
9.5	0.1786	175.2	-0.132
9.6	0.1751	175.3	-0.1329

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.1717	175.4	-0.132
9.8	0.1674	175.5	-0.132
9.9	0.1648	175.6	-0.1329
10.	0.1622	175.7	-0.1329
10.1	0.1596	175.8	-0.1329
10.2	0.157	175.9	-0.1329
10.3	0.1553	176.	-0.1329
10.4	0.1527	176.1	-0.1329
10.5	0.1484	176.2	-0.1337
10.6	0.1458	176.3	-0.1337
10.7	0.1432	176.4	-0.1337
10.8	0.1406	176.5	-0.1337
10.9	0.138	176.6	-0.1346
11.	0.1354	176.7	-0.1337
11.1	0.1329	176.8	-0.1346
11.2	0.1303	176.9	-0.1346
11.3	0.1277	177.	-0.1346
11.4	0.126	177.1	-0.1346
11.5	0.1234	177.2	-0.1354
11.6	0.1216	177.3	-0.1354
11.7	0.1191	177.4	-0.1354
11.8	0.1173	177.5	-0.1354
11.9	0.1147	177.6	-0.1354
12.	0.1122	177.7	-0.1354
12.1	0.1104	177.8	-0.1354
12.2	0.1087	177.9	-0.1372
12.3	0.107	178.	-0.1363
12.4	0.1053	178.1	-0.1363
12.5	0.1035	178.2	-0.1363
12.6	0.1018	178.3	-0.1363
12.7	0.1001	178.4	-0.1363
12.8	0.09749	178.5	-0.1363
12.9	0.09576	178.6	-0.1363
13.	0.09404	178.7	-0.1363
13.1	0.09317	178.8	-0.1363
13.2	0.09145	178.9	-0.1363
13.3	0.08886	179.	-0.1372
13.4	0.08713	179.1	-0.1363
13.5	0.08627	179.2	-0.1363
13.6	0.08541	179.3	-0.1372
13.7	0.08455	179.4	-0.1372
13.8	0.08282	179.5	-0.1363
13.9	0.0811	179.6	-0.1363
14.	0.07937	179.7	-0.1372
14.1	0.07764	179.8	-0.1372
14.2	0.07678	179.9	-0.1372
14.3	0.07506	180.	-0.1363
14.4	0.07419	180.1	-0.1363
14.5	0.07333	180.2	-0.1372
14.6	0.07161	180.3	-0.1363
14.7	0.06902	180.4	-0.1372
14.8	0.06902	180.5	-0.1372
14.9	0.06643	180.6	-0.1372
15.	0.06557	180.7	-0.1372
15.1	0.0647	180.8	-0.1372
15.2	0.06384	180.9	-0.1372
15.3	0.06212	181.	-0.1372
15.4	0.06212	181.1	-0.1372
15.5	0.06039	181.2	-0.138
15.6	0.05953	181.3	-0.138
15.7	0.05867	181.4	-0.1389
15.8	0.05867	181.5	-0.138
15.9	0.05694	181.6	-0.138
16.	0.05694	181.7	-0.1389
16.1	0.05608	181.8	-0.1389
16.2	0.05521	181.9	-0.1389

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.05435	182.	-0.1398
16.4	0.05263	182.1	-0.1398
16.5	0.05263	182.2	-0.1398
16.6	0.05176	182.3	-0.1398
16.7	0.0509	182.4	-0.1406
16.8	0.05004	182.5	-0.1398
16.9	0.05004	182.6	-0.1406
17.	0.04831	182.7	-0.1398
17.1	0.04745	182.8	-0.1415
17.2	0.04745	182.9	-0.1406
17.3	0.04659	183.	-0.1406
17.4	0.04659	183.1	-0.1406
17.5	0.04573	183.2	-0.1415
17.6	0.044	183.3	-0.1406
17.7	0.044	183.4	-0.1406
17.8	0.04314	183.5	-0.1406
17.9	0.04314	183.6	-0.1415
18.	0.04227	183.7	-0.1415
18.1	0.04141	183.8	-0.1406
18.2	0.04055	183.9	-0.1406
18.3	0.03969	184.	-0.1406
18.4	0.03969	184.1	-0.1406
18.5	0.03882	184.2	-0.1415
18.6	0.03882	184.3	-0.1406
18.7	0.03882	184.4	-0.1406
18.8	0.03796	184.5	-0.1415
18.9	0.03796	184.6	-0.1398
19.	0.0371	184.7	-0.1406
19.1	0.0371	184.8	-0.1406
19.2	0.03624	184.9	-0.1406
19.3	0.03624	185.	-0.1406
19.4	0.03537	185.1	-0.1406
19.5	0.03537	185.2	-0.1406
19.6	0.03451	185.3	-0.1398
19.7	0.03365	185.4	-0.1406
19.8	0.03365	185.5	-0.1398
19.9	0.03365	185.6	-0.1398
20.	0.03279	185.7	-0.1398
20.1	0.03279	185.8	-0.1398
20.2	0.03279	185.9	-0.1389
20.3	0.03279	186.	-0.1389
20.4	0.03192	186.1	-0.1389
20.5	0.03192	186.2	-0.1389
20.6	0.0302	186.3	-0.1389
20.7	0.02933	186.4	-0.1389
20.8	0.0302	186.5	-0.138
20.9	0.02933	186.6	-0.138
21.	0.02933	186.7	-0.138
21.1	0.02933	186.8	-0.138
21.2	0.02847	186.9	-0.138
21.3	0.02761	187.	-0.138
21.4	0.02675	187.1	-0.138
21.5	0.02761	187.2	-0.1389
21.6	0.02761	187.3	-0.138
21.7	0.02761	187.4	-0.1389
21.8	0.02675	187.5	-0.1389
21.9	0.02675	187.6	-0.1389
22.	0.02675	187.7	-0.1389
22.1	0.02675	187.8	-0.1398
22.2	0.02588	187.9	-0.1398
22.3	0.02588	188.	-0.1398
22.4	0.02588	188.1	-0.1398
22.5	0.02502	188.2	-0.1398
22.6	0.02502	188.3	-0.1406
22.7	0.02502	188.4	-0.1406
22.8	0.02502	188.5	-0.1415

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
22.9	0.02416	188.6	-0.1415
23.	0.02416	188.7	-0.1406
23.1	0.02416	188.8	-0.1415
23.2	0.0233	188.9	-0.1415
23.3	0.02416	189.	-0.1415
23.4	0.0233	189.1	-0.1415
23.5	0.02243	189.2	-0.1423
23.6	0.0233	189.3	-0.1415
23.7	0.0233	189.4	-0.1423
23.8	0.0233	189.5	-0.1423
23.9	0.02243	189.6	-0.1423
24.	0.02243	189.7	-0.1423
24.1	0.02243	189.8	-0.1432
24.2	0.02243	189.9	-0.1432
24.3	0.02157	190.	-0.1432
24.4	0.02243	190.1	-0.1441
24.5	0.02157	190.2	-0.1441
24.6	0.02243	190.3	-0.1449
24.7	0.02243	190.4	-0.1441
24.8	0.02243	190.5	-0.1449
24.9	0.02243	190.6	-0.1458
25.	0.02243	190.7	-0.1449
25.1	0.02157	190.8	-0.1449
25.2	0.02157	190.9	-0.1449
25.3	0.02157	191.	-0.1449
25.4	0.02157	191.1	-0.1449
25.5	0.02071	191.2	-0.1449
25.6	0.02071	191.3	-0.1449
25.7	0.01984	191.4	-0.1441
25.8	0.01898	191.5	-0.1449
25.9	0.01898	191.6	-0.1441
26.	0.01898	191.7	-0.1441
26.1	0.01812	191.8	-0.1441
26.2	0.01898	191.9	-0.1432
26.3	0.01812	192.	-0.1432
26.4	0.01812	192.1	-0.1423
26.5	0.01898	192.2	-0.1406
26.6	0.01984	192.3	-0.1415
26.7	0.01898	192.4	-0.1415
26.8	0.01812	192.5	-0.1423
26.9	0.01726	192.6	-0.1415
27.	0.01812	192.7	-0.1415
27.1	0.01812	192.8	-0.1406
27.2	0.01726	192.9	-0.1398
27.3	0.01639	193.	-0.1398
27.4	0.01639	193.1	-0.1398
27.5	0.01553	193.2	-0.1389
27.6	0.01553	193.3	-0.1372
27.7	0.01553	193.4	-0.1372
27.8	0.01553	193.5	-0.138
27.9	0.01467	193.6	-0.1389
28.	0.01467	193.7	-0.1389
28.1	0.01553	193.8	-0.138
28.2	0.01553	193.9	-0.1372
28.3	0.01553	194.	-0.1372
28.4	0.01467	194.1	-0.1389
28.5	0.01553	194.2	-0.1398
28.6	0.01553	194.3	-0.1406
28.7	0.01467	194.4	-0.1415
28.8	0.01553	194.5	-0.138
28.9	0.01726	194.6	-0.1363
29.	0.01812	194.7	-0.138
29.1	0.01984	194.8	-0.1423
29.2	0.02071	194.9	-0.1441
29.3	0.01898	195.	-0.1441
29.4	0.01726	195.1	-0.1432

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
29.5	0.01898	195.2	-0.1441
29.6	0.01984	195.3	-0.1441
29.7	0.02157	195.4	-0.1441
29.8	0.01984	195.5	-0.1441
29.9	0.01726	195.6	-0.1458
30.	0.01553	195.7	-0.1467
30.1	0.01639	195.8	-0.1475
30.2	0.01467	195.9	-0.1475
30.3	0.01294	196.	-0.1475
30.4	0.01294	196.1	-0.1475
30.5	0.01294	196.2	-0.1484
30.6	0.01294	196.3	-0.1492
30.7	0.01208	196.4	-0.1501
30.8	0.01381	196.5	-0.1501
30.9	0.01122	196.6	-0.151
31.	0.01381	196.7	-0.1501
31.1	0.01294	196.8	-0.1492
31.2	0.01208	196.9	-0.1492
31.3	0.01208	197.	-0.1501
31.4	0.01294	197.1	-0.151
31.5	0.01208	197.2	-0.151
31.6	0.01208	197.3	-0.1518
31.7	0.01122	197.4	-0.1518
31.8	0.01036	197.5	-0.1527
31.9	0.01036	197.6	-0.1535
32.	0.00863	197.7	-0.1535
32.1	0.00863	197.8	-0.1535
32.2	0.00777	197.9	-0.1544
32.3	0.00777	198.	-0.1535
32.4	0.00863	198.1	-0.1544
32.5	0.0069	198.2	-0.1544
32.6	0.00777	198.3	-0.1553
32.7	0.0069	198.4	-0.1553
32.8	0.00777	198.5	-0.1553
32.9	0.00604	198.6	-0.1553
33.	0.00518	198.7	-0.1553
33.1	0.00518	198.8	-0.1561
33.2	0.00432	198.9	-0.157
33.3	0.00345	199.	-0.157
33.4	0.00432	199.1	-0.1561
33.5	0.00345	199.2	-0.157
33.6	0.00259	199.3	-0.157
33.7	0.00173	199.4	-0.1579
33.8	0.00173	199.5	-0.157
33.9	0.00259	199.6	-0.1579
34.	0.00173	199.7	-0.1579
34.1	0.00087	199.8	-0.1579
34.2	0.00087	199.9	-0.1579
34.3	0.00087	200.	-0.157
34.4	0.00087	200.1	-0.1579
34.5	-0.00086	200.2	-0.1596
34.6	0.		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.727

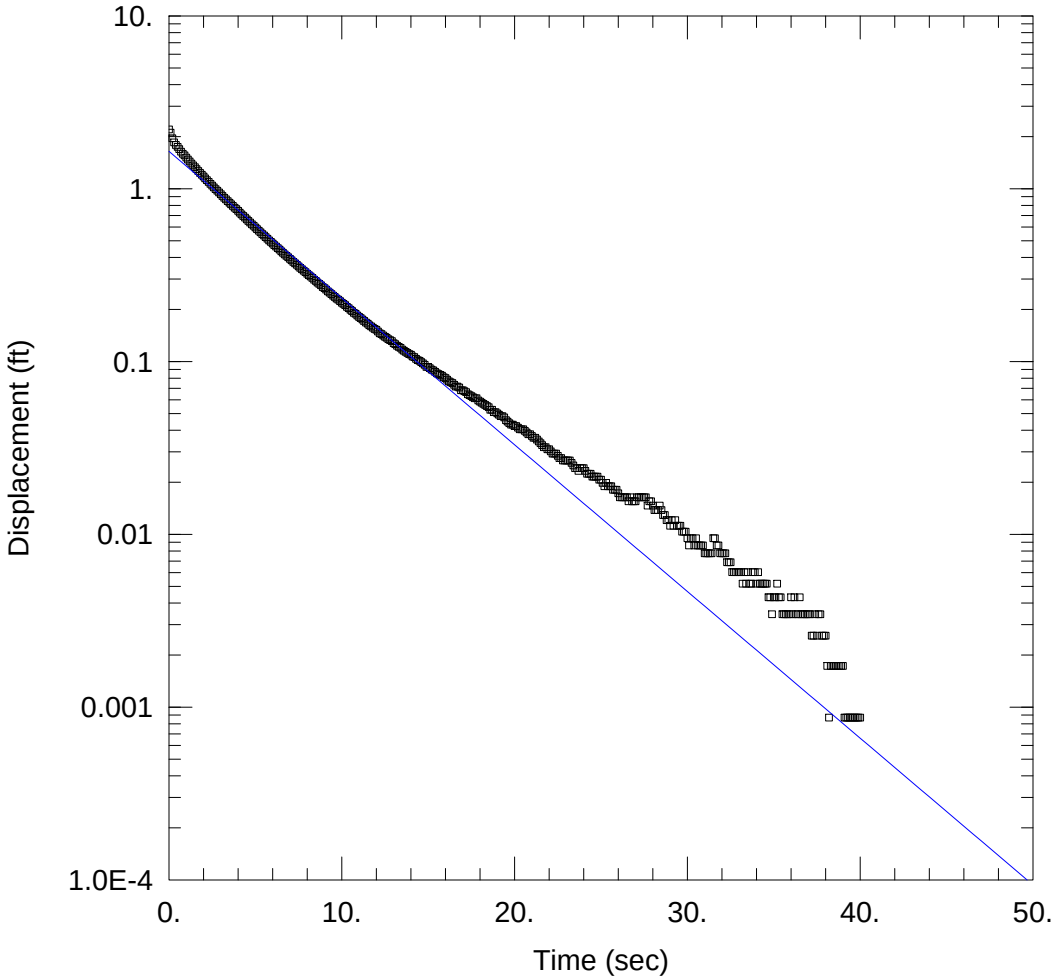
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007625	cm/sec

y0	1.363	ft

T = K*b = 26.73 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-10_TEST4.aqt
Date: 11/09/15 Time: 09:43:49

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-10
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 2.204 ft Static Water Column Height: 10.25 ft
Total Well Penetration Depth: 10.25 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.007036 cm/sec y0 = 1.645 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-10\MW-10_TES
Date: 11/09/15
Time: 09:44:14

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-10

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.204 ft
Static Water Column Height: 10.25 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.25 ft

No. of Observations: 401

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	2.113	20.2	0.04141
0.2	1.96	20.3	0.04055
0.3	1.854	20.4	0.04055
0.4	1.793	20.5	0.04055
0.5	1.746	20.6	0.03969
0.6	1.693	20.7	0.03882
0.7	1.637	20.8	0.03796
0.8	1.594	20.9	0.03796
0.9	1.56	21.	0.0371
1.	1.513	21.1	0.03624
1.1	1.477	21.2	0.03624
1.2	1.438	21.3	0.03537
1.3	1.399	21.4	0.03451
1.4	1.364	21.5	0.03365
1.5	1.331	21.6	0.03279
1.6	1.298	21.7	0.03192
1.7	1.266	21.8	0.03192
1.8	1.234	21.9	0.03106
1.9	1.204	22.	0.03106
2.	1.177	22.1	0.0302
2.1	1.148	22.2	0.02933
2.2	1.121	22.3	0.02933
2.3	1.094	22.4	0.02933
2.4	1.068	22.5	0.02847
2.5	1.042	22.6	0.02761
2.6	1.019	22.7	0.02761
2.7	0.9955	22.8	0.02675
2.8	0.9731	22.9	0.02675
2.9	0.9507	23.	0.02675
3.	0.9283	23.1	0.02675

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.9084	23.2	0.02675
3.2	0.8868	23.3	0.02588
3.3	0.867	23.4	0.02502
3.4	0.8472	23.5	0.02416
3.5	0.8299	23.6	0.02416
3.6	0.8118	23.7	0.0233
3.7	0.7945	23.8	0.02416
3.8	0.7764	23.9	0.02416
3.9	0.7618	24.	0.02416
4.	0.7445	24.1	0.0233
4.1	0.7264	24.2	0.02243
4.2	0.7108	24.3	0.02243
4.3	0.6953	24.4	0.02243
4.4	0.6807	24.5	0.02157
4.5	0.6651	24.6	0.02157
4.6	0.6513	24.7	0.02157
4.7	0.6367	24.8	0.02157
4.8	0.6229	24.9	0.02071
4.9	0.6099	25.	0.02071
5.	0.5961	25.1	0.01984
5.1	0.584	25.2	0.01898
5.2	0.572	25.3	0.01984
5.3	0.5599	25.4	0.01898
5.4	0.5469	25.5	0.01898
5.5	0.5357	25.6	0.01898
5.6	0.5245	25.7	0.01812
5.7	0.5142	25.8	0.01812
5.8	0.5021	25.9	0.01812
5.9	0.4926	26.	0.01726
6.	0.4814	26.1	0.01639
6.1	0.4719	26.2	0.01639
6.2	0.4624	26.3	0.01639
6.3	0.4529	26.4	0.01639
6.4	0.4443	26.5	0.01639
6.5	0.4339	26.6	0.01553
6.6	0.4262	26.7	0.01639
6.7	0.4167	26.8	0.01553
6.8	0.4089	26.9	0.01553
6.9	0.4012	27.	0.01553
7.	0.3925	27.1	0.01639
7.1	0.3848	27.2	0.01639
7.2	0.377	27.3	0.01639
7.3	0.3701	27.4	0.01639
7.4	0.3632	27.5	0.01639
7.5	0.3554	27.6	0.01639
7.6	0.3485	27.7	0.01467
7.7	0.3416	27.8	0.01553
7.8	0.3356	27.9	0.01553
7.9	0.3287	28.	0.01467
8.	0.3218	28.1	0.01381
8.1	0.3157	28.2	0.01381
8.2	0.3106	28.3	0.01381
8.3	0.3045	28.4	0.01467
8.4	0.2976	28.5	0.01381
8.5	0.2924	28.6	0.01294
8.6	0.2864	28.7	0.01294
8.7	0.2812	28.8	0.01208
8.8	0.2761	28.9	0.01208
8.9	0.27	29.	0.01122
9.	0.2657	29.1	0.01208
9.1	0.2605	29.2	0.01122
9.2	0.2545	29.3	0.01208
9.3	0.2502	29.4	0.01122
9.4	0.2459	29.5	0.01122
9.5	0.2407	29.6	0.01122
9.6	0.2364	29.7	0.01036

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.2312	29.8	0.01036
9.8	0.2278	29.9	0.01036
9.9	0.2234	30.	0.00949
10.	0.2191	30.1	0.00863
10.1	0.2157	30.2	0.00949
10.2	0.2122	30.3	0.00949
10.3	0.2071	30.4	0.00863
10.4	0.2036	30.5	0.00949
10.5	0.1993	30.6	0.00863
10.6	0.1958	30.7	0.00863
10.7	0.1915	30.8	0.00863
10.8	0.1889	30.9	0.00863
10.9	0.1846	31.	0.00777
11.	0.1812	31.1	0.00777
11.1	0.1786	31.2	0.00777
11.2	0.1751	31.3	0.00777
11.3	0.1717	31.4	0.00777
11.4	0.1682	31.5	0.00949
11.5	0.1656	31.6	0.00949
11.6	0.1622	31.7	0.00863
11.7	0.1596	31.8	0.00863
11.8	0.157	31.9	0.00777
11.9	0.1544	32.	0.00777
12.	0.1527	32.1	0.00777
12.1	0.1492	32.2	0.00777
12.2	0.1458	32.3	0.0069
12.3	0.1441	32.4	0.0069
12.4	0.1415	32.5	0.0069
12.5	0.1389	32.6	0.00604
12.6	0.1372	32.7	0.00604
12.7	0.1346	32.8	0.00604
12.8	0.1329	32.9	0.00604
12.9	0.1311	33.	0.00604
13.	0.1277	33.1	0.00604
13.1	0.126	33.2	0.00518
13.2	0.1234	33.3	0.00604
13.3	0.1216	33.4	0.00518
13.4	0.1199	33.5	0.00604
13.5	0.1173	33.6	0.00518
13.6	0.1156	33.7	0.00518
13.7	0.1139	33.8	0.00604
13.8	0.1122	33.9	0.00604
13.9	0.1104	34.	0.00518
14.	0.1096	34.1	0.00604
14.1	0.107	34.2	0.00518
14.2	0.1061	34.3	0.00518
14.3	0.1035	34.4	0.00518
14.4	0.1018	34.5	0.00518
14.5	0.1009	34.6	0.00518
14.6	0.09921	34.7	0.00432
14.7	0.09749	34.8	0.00432
14.8	0.09576	34.9	0.00345
14.9	0.09317	35.	0.00432
15.	0.09317	35.1	0.00432
15.1	0.09145	35.2	0.00518
15.2	0.08972	35.3	0.00432
15.3	0.08886	35.4	0.00432
15.4	0.08713	35.5	0.00345
15.5	0.08541	35.6	0.00345
15.6	0.08455	35.7	0.00345
15.7	0.08368	35.8	0.00345
15.8	0.08282	35.9	0.00345
15.9	0.0811	36.	0.00432
16.	0.08023	36.1	0.00345
16.1	0.07851	36.2	0.00432
16.2	0.07678	36.3	0.00345

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.07592	36.4	0.00345
16.4	0.07506	36.5	0.00432
16.5	0.07333	36.6	0.00345
16.6	0.07161	36.7	0.00345
16.7	0.07161	36.8	0.00345
16.8	0.07074	36.9	0.00345
16.9	0.06815	37.	0.00345
17.	0.06815	37.1	0.00345
17.1	0.06729	37.2	0.00259
17.2	0.06643	37.3	0.00259
17.3	0.0647	37.4	0.00345
17.4	0.06384	37.5	0.00259
17.5	0.06298	37.6	0.00345
17.6	0.06212	37.7	0.00345
17.7	0.06125	37.8	0.00259
17.8	0.06125	37.9	0.00259
17.9	0.05953	38.	0.00259
18.	0.05867	38.1	0.00173
18.1	0.0578	38.2	0.00087
18.2	0.05694	38.3	0.00173
18.3	0.05608	38.4	0.00173
18.4	0.05521	38.5	0.00173
18.5	0.05435	38.6	0.00173
18.6	0.05263	38.7	0.00173
18.7	0.05263	38.8	0.00173
18.8	0.0509	38.9	0.00173
18.9	0.0509	39.	0.00173
19.	0.05004	39.1	0.00087
19.1	0.04918	39.2	0.00087
19.2	0.04831	39.3	0.00087
19.3	0.04831	39.4	0.00087
19.4	0.04745	39.5	0.00087
19.5	0.04573	39.6	0.00087
19.6	0.04486	39.7	0.00087
19.7	0.044	39.8	0.00087
19.8	0.04314	39.9	0.00087
19.9	0.04314	40.	0.00087
20.	0.04227	40.1	0.
20.1	0.04227		

SOLUTION

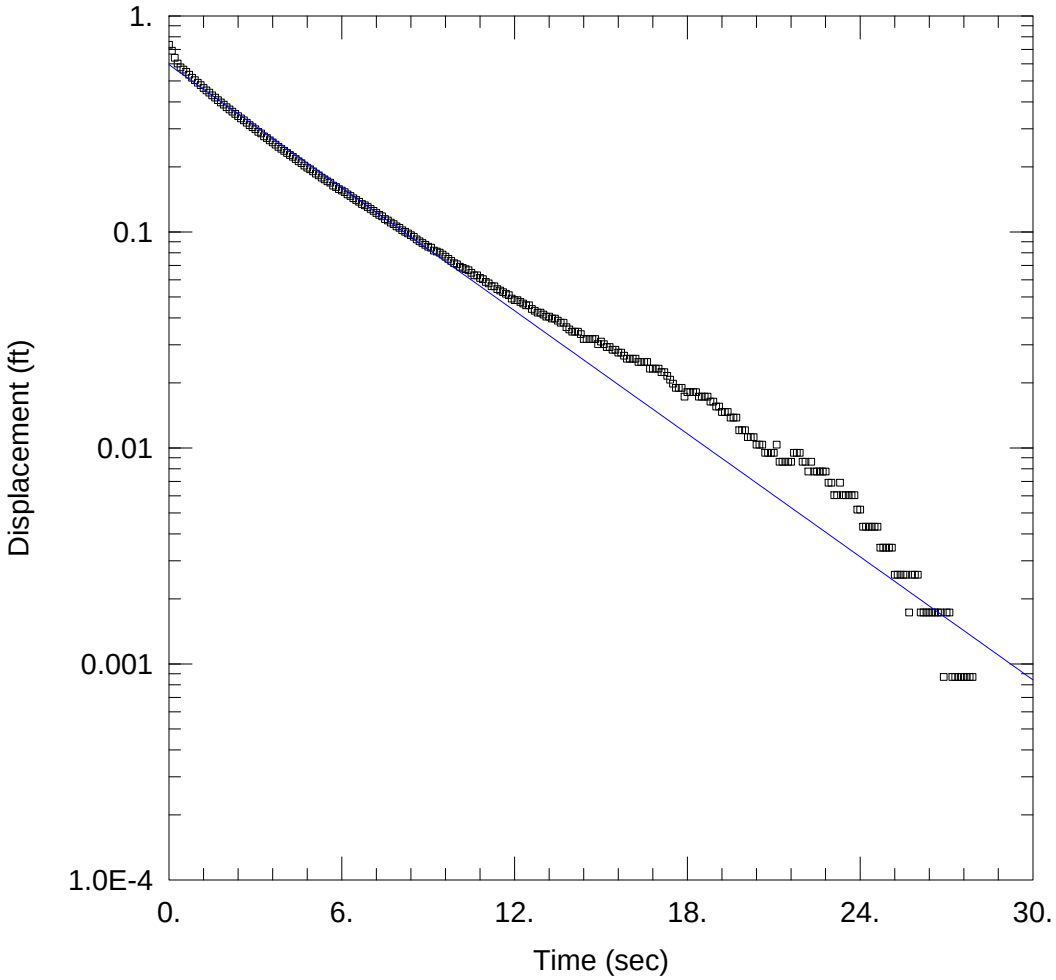
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.727

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007036	cm/sec
y0	1.645	ft

$T = K*b = 24.66$ cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-10_TEST5.aqt
Date: 11/09/15 Time: 09:45:16

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-10
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 0.735 ft Static Water Column Height: 10.25 ft
Total Well Penetration Depth: 10.25 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.007867 cm/sec y0 = 0.5945 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-10\MW-10_TES
Date: 11/09/15
Time: 09:45:32

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-10

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.735 ft
Static Water Column Height: 10.25 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.25 ft

No. of Observations: 280

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.6902	14.1	0.03451
0.2	0.6401	14.2	0.03451
0.3	0.6021	14.3	0.03365
0.4	0.578	14.4	0.03192
0.5	0.5642	14.5	0.03192
0.6	0.5513	14.6	0.03192
0.7	0.534	14.7	0.03192
0.8	0.5176	14.8	0.03192
0.9	0.5038	14.9	0.0302
1.	0.4909	15.	0.03106
1.1	0.4779	15.1	0.0302
1.2	0.4641	15.2	0.02933
1.3	0.4521	15.3	0.02933
1.4	0.4417	15.4	0.02847
1.5	0.4288	15.5	0.02847
1.6	0.4184	15.6	0.02761
1.7	0.4072	15.7	0.02761
1.8	0.3977	15.8	0.02675
1.9	0.3882	15.9	0.02588
2.	0.3779	16.	0.02588
2.1	0.3692	16.1	0.02588
2.2	0.3606	16.2	0.02588
2.3	0.352	16.3	0.02502
2.4	0.3433	16.4	0.02502
2.5	0.3356	16.5	0.02502
2.6	0.3287	16.6	0.02502
2.7	0.3201	16.7	0.0233
2.8	0.3123	16.8	0.0233
2.9	0.3054	16.9	0.0233
3.	0.2985	17.	0.0233

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.2907	17.1	0.02243
3.2	0.2856	17.2	0.02243
3.3	0.2769	17.3	0.02157
3.4	0.2717	17.4	0.02071
3.5	0.2657	17.5	0.01984
3.6	0.2597	17.6	0.01898
3.7	0.2536	17.7	0.01898
3.8	0.2476	17.8	0.01898
3.9	0.2424	17.9	0.01726
4.	0.2372	18.	0.01812
4.1	0.2321	18.1	0.01812
4.2	0.2269	18.2	0.01812
4.3	0.2226	18.3	0.01812
4.4	0.2174	18.4	0.01726
4.5	0.2122	18.5	0.01726
4.6	0.2079	18.6	0.01726
4.7	0.2027	18.7	0.01726
4.8	0.1984	18.8	0.01639
4.9	0.195	18.9	0.01639
5.	0.1907	19.	0.01553
5.1	0.1863	19.1	0.01553
5.2	0.1829	19.2	0.01467
5.3	0.1786	19.3	0.01467
5.4	0.1751	19.4	0.01467
5.5	0.1717	19.5	0.01381
5.6	0.1691	19.6	0.01381
5.7	0.1639	19.7	0.01381
5.8	0.1613	19.8	0.01208
5.9	0.1579	19.9	0.01208
6.	0.1553	20.	0.01208
6.1	0.1527	20.1	0.01122
6.2	0.1492	20.2	0.01122
6.3	0.1467	20.3	0.01122
6.4	0.1432	20.4	0.01036
6.5	0.1406	20.5	0.01036
6.6	0.138	20.6	0.01036
6.7	0.1346	20.7	0.00949
6.8	0.1329	20.8	0.00949
6.9	0.1303	20.9	0.00949
7.	0.1277	21.	0.00949
7.1	0.1251	21.1	0.01036
7.2	0.1225	21.2	0.00863
7.3	0.1199	21.3	0.00863
7.4	0.1182	21.4	0.00863
7.5	0.1147	21.5	0.00863
7.6	0.113	21.6	0.00863
7.7	0.1104	21.7	0.00949
7.8	0.1087	21.8	0.00949
7.9	0.1061	21.9	0.00949
8.	0.1044	22.	0.00863
8.1	0.1018	22.1	0.00863
8.2	0.1001	22.2	0.00777
8.3	0.09835	22.3	0.00863
8.4	0.09662	22.4	0.00777
8.5	0.0949	22.5	0.00777
8.6	0.09231	22.6	0.00777
8.7	0.09058	22.7	0.00777
8.8	0.08886	22.8	0.00777
8.9	0.08713	22.9	0.0069
9.	0.08541	23.	0.0069
9.1	0.08455	23.1	0.00604
9.2	0.08196	23.2	0.00604
9.3	0.0811	23.3	0.0069
9.4	0.08023	23.4	0.00604
9.5	0.07851	23.5	0.00604
9.6	0.07678	23.6	0.00604

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.07506	23.7	0.00604
9.8	0.07333	23.8	0.00604
9.9	0.07161	23.9	0.00518
10.	0.07074	24.	0.00518
10.1	0.06902	24.1	0.00432
10.2	0.06815	24.2	0.00432
10.3	0.06729	24.3	0.00432
10.4	0.06643	24.4	0.00432
10.5	0.0647	24.5	0.00432
10.6	0.06298	24.6	0.00432
10.7	0.06298	24.7	0.00345
10.8	0.06125	24.8	0.00345
10.9	0.06039	24.9	0.00345
11.	0.05867	25.	0.00345
11.1	0.0578	25.1	0.00345
11.2	0.05608	25.2	0.00259
11.3	0.05608	25.3	0.00259
11.4	0.05435	25.4	0.00259
11.5	0.05349	25.5	0.00259
11.6	0.05263	25.6	0.00259
11.7	0.05176	25.7	0.00173
11.8	0.0509	25.8	0.00259
11.9	0.04918	25.9	0.00259
12.	0.04831	26.	0.00259
12.1	0.04831	26.1	0.00173
12.2	0.04745	26.2	0.00173
12.3	0.04659	26.3	0.00173
12.4	0.04573	26.4	0.00173
12.5	0.04573	26.5	0.00173
12.6	0.044	26.6	0.00173
12.7	0.04314	26.7	0.00173
12.8	0.04227	26.8	0.00173
12.9	0.04227	26.9	0.00087
13.	0.04141	27.	0.00173
13.1	0.04055	27.1	0.00173
13.2	0.04055	27.2	0.00087
13.3	0.03969	27.3	0.00087
13.4	0.03969	27.4	0.00087
13.5	0.03882	27.5	0.00087
13.6	0.03796	27.6	0.00087
13.7	0.03796	27.7	0.00087
13.8	0.03624	27.8	0.00087
13.9	0.03537	27.9	0.00087
14.	0.03451	28.	0.

SOLUTION

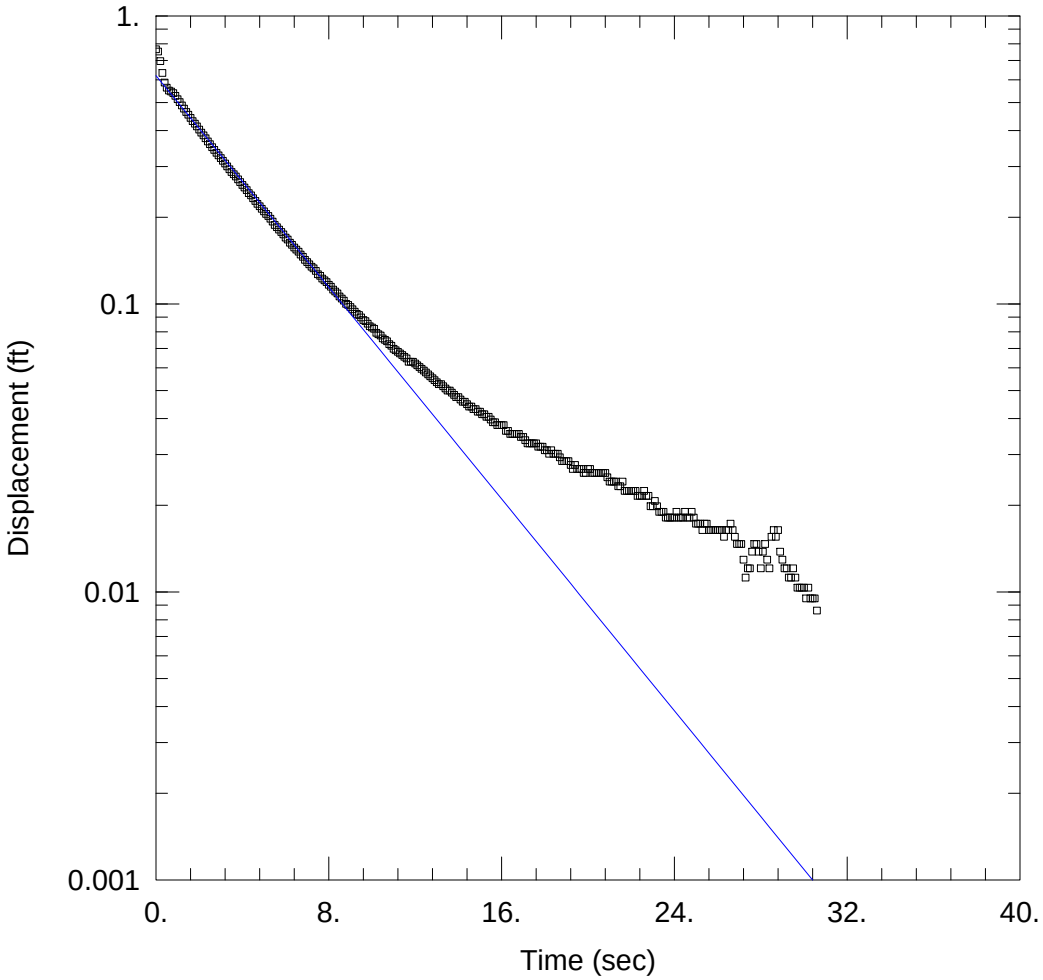
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.727

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007867	cm/sec
y0	0.5945	ft

$T = K*b = 27.58$ cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-10_TEST6.aqt
Date: 11/09/15 Time: 09:46:16

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-10
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 0.7661 ft Static Water Column Height: 10.25 ft
Total Well Penetration Depth: 10.25 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.007613 cm/sec y0 = 0.6203 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-10\MW-10_TES
Date: 11/09/15
Time: 09:46:33

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-10

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.7661 ft
Static Water Column Height: 10.25 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.25 ft

No. of Observations: 306

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.7522	15.4	0.04054
0.2	0.697	15.5	0.03968
0.3	0.6341	15.6	0.03882
0.4	0.5866	15.7	0.03882
0.5	0.5633	15.8	0.03795
0.6	0.5504	15.9	0.03795
0.7	0.5461	16.	0.03795
0.8	0.5392	16.1	0.03795
0.9	0.528	16.2	0.03623
1.	0.5142	16.3	0.03623
1.1	0.5021	16.4	0.03537
1.2	0.4891	16.5	0.03537
1.3	0.4762	16.6	0.03537
1.4	0.4641	16.7	0.03537
1.5	0.4538	16.8	0.03537
1.6	0.4426	16.9	0.0345
1.7	0.4313	17.	0.0345
1.8	0.4227	17.1	0.03364
1.9	0.4132	17.2	0.03278
2.	0.4029	17.3	0.03278
2.1	0.3934	17.4	0.03278
2.2	0.3847	17.5	0.03278
2.3	0.3761	17.6	0.03278
2.4	0.3666	17.7	0.03192
2.5	0.3589	17.8	0.03192
2.6	0.3502	17.9	0.03192
2.7	0.3425	18.	0.03105
2.8	0.3347	18.1	0.03105
2.9	0.3278	18.2	0.03019
3.	0.3209	18.3	0.03105

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.314	18.4	0.03019
3.2	0.3071	18.5	0.03019
3.3	0.3002	18.6	0.03019
3.4	0.2933	18.7	0.02933
3.5	0.2873	18.8	0.02847
3.6	0.2821	18.9	0.02847
3.7	0.2769	19.	0.02847
3.8	0.2709	19.1	0.02847
3.9	0.2648	19.2	0.0276
4.	0.2588	19.3	0.02674
4.1	0.2536	19.4	0.0276
4.2	0.2485	19.5	0.02674
4.3	0.2424	19.6	0.02674
4.4	0.2381	19.7	0.02674
4.5	0.2329	19.8	0.02588
4.6	0.2277	19.9	0.02588
4.7	0.2226	20.	0.02674
4.8	0.2183	20.1	0.02674
4.9	0.2139	20.2	0.02588
5.	0.2096	20.3	0.02588
5.1	0.2053	20.4	0.02588
5.2	0.2019	20.5	0.02588
5.3	0.1976	20.6	0.02588
5.4	0.1932	20.7	0.02588
5.5	0.1881	20.8	0.02588
5.6	0.1846	20.9	0.02501
5.7	0.1812	21.	0.02415
5.8	0.1777	21.1	0.02415
5.9	0.1743	21.2	0.02415
6.	0.1699	21.3	0.02415
6.1	0.1674	21.4	0.02329
6.2	0.163	21.5	0.02329
6.3	0.1605	21.6	0.02415
6.4	0.157	21.7	0.02243
6.5	0.1544	21.8	0.02243
6.6	0.1518	21.9	0.02243
6.7	0.1484	22.	0.02243
6.8	0.1458	22.1	0.02243
6.9	0.1423	22.2	0.02243
7.	0.1398	22.3	0.02156
7.1	0.1372	22.4	0.02156
7.2	0.1346	22.5	0.02156
7.3	0.1329	22.6	0.02243
7.4	0.1303	22.7	0.02156
7.5	0.1268	22.8	0.02156
7.6	0.1251	22.9	0.01984
7.7	0.1225	23.	0.01984
7.8	0.1208	23.1	0.0207
7.9	0.1191	23.2	0.01984
8.	0.1165	23.3	0.01898
8.1	0.1147	23.4	0.01898
8.2	0.1122	23.5	0.01898
8.3	0.1104	23.6	0.01811
8.4	0.1087	23.7	0.01811
8.5	0.1061	23.8	0.01811
8.6	0.1044	23.9	0.01811
8.7	0.1027	24.	0.01811
8.8	0.1001	24.1	0.01898
8.9	0.09921	24.2	0.01811
9.	0.09748	24.3	0.01811
9.1	0.09575	24.4	0.01811
9.2	0.09403	24.5	0.01898
9.3	0.0923	24.6	0.01811
9.4	0.09144	24.7	0.01811
9.5	0.08972	24.8	0.01898
9.6	0.08799	24.9	0.01811

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.08713	25.	0.01725
9.8	0.0854	25.1	0.01725
9.9	0.08368	25.2	0.01725
10.	0.08281	25.3	0.01639
10.1	0.08195	25.4	0.01725
10.2	0.07936	25.5	0.01725
10.3	0.0785	25.6	0.01639
10.4	0.07764	25.7	0.01639
10.5	0.07591	25.8	0.01639
10.6	0.07505	25.9	0.01639
10.7	0.07419	26.	0.01639
10.8	0.07246	26.1	0.01639
10.9	0.0716	26.2	0.01639
11.	0.06987	26.3	0.01553
11.1	0.06901	26.4	0.01639
11.2	0.06815	26.5	0.01639
11.3	0.06729	26.6	0.01725
11.4	0.06642	26.7	0.01639
11.5	0.06556	26.8	0.01553
11.6	0.0647	26.9	0.01466
11.7	0.06297	27.	0.01466
11.8	0.06297	27.1	0.01466
11.9	0.06297	27.2	0.01294
12.	0.06211	27.3	0.01121
12.1	0.06125	27.4	0.01207
12.2	0.06038	27.5	0.01207
12.3	0.05952	27.6	0.0138
12.4	0.05866	27.7	0.01466
12.5	0.0578	27.8	0.01466
12.6	0.05693	27.9	0.0138
12.7	0.05607	28.	0.01207
12.8	0.05521	28.1	0.0138
12.9	0.05435	28.2	0.01466
13.	0.05348	28.3	0.01294
13.1	0.05262	28.4	0.01207
13.2	0.05262	28.5	0.01553
13.3	0.05176	28.6	0.01639
13.4	0.05089	28.7	0.01553
13.5	0.05003	28.8	0.01639
13.6	0.05003	28.9	0.0138
13.7	0.04917	29.	0.01294
13.8	0.04831	29.1	0.01207
13.9	0.04744	29.2	0.01207
14.	0.04744	29.3	0.01121
14.1	0.04658	29.4	0.01121
14.2	0.04572	29.5	0.01207
14.3	0.04572	29.6	0.01121
14.4	0.04486	29.7	0.01035
14.5	0.04399	29.8	0.01035
14.6	0.04399	29.9	0.01035
14.7	0.04313	30.	0.01035
14.8	0.04313	30.1	0.00949
14.9	0.04227	30.2	0.01035
15.	0.04227	30.3	0.00949
15.1	0.04141	30.4	0.00949
15.2	0.04141	30.5	0.00949
15.3	0.04054	30.6	0.00862

SOLUTION

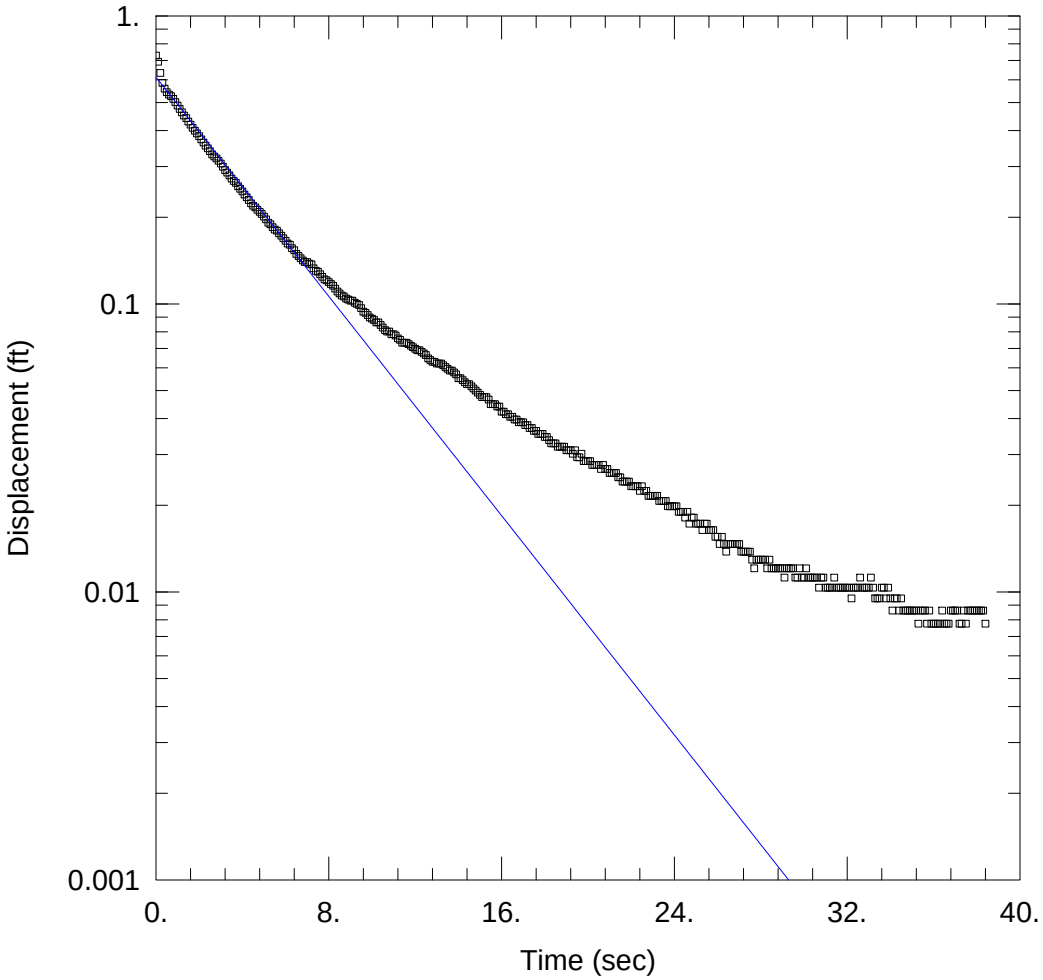
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.727

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007613	cm/sec
y0	0.6203	ft

T = K*b = 26.68 cm²/sec



WELL TEST ANALYSIS

Data Set: Z:\...\MW-10_TEST7.aqt
Date: 11/09/15 Time: 09:47:24

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Well: MW-10
Test Date: 10/28/15

AQUIFER DATA

Saturated Thickness: 115. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 0.729 ft Static Water Column Height: 10.25 ft
Total Well Penetration Depth: 10.25 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.3438 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.007886 cm/sec y0 = 0.6128 ft

Data Set: Z:\Clients\ENV\KCBPU\88019_CCRWELLINSTALL\Support\Data\Pneumatic Slug Tests\MW-10\MW-10_TES
Date: 11/09/15
Time: 09:47:39

PROJECT INFORMATION

Company: Burns & McDonnellf
Client: KCBPU
Project: 88019
Location: Kansas City, KS
Test Date: 10/28/15
Test Well: MW-10

AQUIFER DATA

Saturated Thickness: 115. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-10

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.729 ft
Static Water Column Height: 10.25 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3438 ft
Well Skin Radius: 1. ft
Screen Length: 5. ft
Total Well Penetration Depth: 10.25 ft

No. of Observations: 384

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.1	0.6927	19.3	0.03019
0.2	0.6341	19.4	0.03105
0.3	0.5858	19.5	0.02933
0.4	0.559	19.6	0.02933
0.5	0.5435	19.7	0.03019
0.6	0.5331	19.8	0.02847
0.7	0.5262	19.9	0.02847
0.8	0.515	20.	0.02847
0.9	0.5021	20.1	0.02847
1.	0.4883	20.2	0.0276
1.1	0.4753	20.3	0.0276
1.2	0.4624	20.4	0.0276
1.3	0.4512	20.5	0.0276
1.4	0.4417	20.6	0.02674
1.5	0.4296	20.7	0.0276
1.6	0.4193	20.8	0.02674
1.7	0.4089	20.9	0.02674
1.8	0.3994	21.	0.02588
1.9	0.3908	21.1	0.02588
2.	0.3822	21.2	0.02588
2.1	0.3727	21.3	0.02588
2.2	0.3632	21.4	0.02501
2.3	0.3546	21.5	0.02501
2.4	0.3468	21.6	0.02415
2.5	0.339	21.7	0.02415
2.6	0.3304	21.8	0.02415
2.7	0.3252	21.9	0.02415
2.8	0.3201	22.	0.02329
2.9	0.314	22.1	0.02329
3.	0.3071	22.2	0.02329

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.1	0.2994	22.3	0.02329
3.2	0.2916	22.4	0.02243
3.3	0.2855	22.5	0.02329
3.4	0.2795	22.6	0.02243
3.5	0.2726	22.7	0.02243
3.6	0.2674	22.8	0.02156
3.7	0.2631	22.9	0.02156
3.8	0.2562	23.	0.02156
3.9	0.251	23.1	0.02156
4.	0.2459	23.2	0.02156
4.1	0.2398	23.3	0.0207
4.2	0.2347	23.4	0.0207
4.3	0.2295	23.5	0.0207
4.4	0.2234	23.6	0.0207
4.5	0.2191	23.7	0.01984
4.6	0.2165	23.8	0.01984
4.7	0.2122	23.9	0.01984
4.8	0.2088	24.	0.01984
4.9	0.2053	24.1	0.01984
5.	0.201	24.2	0.01898
5.1	0.1967	24.3	0.01898
5.2	0.1915	24.4	0.01898
5.3	0.1889	24.5	0.01811
5.4	0.1846	24.6	0.01898
5.5	0.1812	24.7	0.01725
5.6	0.1794	24.8	0.01811
5.7	0.176	24.9	0.01811
5.8	0.1725	25.	0.01725
5.9	0.1691	25.1	0.01725
6.	0.1656	25.2	0.01725
6.1	0.1622	25.3	0.01639
6.2	0.1605	25.4	0.01725
6.3	0.1561	25.5	0.01725
6.4	0.1535	25.6	0.01639
6.5	0.1492	25.7	0.01639
6.6	0.1467	25.8	0.01639
6.7	0.1441	25.9	0.01553
6.8	0.1415	26.	0.01553
6.9	0.1398	26.1	0.01466
7.	0.1398	26.2	0.01553
7.1	0.138	26.3	0.01466
7.2	0.1372	26.4	0.0138
7.3	0.1329	26.5	0.01466
7.4	0.1303	26.6	0.01466
7.5	0.1294	26.7	0.01466
7.6	0.1268	26.8	0.01466
7.7	0.1242	26.9	0.01466
7.8	0.1216	27.	0.01466
7.9	0.1208	27.1	0.0138
8.	0.1191	27.2	0.0138
8.1	0.1173	27.3	0.0138
8.2	0.1156	27.4	0.0138
8.3	0.113	27.5	0.0138
8.4	0.1104	27.6	0.01294
8.5	0.1087	27.7	0.01207
8.6	0.107	27.8	0.01294
8.7	0.1061	27.9	0.01294
8.8	0.1044	28.	0.01294
8.9	0.1035	28.1	0.01294
9.	0.1027	28.2	0.01294
9.1	0.1027	28.3	0.01207
9.2	0.1009	28.4	0.01294
9.3	0.1001	28.5	0.01207
9.4	0.09921	28.6	0.01207
9.5	0.09662	28.7	0.01207
9.6	0.09403	28.8	0.01207

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.7	0.09317	28.9	0.01207
9.8	0.09144	29.	0.01207
9.9	0.08972	29.1	0.01121
10.	0.08885	29.2	0.01207
10.1	0.08799	29.3	0.01207
10.2	0.08626	29.4	0.01207
10.3	0.08626	29.5	0.01207
10.4	0.08454	29.6	0.01121
10.5	0.08281	29.7	0.01121
10.6	0.08109	29.8	0.01207
10.7	0.08023	29.9	0.01121
10.8	0.08023	30.	0.01121
10.9	0.0785	30.1	0.01207
11.	0.0785	30.2	0.01121
11.1	0.07764	30.3	0.01121
11.2	0.07591	30.4	0.01121
11.3	0.07505	30.5	0.01121
11.4	0.07332	30.6	0.01121
11.5	0.07332	30.7	0.01035
11.6	0.07332	30.8	0.01121
11.7	0.07246	30.9	0.01121
11.8	0.0716	31.	0.01035
11.9	0.07074	31.1	0.01035
12.	0.06987	31.2	0.01035
12.1	0.06901	31.3	0.01035
12.2	0.06901	31.4	0.01121
12.3	0.06815	31.5	0.01035
12.4	0.06729	31.6	0.01035
12.5	0.06642	31.7	0.01035
12.6	0.0647	31.8	0.01035
12.7	0.06384	31.9	0.01035
12.8	0.06297	32.	0.01035
12.9	0.06297	32.1	0.01035
13.	0.06211	32.2	0.00949
13.1	0.06211	32.3	0.01035
13.2	0.06211	32.4	0.01035
13.3	0.06125	32.5	0.01035
13.4	0.06038	32.6	0.01121
13.5	0.05952	32.7	0.01035
13.6	0.05866	32.8	0.01035
13.7	0.05866	32.9	0.01035
13.8	0.0578	33.	0.01035
13.9	0.05693	33.1	0.01121
14.	0.05521	33.2	0.01035
14.1	0.05521	33.3	0.00949
14.2	0.05435	33.4	0.00949
14.3	0.05348	33.5	0.00949
14.4	0.05262	33.6	0.01035
14.5	0.05262	33.7	0.01035
14.6	0.05176	33.8	0.00949
14.7	0.05089	33.9	0.01035
14.8	0.05003	34.	0.00949
14.9	0.04917	34.1	0.00862
15.	0.04831	34.2	0.00949
15.1	0.04744	34.3	0.00949
15.2	0.04744	34.4	0.00862
15.3	0.04744	34.5	0.00949
15.4	0.04658	34.6	0.00862
15.5	0.04486	34.7	0.00862
15.6	0.04486	34.8	0.00862
15.7	0.04486	34.9	0.00862
15.8	0.04399	35.	0.00862
15.9	0.04399	35.1	0.00862
16.	0.04227	35.2	0.00862
16.1	0.04227	35.3	0.00776
16.2	0.04141	35.4	0.00862

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
16.3	0.04141	35.5	0.00862
16.4	0.04054	35.6	0.00862
16.5	0.04054	35.7	0.00776
16.6	0.03968	35.8	0.00862
16.7	0.03968	35.9	0.00776
16.8	0.03882	36.	0.00776
16.9	0.03882	36.1	0.00776
17.	0.03882	36.2	0.00776
17.1	0.03795	36.3	0.00776
17.2	0.03795	36.4	0.00862
17.3	0.03709	36.5	0.00776
17.4	0.03709	36.6	0.00776
17.5	0.03623	36.7	0.00776
17.6	0.03623	36.8	0.00862
17.7	0.03537	36.9	0.00862
17.8	0.03537	37.	0.00862
17.9	0.03537	37.1	0.00862
18.	0.0345	37.2	0.00776
18.1	0.0345	37.3	0.00776
18.2	0.03364	37.4	0.00862
18.3	0.03278	37.5	0.00776
18.4	0.03278	37.6	0.00862
18.5	0.03278	37.7	0.00862
18.6	0.03192	37.8	0.00862
18.7	0.03192	37.9	0.00862
18.8	0.03192	38.	0.00862
18.9	0.03192	38.1	0.00862
19.	0.03105	38.2	0.00862
19.1	0.03105	38.3	0.00862
19.2	0.03105	38.4	0.00776

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.727

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.007886	cm/sec
y0	0.6128	ft

$T = K*b = 27.64$ cm²/sec

APPENDIX C – SURVEY DATA

KAW VALLEY ENGINEERING, INC.

Office: 785.762.5040
Fax: 785.762.7744
Web: www.kveng.com
Address: 2319 N. Jackson
P.O. Box 1304
Junction City, KS 66441

Monitor Well Report - KCBPU CCR Well Install/88019 1.KCM

Hunter, KS
KVE Project A15S7523

Monitor Well No.	Northing	Easting	Elevation	
			Coordinate Point	Top Of Casing
MW-2A	323923.74	2250166.32	745.37	747.86
MW-3	323434.36	2250416.90	748.81	750.44
MW-4	322799.01	2250172.01	746.18	746.90
MW-8A	323462.51	2249347.76	747.99	750.10
MW-10	323845.38	2249728.55	743.02	745.25

Coordinates are to a chiseled "+" in concrete or a 1/2" rebar with Cap
Horizontal Coordinates are Kansas State Plane North, Zone 1501, NAD 1983(2011) US Survey Feet
Elevations are NAVD 1988 US Survey Feet

This survey was performed by me or under my direct supervision and is true and accurate to the best of my belief.
Date of Survey - 10/30/2015

JASON R. LOADER
LICENSED
LS-1462
11/12/15
KANSAS
LAND SURVEYOR

Surveyor

APPENDIX D – MONITORING WELL SAMPLING FORMS

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10-30-15 SITE: KCBPU VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 83548 WEATHER: 50°

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): —

WELL IDENTIFICATION

BA POND 3 DUP-2

TOTAL DEPTH (ft TOC): —

WELL DIAMETER (inches): _____

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0955	—	—	7.9	15.1	789	8.1	—	—	—
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0955	—	—	7.9	15.1	789	8.1	—	—	—

FINAL DEPTH TO WATER (ft TOC): _____ TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: BA POND 3 DUP-2 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	**Remarks**
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): TIM DUCKER

	NAME	SIGNATURE	DATE
PREPARED:	_____	[signature]	10-30-15

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10-30-15 SITE: KCBPU VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 85458 WEATHER: 58°

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 19.78

WELL IDENTIFICATION

MW-4

TOTAL DEPTH (ft TOC): 31.67

WELL DIAMETER (inches): _____

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs).	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0900	1	400	7.4	13.88	.98	8.9	114.0	3.07	19.78
0905	2	400	7.0	13.99	.99	2.0	109.1	2.80	19.78
0910	4	400	6.9	14.02	.99	1.7	109.0	2.81	19.78
0915	6	400	6.8	14.14	.99	1.4	108.7	2.70	19.78
0920	8	400	6.8	14.03	.99	1.3	108.9	2.69	19.78
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0920	8	400	6.8	14.03	.99	1.3	108.9	2.69	

FINAL DEPTH TO WATER (ft TOC): _____ TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: MW-4/GW1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	**Remarks**
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): TIM DUCKER

	NAME	SIGNATURE	DATE
PREPARED:	_____	[signature]	10-30-15

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10.29.15 SITE: KCBPU VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 85458 WEATHER: 50°

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 23.38

WELL IDENTIFICATION

MW-3

TOTAL DEPTH (ft TOC): 33.80

WELL DIAMETER (inches): _____

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1420	1	400	7.02	14.46	1.03	7.3	107.3	2.14	23.38
1425	2	406	7.02	14.34	1.02	4.2	113.0	1.11	23.38
1430	4	400	6.97	14.33	1.02	3.4	110.1	.85	23.38
1435	6	400	6.93	14.33	1.01	2.1	108.6	.76	23.38
1440	8	400	6.93	14.31	1.01	2.0	107.8	.73	23.38
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1440	8	400	6.93	14.31	1.01	2.0	107.8	.73	23.38

FINAL DEPTH TO WATER (ft TOC): _____ TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: MW-3/GW1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): TIM DUCKER

	NAME	SIGNATURE	DATE
PREPARED:	_____	[signature]	10.29.15

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10.29.15 SITE: KCBPV VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 85458 WEATHER: 50 DEGREES

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 24.50

WELL IDENTIFICATION

MW-8A

TOTAL DEPTH (ft TOC): 35.21

WELL DIAMETER (inches): _____

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged (~~gals~~) L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1045	1	400	6.70	14.79	1.45	33.1	183.1	1.8	35.21
1050	2	400	6.81	14.73	1.44	14.5	142.5	1.3	35.21
1055	4	400	6.91	14.76	1.43	9.35	102.7	.98	35.21
1100	6	400	6.94	14.79	1.44	7.21	86.9	.86	35.21
1105	8	400	6.96	14.89	1.44	6.4	79.1	.79	35.21
1110	10	400	6.95	14.87	1.44	6.2	68.2	.71	35.21
1115	12	400	6.99	14.82	1.43	5.2	58.1	.68	35.21
1120	14	400	6.94	14.86	1.40	4.1	51.7	.60	35.21
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (~~gals~~) L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1125	14	400	6.94	14.86	1.40	4.1	51.7	.60	~~35.21~~ 24.50

FINAL DEPTH TO WATER (ft TOC): _____ TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: MW-8A/GW1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): TIM DUCKER

	NAME	SIGNATURE	DATE
PREPARED:			10.29.15

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10-29-15 SITE: KCBPU VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 85458 WEATHER: 50°

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 19.42

WELL IDENTIFICATION

MW-10

TOTAL DEPTH (ft TOC): 29.67

WELL DIAMETER (inches): _____

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1240	1	400	7.48	14.41	1.21	19.2	111.3	.71	29.67
1245	2	400	7.04	14.54	1.21	10.7	89.5	.89	29.67
1250	4	400	7.04	14.54	1.21	5.4	65.3	.87	29.67
1255	6	400	7.03	14.61	1.21	4.2	47.0	.81	29.67
1300	8	400	7.03	14.60	1.10	2.3	45.1	.82	29.67
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1300	8	400	7.03	14.6	1.10	2.3	45.1	.82	29.67

FINAL DEPTH TO WATER (ft TOC): _____ TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: MW-10/GW1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): TIM DUCKER

	NAME	SIGNATURE	DATE
PREPARED:	_____	[signature]	10-29-15

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10-29-15 SITE: KCBPV VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: B5458 WEATHER: 50°

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 21.36

WELL IDENTIFICATION

MW-2A

TOTAL DEPTH (ft TOC): ~~21.36~~ 31.65

WELL DIAMETER (inches): _____

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Baller Other: _____

Time (24 hrs)	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1335	1	400	7.08	13.81	1.12	13.1	97.8	1.17	21.36
1340	2	400	7.04	13.80	1.14	10.3	97.0	1.14	21.36
1345	4	400	6.99	13.79	1.12	4.3	91.7	1.01	21.36
1350	6	400	6.96	13.77	1.12	2.4	86.4	.98	21.36

Continued on next page (circle one): yes / no

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged ~~(gals)~~ L	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1355	6.	400	6.96	13.77	1.12	2.4	86.4	.98	21.36

FINAL DEPTH TO WATER (ft TOC): _____ TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: MW-2A/GW1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	**Remarks**
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): TIM DUCKER

	NAME	SIGNATURE	DATE
PREPARED:	_____	[signature]	10-29-15

FIELD GROUNDWATER SAMPLING REPORT

DATE: 1.27.16 SITE: BA POND PID READING at WELL HEAD (ppm): _____

PROJECT NUMBER: _____ WEATHER: 40' Clear

WELL NUMBER: MW-10

DEPTH TO WATER (ft): 19.5 TOTAL DEPTH (ft): ~~28.94~~ 29.64 WELL DIAMETER (inches): 2

DEPTH TO TOP OF PUMP (ft): _____ DEPTH TO TOP OF YSI (ft): _____ (for downhole DO measurement)

PURGING

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

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

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1215	I	300	7.2	13.77	1.108	14.0	28.3	1.50	19.5
1220	.395	300	7.2	13.77	1.109	10.1	11.7	.50	19.5
1225	.791	300	7.1	13.94	1.107	8.1	8.6	.55	19.4
1230	1.186	300	7.1	13.93	1.107	6.7	-0.5	.56	19.4
1235	1.581	300	7.1	13.91	1.106	3.6	-1.3	.57	19.4

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1235	1.581	7.1	13.91	1.106	3.6	-1.3	.57	19.4	

Ferrous Iron (mg/L): _____

FINAL DEPTH TO WATER (ft TOC): 19.4 TIME FINAL DEPTH TAKEN: 1235

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

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW TOTAL: _____ Flow Through Cell Model Number: _____

	NAME	SIGNATURE	DATE
PREPARED:			
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 1·27·16 SITE: BA POND PID READING at WELL HEAD (ppm): _____

PROJECT NUMBER: _____ WEATHER: 40's Clear

WELL NUMBER: MW-3

DEPTH TO WATER (ft): 23.35 TOTAL DEPTH (ft): 33.99 WELL DIAMETER (inches): _____

DEPTH TO TOP OF PUMP (ft): _____ DEPTH TO TOP OF YSI (ft): _____ (for downhole DO measurement)

PURGING

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

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

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1355	I	300	6.8	13.91	.954	9.8	69.7	1.98	23.35
1400	.395	300	6.7	14.01	.945	9.1	61.0	.47	23.34
1405	.791	300	6.7	14.07	.954	7.2	50.0	.47	23.34
1410	1.186	300	6.7	14.08	.948	6.9	43.1	.47	23.34
1415	1.581	300	6.7	14.05	.938	6.1	36.7	.49	23.34
1420	1.976	300	6.7	14.06	.937	3.6	35.1	.50	23.34
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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1425	1.976	6.7	14.06	.937	3.6	35.1	.50	23.34	

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 23.34 TIME FINAL DEPTH TAKEN: 1420

SAMPLE ID: MW-3 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW TOTAL: _____ Flow Through Cell Model Number: _____

	NAME	SIGNATURE	DATE
PREPARED:			
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 1.27.16 SITE: BA POND PID READING at WELL HEAD (ppm): _____

PROJECT NUMBER: _____ WEATHER: 40's Clear

WELL NUMBER: MW-4

DEPTH TO WATER (ft): 19.34 TOTAL DEPTH (ft): 31.88 WELL DIAMETER (inches): 4

DEPTH TO TOP OF PUMP (ft): _____ DEPTH TO TOP OF YSI (ft): _____ (for downhole DO measurement)

PURGING

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

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

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1445	I	300	6.8	13.88	.872	16.1	83.0	2.75	19.34
1450	.395	300	6.7	13.88	.873	12.4	85.1	2.62	19.32
1455	.791	300	6.6	13.98	.875	10.2	87.6	2.40	19.32
1500	1.186	300	6.6	13.98	.876	7.4	87.0	2.38	19.32
1505	1.581	300	6.7	14.00	.877	6.2	88.8	2.32	19.32
1510	1.976	300	6.7	13.95	.877	4.1	90.4	2.26	19.32

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1515	1.976	6.7	13.95	.877	4.1	90.4	2.26	19.32	

Ferrous Iron (mg/L): ✓

FINAL DEPTH TO WATER (ft TOC): 19.32 TIME FINAL DEPTH TAKEN: 1510

SAMPLE ID: MW-4 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW TOTAL: _____ Flow Through Cell Model Number: _____

	NAME	SIGNATURE	DATE
PREPARED:			
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 1·27·16 SITE: BA POND PID READING at WELL HEAD (ppm): _____

PROJECT NUMBER: _____ WEATHER: 40's Clear

WELL NUMBER: MW-2A

DEPTH TO WATER (ft): 21.30 TOTAL DEPTH (ft): ~~28.94~~ 31.45 WELL DIAMETER (inches): 2

DEPTH TO TOP OF PUMP (ft): _____ DEPTH TO TOP OF YSI (ft): _____ (for downhole DO measurement)

PURGING

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

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

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1300	I	300	6.8	13.71	.979	14.4	28.8	.98	21.30
1305	.595	300	6.8	13.76	.981	10.1	16.3	.44	21.29
1310	.791	300	6.9	13.73	.984	6.7	6.2	.41	21.29
1315	1.186	300	6.9	13.70	.984	6.0	1.9	.43	21.29
1320	1.581	300	6.8	13.69	.982	4.2	-1.2	.45	21.29

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1325	1.581	6.8	13.69	.982	4.2	-1.2	.45	21.29	

Ferrous Iron (mg/L): ✓

FINAL DEPTH TO WATER (ft TOC): 21.29 TIME FINAL DEPTH TAKEN: 1320

SAMPLE ID: MW-2A SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW TOTAL: _____ Flow Through Cell Model Number: _____

	NAME	SIGNATURE	DATE
PREPARED:			
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 1·27·16 SITE: BA POND PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: _____ WEATHER: Clear 40's

WELL NUMBER: MW-8A

DEPTH TO WATER (ft): 24.90 TOTAL DEPTH (ft): 35.20 WELL DIAMETER (inches): 2

DEPTH TO TOP OF PUMP (ft): _____ DEPTH TO TOP OF YSI (ft): _____ (for downhole DO measurement)

PURGING

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

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

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1105	I	300	6.9	13.56	1.294	40.2	66.0	2.70	24.90
1110	.395	300	6.8	13.78	1.296	25.4	15.1	1.60	24.89
1115	.791	300	6.8	14.01	1.319	12.13	1.4	1.10	24.89
1120	1.186	300	6.8	14.21	1.316	10.04	-12.8	.59	24.89
1125	1.581	300	6.9	14.30	1.316	9.68	-23.9	.52	24.88
1130	1.976	300	6.9	14.25	1.316	8.43	-28.6	.50	24.88
1135	2.371	300	6.9	14.20	1.315	7.26	-33.4	.52	24.88
1140	2.766	300	6.9	14.26	1.315	6.04	-35.4	.50	24.88
1145	3.161	300	6.9	14.27	1.315	5.54	-36.4	.51	24.88
1150	3.556	300	6.9	14.30	1.314	4.96	-38.5	.50	24.88

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1150	3.556	6.9	14.30	1.316	4.96	-38.5	.50	24.8	

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 24.88 TIME FINAL DEPTH TAKEN: 1150

SAMPLE ID: MW-8A SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW TOTAL: _____ Flow Through Cell Model Number: _____

	NAME	SIGNATURE	DATE
PREPARED:			
REVIEWED:			

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 4.27.16 SITE: KCBPV VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 84883 WEATHER: 60's Cloudy

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 20.53

WELL IDENTIFICATION

MW-2A

TOTAL DEPTH (ft TOC): 31.65

WELL DIAMETER (inches): 2

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1415	I	200	6.29	15.02	1.341	3.05	10.1	1.41	20.53
1420	0.52	200	6.24	14.91	1.210	1.04	10.6	1.02	20.53
1425	.104	200	6.22	14.80	1.195	1.24	18.1	0.57	20.53
1430	.156	200	6.26	14.72	1.193	1.12	19.2	0.49	20.53
1435	.208	200	6.26	14.79	1.194	1.38	20.3	0.40	20.53
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1440	.208	200	6.26	14.79	1.194	1.38	20.3	0.40	20.53

FINAL DEPTH TO WATER (ft TOC): 20.53 TIME FINAL DEPTH TAKEN: 1440

SAMPLE ID: MW-2B SAMPLE ID FOR QC: MW-2A

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): _____

	NAME	SIGNATURE	DATE
PREPARED:	Tim Ducker	_____	4.27.16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 4-27-16 SITE: KCBPU VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 84483 WEATHER: 60° Cloudy

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 18.10

WELL IDENTIFICATION

MW-10

TOTAL DEPTH (ft TOC): 29.64

WELL DIAMETER (inches): 2

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1515	I	200	7.60	14.78	1.224	140	71.0	6.82	18.10
1520	.052	200	6.59	14.33	1.211	89.7	64.9	.76	18.0
1525	.104	200	6.53	14.27	1.222	10.21	50.6	.61	18.10
1530	.156	200	6.51	14.16	1.221	9.10	59.1	.61	18.10
1535	.208	200	6.51	14.10	1.210	7.01	38.5	.56	18.10
1540	.260	200	6.50	14.10	1.220	6.09	39.9	.56	18.10
1545	.312	200	6.50	14.11	1.220	5.00	40.1	.57	18.10
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1550	.312	200	6.50	14.11	1.220	5.0	40.1	.57	18.10

FINAL DEPTH TO WATER (ft TOC): 18.10 TIME FINAL DEPTH TAKEN: 1550

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

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): _____

	NAME	SIGNATURE	DATE
PREPARED:	Tim Ducker		4-27-16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 4-27-16 SITE: KCBPU VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 84883 WEATHER: 60 Cloudy

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 20.14

WELL IDENTIFICATION

MW-4

TOTAL DEPTH (ft TOC): 31.89

WELL DIAMETER (inches): 4

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1230	I	200	6.04	15.04	1.168	1.23	91.8	2.40	20.14
1235	.052	200	6.00	15.12	1.170	1.05	86.1	1.81	20.14
1240	.104	200	6.02	15.10	1.171	0.50	72.5	1.526	20.14
1245	.156	200	6.05	14.92	1.172	0.49	69.0	1.26	20.14
1250	.208	200	6.08	15.00	1.171	0.48	64.3	1.16	20.14
1255	.260	200	6.11	15.03	1.173	0.48	64.1	1.09	20.14
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1300	.260	200	6.11	15.03	1.173	0.48	64.1	1.09	20.14

FINAL DEPTH TO WATER (ft TOC): 20.14 TIME FINAL DEPTH TAKEN: 1300

SAMPLE ID: MW-4 SAMPLE ID FOR QC: MW-4

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): _____

	NAME	SIGNATURE	DATE
PREPARED:	Tim Ducker	T. Ducker	4-27-16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 4-28-16 SITE: KCBPU VAPOR READING at WELLHEAD: _____

PROJECT NUMBER: 84883 WEATHER: 50' Cloudy

PROJECT NUMBER: _____

DEPTH TO WATER (ft TOC): 23.52

WELL IDENTIFICATION

MW-8A

TOTAL DEPTH (ft TOC): 35.21

WELL DIAMETER (inches): 2

Immiscible Layer Observed? (Y/N): _____ Thickness of Immiscible Layer: _____

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0905	I	200	6.91	15.38	1.694	11.5	54.1	0.77	23.52
0910	.052	200	6.83	15.38	1.692	6.76	49.7	0.70	23.52
0915	.104	200	6.75	15.39	1.692	5.54	50.2	0.68	23.52
0920	.156	200	6.75	15.39	1.691	3.39	50.7	0.62	23.52
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): _____ Time to Recharge: _____ Depth to Water (ft TOC): _____

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0925	.156	200	6.75	15.39	1.691	3.39	50.7	0.62	23.52

FINAL DEPTH TO WATER (ft TOC): 23.52 TIME FINAL DEPTH TAKEN: 0925

SAMPLE ID: MW-8A SAMPLE ID FOR QC: MW-8A

PARAMETERS REQUESTED FOR ANALYSIS: _____

IDW PURGE WATER TOTAL: _____ FLOW THROUGH CELL MODEL #: _____

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s): _____

	NAME	SIGNATURE	DATE
PREPARED:	TIM DUCKER		4.28.16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 4·27·16 SITE: KCBPV VAPOR READING at WELLHEAD: —

PROJECT NUMBER: 84883 WEATHER: 60' Cloudy

PROJECT NUMBER:

DEPTH TO WATER (ft TOC): 23.50

WELL IDENTIFICATION

MW-3

TOTAL DEPTH (ft TOC): 33.98

WELL DIAMETER (inches): 4

Immiscible Layer Observed? (Y/N): Thickness of Immiscible Layer:

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1325	I	200	7.30	15.89	0.670	2.10	155.1	13.10	23.50
1330	.052	200	6.47	16.18	1.165	1.12	99.4	2.32	23.50
1335	.104	200	6.40	15.56	1.174	0.95	59.6	1.42	23.50
1340	.156	200	6.33	15.27	1.181	0.90	43.1	1.06	23.50
1345	.208	200	6.33	15.14	1.180	0.90	39.1	1.04	23.50
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): Time to Recharge: Depth to Water (ft TOC):

SAMPLING Equipment Used: Same as above Other:

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1350	.208	200	6.33	15.4	1.180	0.90	39.1	1.04	23.50

FINAL DEPTH TO WATER (ft TOC): 23.50 TIME FINAL DEPTH TAKEN: 1350

SAMPLE ID: MW-3 SAMPLE ID FOR QC: MW-3

PARAMETERS REQUESTED FOR ANALYSIS:

IDW PURGE WATER TOTAL: FLOW THROUGH CELL MODEL #:

Well Condition	Remarks
Concrete Pad?	
Bumper Posts?	
Protective Casing?	
Paint and Label?	
Lock?	
Well Casing?	
Reference Point?	

Field Sampler(s) Name(s):

	NAME	SIGNATURE	DATE
PREPARED:	Tim Docker		4.27.16

FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-25 SITE: KCBPU NEAL MAT

PROJECT NUMBER: 88777 WEATHER: 73, Cloudy, Humid

WELL NUMBER

MW-8A

DEPTH TO WATER (ft): 22.03

TOTAL DEPTH (ft): _____ 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)
1230	1	400	6.40	16.2	1632	808	4.1	2.46	22.8
1235	0.5	400	6.60	16.4	1613	321	15.5	0.76	22.06
1240	1.0	400	6.59	16.3	1611	152	9.3	0.16	22.06
1245	1.5	400	6.58	16.2	1611	117	8.5	0.14	22.06
1250	2.0	400	6.57	16.2	1610	90.2	3.9	0.14	22.06
1255	2.5	400	6.57	16.3	1609	42.1	3.6	0.14	22.06
1300	3.0	400	6.57	16.3	1609	18.5	0.2	0.14	22.06
1305	3.5	400	6.57	16.4	1610	11.1	-1.3	0.14	22.06
1310	4.0	400	6.57	16.5	1610	10.7	-3.8	0.14	22.06

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.
1330	5.0	6.58	16.8	1609	4.7	-6.4	0.14	22.06	clear

FINAL DEPTH TO WATER (ft TOC): 22.07 TIME FINAL DEPTH TAKEN: 1340

SAMPLE ID: MW-8A / GW-1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: Cl, Fl, Metals, TDS, Radium, Sulfate

IDW TOTAL: 5.0 gal

YSI MULTI-METER MODEL: YSI Multimeter (Professional Plus)

CHECKED FLOW THROUGH CELL FOR LEAKS: ☐ COMMENTS: _____

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		7-25-16
REVIEWED:			

WELL NUMBER

MW-8A

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)
1315	4.5	400	6.56	16.7	1609	7.8	-5.1	0.14	22.06
1320	5.0	400	6.56	16.7	1609	4.7	-6.4	0.14	22.06

COMMENTS

FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-25 SITE: KCBPU Neahman

PROJECT NUMBER: 88777 WEATHER: 78°, Cloudy, Humid

WELL NUMBER

MW-10

DEPTH TO WATER (ft): 16.57

TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): _____

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)
1350	I	400	6.60	16.0	1282	176	2.9	1.00	16.59
1355	0.5	400	6.62	14.9	1235	36.8	0.7	0.52	16.60
1400	1.0	400	6.65	14.8	1267	19.7	-4.6	0.29	16.60
1405	1.5	400	6.65	14.8	1286	11.3	-7.1	0.28	16.60
1410	2.0	400	6.66	14.7	1287	6.25	-11.9	0.27	16.60
1415	2.5	400	6.66	14.6	1288	4.86	-12.8	0.27	16.60

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.
1420	2.5	6.66	14.6	1285	4.86	-12.8	0.27	16.60	clear

FINAL DEPTH TO WATER (ft TOC): 16.60 TIME FINAL DEPTH TAKEN: 1430

SAMPLE ID: MW-10/GW-1 SAMPLE ID FOR QC: DUP-1/GW-1

PARAMETERS REQUESTED FOR ANALYSIS: Cl, F, Metals, TDS, Radium, Sulfate

IDW TOTAL: 2.5 gal

YSI MULTI-METER MODEL: YSI MULTIMETER (PROFESSIONAL PLUS)

CHECKED FLOW THROUGH CELL FOR LEAKS: ☐ COMMENTS: _____

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schultz		7-25-14
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-25 SITE: KCBM NEARMAN

PROJECT NUMBER: 88777 WEATHER: 76°, HUMID, CLOUDY

WELL NUMBER

MW-2A

DEPTH TO WATER (ft): 18.42

TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): _____

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)
1440	1	400	6.61	16.0	1246	178	12.9	4.93	18.44
1445	0.5	400	6.61	14.9	1256	109	-9.4	5.38	18.44
1450	1.0	400	6.62	14.9	1258	46.8	-19.9	2.60	18.44
1455	1.5	400	6.63	14.9	1252	15.5	-24.1	*4.17	18.44
1500	2.0	400	6.63	14.8	1256	11.6	-8.1	0.12	18.44
1505	2.5	400	6.63	14.8	1269	9.76	-9.3	0.11	18.44
1510	3.0	400	6.63	14.9	1270	8.24	-10.6	0.10	18.44
1515	3.5	400	6.63	14.9	1270	7.16	-11.4	0.10	18.44
1520	4.0	400	6.63	14.8	1270	4.61	-11.5	0.11	18.44

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.
1525	4.0	6.63	14.8	1270	4.61	-11.5	0.11	18.44	clear

FINAL DEPTH TO WATER (ft TOC): 18.44 TIME FINAL DEPTH TAKEN: 1525

SAMPLE ID: MW-2A / GW-1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: Cl, F, Metals, TDS, Radium, SULFATE

IDW TOTAL: 4.0 GAL

YSI MULTI-METER MODEL: YSI Multimeter (Professional Plus)

CHECKED FLOW THROUGH CELL FOR LEAKS: ☐ COMMENTS: *AIR BUBBLE IN FLOW THRU CELL @ 1455

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schuette		7-25-16
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-25 SITE: KCBPU NEAMAY

PROJECT NUMBER: 88777 WEATHER: 52°F / cloudy

WELL NUMBER

MW-3

DEPTH TO WATER (ft): 20.52

TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): _____

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)
1545	1	400	6.83	16.3	1248	4.07	41.8	0.72	20.60
1550	0.5	400	6.87	16.5	1267	4.37	41.7	0.58	20.61
1555	1.0	400	6.88	16.6	1265	4.08	33.9	0.50	20.60
1600	1.5	400	6.87	16.6	1264	4.11	29.6	0.48	20.60
1605	2.0	400	6.87	16.5	1265	2.10	29.1	0.47	20.60

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.
1610	2.0	6.87	16.5	1265	2.10	29.1	0.47	20.60	clear

FINAL DEPTH TO WATER (ft TOC): 20.60 TIME FINAL DEPTH TAKEN: 1615

SAMPLE ID: MW-3/GW-1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: Cl, F, Metals, TDS, Radium, sulfate

IDW TOTAL: _____

YSI MULTI-METER MODEL: YSI Multimeter (Professional Plus)

CHECKED FLOW THROUGH CELL FOR LEAKS: ☐ COMMENTS: _____

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schuth		7-25-11
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 7-25 SITE: KCBPU NAAMAN

PROJECT NUMBER: 88777 WEATHER: 82°/Clear/Hum

WELL NUMBER

MW-4

DEPTH TO WATER (ft): 17.03

TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): _____

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)
1620	1	400	6.79	15.3	1043	2.28	37.8	5.46	17.04
1625	0.5	400	6.81	15.3	1037	1.06	32.4	4.27	17.04
1630	1.0	400	6.81	15.2	1038	1.17	42.6	4.01	17.05
1635	1.5	400	6.81	15.2	1038	1.03	41.7	4.03	17.05
1640	2.0	400	6.81	15.2	1038	1.11	40.9	4.08	17.05

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.
1645	2.0	6.81	15.2	1031	1.11	40.9	4.08	17.05	Clear

FINAL DEPTH TO WATER (ft TOC): _____ TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: MW-4/ow1 SAMPLE ID FOR QC: _____

PARAMETERS REQUESTED FOR ANALYSIS: Cl, F, Metals, TDS, Radium, Sulfate

IDW TOTAL: 2.0 gal

YSI MULTI-METER MODEL: YSI Multimeter (Professional Plus)

CHECKED FLOW THROUGH CELL FOR LEAKS: ☐ COMMENTS: _____

	NAME	SIGNATURE	DATE
PREPARED:	Kevin Schultz		7-25-16
REVIEWED:			

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10-25-16 SITE: BPU VAPOR READING at WELLHEAD: —

PROJECT NUMBER: BPU-NEARMAN WEATHER: 60s, 5mph SW

PROJECT NUMBER:

DEPTH TO WATER (ft TOC): 20.80

WELL IDENTIFICATION

MW-2A

TOTAL DEPTH (ft TOC): 31.68

WELL DIAMETER (inches): 2 in

Immiscible Layer Observed? (Y/N): N Thickness of Immiscible Layer: N/A

PURGING

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

Equipment Used: (Dedicated Bladder Pump) Nondedicated Bladder Pump Bailer Other:

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1320	I	500	7.07	13.75	1.170	10.1	-30.2	17.00	20.80
1325		500	6.96	13.55	1.146	7.63	-33.2	8.15	20.80
1330		500	6.92	13.56	1.150	4.22	-39.9	2.12	20.80
1335		500	6.88	13.56	1.148	4.11	-44.4	0.49	20.80
1340		500	6.87	13.56	1.147	3.98	-47.9	0.34	20.80
1345		500	6.86	13.56	1.147	4.02	-47.6	0.29	20.80

Continued on next page (circle one): yes / (no)

Well Purged to Dryness? (Y/N): N Time to Recharge: N/A Depth to Water (ft TOC): 20.80

SAMPLING Equipment Used: Same as above Other:

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1350	3.30	500	6.86	13.56	1.147	4.02	-47.6	0.29	20.80

FINAL DEPTH TO WATER (ft TOC): 20.80 TIME FINAL DEPTH TAKEN: 1350

SAMPLE ID: MW-2A / GW1 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: CSI, CCR PARAMETERS

IDW PURGE WATER TOTAL: 3.30 gal FLOW THROUGH CELL MODEL #: YSI 556 MPS

Well Condition	Remarks
Concrete Pad? GOOD	
Bumper Posts? GOOD	
Protective Casing? GOOD	
Paint and Label? GOOD	
Lock? GOOD	
Well Casing? GOOD	
Reference Point? AROUND BOTTOM ASH POND	

Field Sampler(s) Name(s): J. HERMANSON

	NAME	SIGNATURE	DATE
PREPARED:	J. HERMANSON	[signature]	10/26/16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10-25-16 SITE: KCBPA VAPOR READING at WELLHEAD: —

PROJECT NUMBER: BPA-NEARMAN WEATHER: 60s, partly cloudy

PROJECT NUMBER: DEPTH TO WATER (ft TOC): 22.83

WELL IDENTIFICATION: MW-3 TOTAL DEPTH (ft TOC): 34.75

WELL DIAMETER (inches): 4

Immiscible Layer Observed? (Y/N): N Thickness of Immiscible Layer: N/A

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1420	1	500	6.85	14.46	1.504	8.66	-3.3	3.14	22.83
1425		500	6.71	13.78	1.510	6.17	1.3	0.66	22.83
1430		500	6.71	13.70	1.505	4.99	-1.9	0.50	22.83
1435		500	6.74	14.12	1.490	4.12	-9.3	0.30	22.83
1440		500	6.74	14.21	1.484	3.92	-9.7	0.37	22.83
1445		500	6.74	14.05	1.495	3.97	-9.6	6.25	22.83

} 22.83

Continued on next page (circle one): yes / no

Well Purged to Dryness? (Y/N): N Time to Recharge: N/A Depth to Water (ft TOC): 22.83

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1450	3.30	500	6.74	14.05	1.495	3.97	-9.6	6.25	22.83

FINAL DEPTH TO WATER (ft TOC): 22.83 TIME FINAL DEPTH TAKEN: 1450

SAMPLE ID: MW-3(GW) SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: CSI + CCR

IDW PURGE WATER TOTAL: 3.30 gal FLOW THROUGH CELL MODEL #: YSI 556 MPS

Well Condition	Remarks
Concrete Pad? GOOD	
Bumper Posts? GOOD	
Protective Casing? GOOD	
Paint and Label? GOOD	
Lock? GOOD	
Well Casing? GOOD	
Reference Point? ARROW POINT	

Field Sampler(s) Name(s): JONATHAN HEARNSBERGER

	NAME	SIGNATURE	DATE
PREPARED:	JONATHAN HEARNSBERGER	Jonathan Hearnsberger	10-25-16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10-25-16 SITE: KLEEN

PROJECT NUMBER: BP-NORMAN

PROJECT NUMBER:

VAPOR READING at WELLHEAD: —

WEATHER: 60s, partly cloudy, 5 mph S

DEPTH TO WATER (ft TOC): 19.35

TOTAL DEPTH (ft TOC): 31.75

WELL DIAMETER (inches): 4

WELL IDENTIFICATION: MW-4

Immiscible Layer Observed? (Y/N): N Thickness of Immiscible Layer: N/A

PURGING

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

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

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1520	1	500	6.94	14.10	1.308	7.25	31.3	4.10	19.35
1525		500	6.83	14.07	1.317	4.11	29.2	3.60	19.35
1530		400	6.83	13.92	1.318	4.01	26.3	3.58	19.35
1535		400	6.83	13.94	1.317	3.89	28.6	3.43	19.35
1540		400	6.85	14.01	1.318	3.85	29.2	3.39	19.35
Continued on next page (circle one): yes / no									

Well Purged to Dryness? (Y/N): N Time to Recharge: N/A Depth to Water (ft TOC): 19.35

SAMPLING Equipment Used: Same as above Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1545	2.11	400	6.85	14.01	1.318	3.85	29.2	3.39	19.35

FINAL DEPTH TO WATER (ft TOC): 19.75 TIME FINAL DEPTH TAKEN: 1545

SAMPLE ID: MW-4 (DUP MW-1) SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: CSI + CCR

IDW PURGE WATER TOTAL: 2.11 FLOW THROUGH CELL MODEL #: YSI 556 MPS

Well Condition	Remarks
Concrete Pad? Good	
Bumper Posts? Good	
Protective Casing? Good	
Paint and Label? Good	
Lock? Good	
Well Casing? Good	
Reference Point? Around Bottom Access Door	

Field Sampler(s) Name(s): JONATHAN HERMANSON

	NAME	SIGNATURE	DATE
PREPARED:	JONATHAN HERMANSON	Jonathan Hermanson	10/25/16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10/25/16 SITE: UCBDH VAPOR READING at WELLHEAD: —

PROJECT NUMBER: BPA-Nerenow WEATHER: 60s, 5mph S, pretty cloudy

PROJECT NUMBER: ______

DEPTH TO WATER (ft TOC): 24.10

WELL IDENTIFICATION

TOTAL DEPTH (ft TOC): 3

MW-8A

WELL DIAMETER (inches): 2

Immiscible Layer Observed? (Y/N): N Thickness of Immiscible Layer: N/A

PURGING

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

Equipment Used: Dedicated Bladder Pump (circled) Nondedicated Bladder Pump Bailer Other: ______

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1610	I	500	7.16	15.17	1.734	45.6	-35.7	4.18	24.10
1615		500	7.00	14.65	1.663	24.2	-40.4	0.81	24.10
1620		500	6.94	14.46	1.668	15.1	-46.6	0.37	24.10
1625		500	6.92	14.35	1.665	7.05	-55.1	0.25	24.10
1630		500	6.92	14.41	1.667	4.88	-61.7	0.19	24.10

Continued on next page (circle one): yes / no (circled)

Well Purged to Dryness? (Y/N): ______ Time to Recharge: ______ Depth to Water (ft TOC): 24.10

SAMPLING Equipment Used: Same as above (circled) Other: ______

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1635	2.64	500	6.92	14.41	1.667	4.88	-61.7	0.19	24.10

FINAL DEPTH TO WATER (ft TOC): 24.10 TIME FINAL DEPTH TAKEN: 1635

SAMPLE ID: MW-8A/GW1 SAMPLE ID FOR QC: MW-8A/GW1/MS, MW-8A/GW1/MSMSD

PARAMETERS REQUESTED FOR ANALYSIS: CSI & CLP

IDW PURGE WATER TOTAL: 2.64 gal FLOW THROUGH CELL MODEL #: YSI 556 MPS

Well Condition

Concrete Pad?	GOOD
Bumper Posts?	GOOD
Protective Casing?	GOOD
Paint and Label?	GOOD
Lock?	GOOD
Well Casing?	GOOD
Reference Point?	WEST OF BOTTOM OF PUMP

Remarks

Field Sampler(s) Name(s): Jonathan Hermanson

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	[signature]	10-25-16

FIELD GROUND-WATER SAMPLING DATA FORM

DATE: 10/26/16 SITE: KCBPA VAPOR READING at WELLHEAD: —

PROJECT NUMBER: BPA-NORTHWEST WEATHER: 60s, mostly cloudy, SMPS

PROJECT NUMBER:

DEPTH TO WATER (ft TOC): 18.98

WELL IDENTIFICATION

MW-10

TOTAL DEPTH (ft TOC): 29.80

WELL DIAMETER (inches): 2

Immiscible Layer Observed? (Y/N): N Thickness of Immiscible Layer: N/A

PURGING

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

Equipment Used: (Dedicated Bladder Pump) Nondedicated Bladder Pump Bailer Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1340	1	500	6.80	14.24	1.461	10.3	-11.9	4.39	18.98
1345		500	6.77	14.20	1.465	9.12	-11.1	2.58	18.98
1350		500	6.67	14.17	1.475	6.69	-13.1	0.98	18.98
1355		500	6.68	14.19	1.476	4.27	-17.1	0.29	18.48
1400		500	6.69	14.20	1.477	3.70	-20.3	0.28	18.48
1405		500	6.70	14.19	1.477	3.11	-23.4	0.22	18.48

Continued on next page (circle one): yes / (no)

Well Purged to Dryness? (Y/N): N Time to Recharge: NM Depth to Water (ft TOC): 18.48

SAMPLING Equipment Used: (Same as above) Other: _____

Time (24 hrs)	Amount Purged (gals)	Flow Rate (mL/min)	pH	Temp. (°C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1410	3.30	500	6.70	14.19	1.477	3.11	-23.4	0.22	18.48

FINAL DEPTH TO WATER (ft TOC): 18.98 TIME FINAL DEPTH TAKEN: 1410

SAMPLE ID: MW-10/6M1 SAMPLE ID FOR QC: Dup-1/6M-1

PARAMETERS REQUESTED FOR ANALYSIS: CSI + CCR

IDW PURGE WATER TOTAL: 3.30 FLOW THROUGH CELL MODEL #: YSI 556 MPS

Well Condition	Remarks
Concrete Pad? GOOD	
Bumper Posts? GOOD	
Protective Casing? GOOD	
Paint and Label? GOOD	
Lock? GOOD	
Well Casing? GOOD	
Reference Point? ~~EAST OF~~ WEST OF ASH POND	

Field Sampler(s) Name(s): JONATHAN HERMANSON

	NAME	SIGNATURE	DATE
PREPARED:	JONATHAN HERMANSON	Jonathan Hermanson	10-26-16

FIELD GROUND-WATER SAMPLING REPORT

DATE: 1/23/17 SITE: KCBPA PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91856/88777 WEATHER: Overcast, 5mph NW, 30s

WELL NUMBER

MW-2A

DEPTH TO WATER (ft): 24.25

TOTAL DEPTH (ft): 31.65 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)
1305	I	400	6.61	14.58	1.013	10.2	43.4	3.14	24.25
1310	0.63	400	6.72	14.84	1.028	8.13	22.4	2.25	24.25
1315	1.06	400	6.76	14.88	1.026	8.20	1.2	2.75	24.25
1320	1.59	400	6.76	14.88	1.023	8.18	-8.4	1.87	24.25
1325	2.12	400	6.76	14.82	1.029	5.16	-5.2	1.89	24.25
1330	2.65	400	6.76	14.79	1.028	4.32	-12.0	1.60	24.25
1335	3.18	400	6.75	14.77	1.029	4.11	-16.6	1.54	24.25
1340	3.71	400	6.75	14.77	1.029	3.61	-19.0	1.49	24.25
[illegible]									

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.
1345	4.24	6.75	14.77	1.029	3.61	-19.0	1.49	24.25	—

FINAL DEPTH TO WATER (ft TOC): 24.25 TIME FINAL DEPTH TAKEN: 1345

SAMPLE ID: MW-2A SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: CSI + CCR parameters

FERROUS IRON (mg/L): — IDW TOTAL: 4.24 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Hermanson	1/23/17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 1/23/17 SITE: KCBPA PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91856/88777 WEATHER: Overcast, 30s, 5 mph NW

WELL NUMBER

MW-10

DEPTH TO WATER (ft): 22.30

TOTAL DEPTH (ft): 29.65 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)
1410	I	400.0	6.86	13.96	1.397	6.29	-19.9	8.36	22.30
1415	0.53	400	6.74	14.87	1.402	4.88	-38.5	1.46	22.30
1420	1.06	400	6.78	14.98	1.394	4.01	-35.7	1.52	22.30
1425	1.59	400	6.78	14.98	1.397	3.06	-31.6	1.42	22.30
1430	2.12	400	6.78	14.99	1.394	2.61	-29.3	1.32	22.30

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.
1435	2.12	6.78	14.99	1.394	2.61	-29.3	1.32	22.30	—

FINAL DEPTH TO WATER (ft TOC): 22.30 TIME FINAL DEPTH TAKEN: 1435

SAMPLE ID: MW-10 SAMPLE ID FOR QC: Dup-1 for CSI

PARAMETERS REQUESTED FOR ANALYSIS: CSI & CER parameters

FERROUS IRON (mg/L): — IDW TOTAL: 2.12

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Hermanson	1/23/17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 1-23-17 SITE: LCBPU PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91856/88777 WEATHER: 30s, Overcast, 5 MPH NW

WELL NUMBER

MW-8A

DEPTH TO WATER (ft): 27.77

TOTAL DEPTH (ft): ~~35.17~~ 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)
1505	I	400	6.58	15.33	1.496	20.6	-39.8	4.40	27.77
1510	1.53	400	6.91	15.67	1.478	18.11	-56.0	2.32	27.77
1515	1.06	400	6.89	15.69	1.471	15.2	-34.4	1.52	27.77
1520	1.59	400	6.88	15.71	1.467	9.35	-38.8	1.27	27.77
1525	2.12	400	6.88	15.72	1.470	5.63	-32.3	1.28	27.77
1530	2.65	400	6.88	15.73	1.473	3.66	-32.7	1.15	27.77

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	2.65	6.88	15.73	1.473	3.66	-32.7	1.15	27.77	—

FINAL DEPTH TO WATER (ft TOC): 27.77 TIME FINAL DEPTH TAKEN: 1535

SAMPLE ID: ~~MW-8A~~ SAMPLE ID FOR QC: MW-8A MS, MW-8A MSD for CSF

PARAMETERS REQUESTED FOR ANALYSIS: CSI & CCR parameters

FERROUS IRON (mg/L): — IDW TOTAL: 2.65 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hemmerson	Jonathan Hemmerson	1-23-17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 1-24-17 SITE: KCBPU PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 481561 89777 WEATHER: Overcast, 30s, windy

WELL NUMBER

MW-3

DEPTH TO WATER (ft): 26.70

TOTAL DEPTH (ft): 33.96 WELL DIAMETER (inches): 4

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)
0935	I	400	6.76	13.89	1.740	4.18	-30.7	3.46	26.70
0940	0.53	400	6.76	14.01	1.740	4.04	-29.1	2.56	26.70
0945	1.06	400	6.75	14.38	1.741	3.62	-25.6	1.40	26.70
0950	1.59	400	6.75	14.41	1.734	3.56	-25.3	1.21	26.70
0955	2.12	400	6.75	14.45	1.734	2.98	-25.4	1.21	26.70

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.
0955	2.12	6.75	14.45	1.734	2.98	-25.4	1.21	26.70	—

FINAL DEPTH TO WATER (ft TOC): 26.70 TIME FINAL DEPTH TAKEN: 0955

SAMPLE ID: MW-3 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: CSI + CCR Parameters

FERROUS IRON (mg/L): — IDW TOTAL: 2.12 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Hermanson	1-24-17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 1-24-17 SITE: ECBPN PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91856/88177 WEATHER: 30s, overcast, no wind

WELL NUMBER

MW-4

DEPTH TO WATER (ft): 23.26

TOTAL DEPTH (ft): 31.90 WELL DIAMETER (inches): 4

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)
0850	1	400	6.81	13.71	1.640	6.20	-10.1	2.99	23.26
0855	0.53	400	6.82	14.73	1.644	4.49	-13.1	1.94	23.26
0900	1.06	400	6.81	14.82	1.622	4.56	-16.6	1.63	23.26
0905	1.59	400	6.81	14.86	1.612	3.73	-18.2	1.59	23.26
0910	2.12	400	6.81	14.86	1.600	3.21	-20.0	1.57	23.26

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.
0915	2.12	6.81	14.86	1.600	3.21	-20.0	1.57	23.26	—

FINAL DEPTH TO WATER (ft TOC): 23.26 TIME FINAL DEPTH TAKEN: 0915

SAMPLE ID: MW-4 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: ESI & CCR Parameters

FERROUS IRON (mg/L): — IDW TOTAL: 2.12 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermesman	Jonathan Hermesman	1-24-17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 4/29/16 SITE: Newman PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: _____ WEATHER: 70s, partly cloudy, 15-25 mphS

WELL NUMBER

MW-8A

DEPTH TO WATER (ft): 23.84

TOTAL DEPTH (ft): 35.00 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)
1220	I	450	6.97	14.34	1.302	46.1	3.7	5.71	23.84
1225	0.59	450	6.82	14.07	1.264	23.4	-29.8	2.56	23.84
1230	1.18	450	6.84	14.01	1.262	12.8	-32.9	2.24	~~23.84~~ 23.84
1235	1.77	450	6.85 ✓	14.02 ✓	1.261 ✓	10.1	-34.6 ✓	1.15	23.84
1240	2.36	450	6.86 ✓	14.04 ✓	1.258 ✓	11.03	-34.9 ✓	1.00	23.84
1245	2.95	450	6.86 ✓	13.99 ✓	1.257 ✓	7.61	-35.2 ✓	0.90	23.84
1250	3.54	450	6.86 ✓	13.99 ✓	1.254 ✓	4.47	-33.3 ✓	0.85 ✓	23.84

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.
1300	3.54	6.86	13.99	1.254	4.47	-33.3	0.85	23.84	—

FINAL DEPTH TO WATER (ft TOC): 23.84 TIME FINAL DEPTH TAKEN: 23.84

SAMPLE ID: MW8A/6W02 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: CLP App. III + IV & Dissolved gas parameters

FERROUS IRON (mg/L): — IDW TOTAL: 3.54 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hearnsberger	Jonathan Hearnsberger	4/29/16
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 4-24-17 SITE: ACBPa - Numonia PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: ~~29.59~~ WEATHER: 70s, partly cloudy, 15-25 mph S

WELL NUMBER

MW-10

DEPTH TO WATER (ft): 18.59

TOTAL DEPTH (ft): 29.59 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)
1320	I	500	6.88	13.12	1.069	2592	5.0	4.23	18.59
1325	0.66	500	6.88	13.06	1.048	72.5	13.1	2.80	18.59
1330	1.32	500	6.88	13.00	1.049	29.0	14.1	1.61	18.59
1335	1.98	500	6.87 ✓	12.99 ✓	1.049 ✓	18.5	14.7 ✓	1.16	18.59
1340	2.64	500	6.87 ✓	12.95 ✓	1.050 ✓	12.8	14.6 ✓	1.09	18.59
1345	3.30	500	6.87 ✓	12.96 ✓	1.052 ✓	4.98	14.4 ✓	0.98 ✓	18.59

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.
1350	3.30	6.87	12.96	1.052	4.98	14.4	0.98	18.59	—

FINAL DEPTH TO WATER (ft TOC): 18.59 TIME FINAL DEPTH TAKEN: 1350

SAMPLE ID: MW-10(6m02 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: CCR App. III & IV & Diesel fuel parameters

FERROUS IRON (mg/L): — IDW TOTAL: 3.30 gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS: ☒ COMMENTS: NCA

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hickman	Jonathan Hickman	4-24-17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 4-24-17 SITE: Newman-BP PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: _____ WEATHER: 70s, partly cloudy, 15-25 mph S

WELL NUMBER

MW-2A

DEPTH TO WATER (ft): 20.85

TOTAL DEPTH (ft): 31.68 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)
1420	I	450	6.87	13.51	0.789	17.5	73.6	4.92	20.85
1425	0.59	450	6.85	13.44	0.784	14.9	69.8	3.08	20.85
1430	1.18	450	6.85	13.62	0.784	11.7	63.9	2.40	20.85
1435	1.77	450	6.85✓	13.69✓	0.782✓	7.08	65.1✓	1.93	20.85
1440	2.36	450	6.85✓	13.64✓	0.782✓	5.89	54.5✓	1.68	20.85
1445	2.95	450	6.85✓	13.62✓	0.782✓	5.03	52.2✓	1.53	20.85
1450	3.54	450	6.85✓	13.61✓	0.782✓	4.72	50.2✓	1.43	20.85
1455	4.13	450	6.85✓	13.60✓	0.781✓	4.46	47.8✓	1.33✓	20.85

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.
1500	4.13	6.85	13.60	0.781	4.46	47.8	1.33	20.85	—

FINAL DEPTH TO WATER (ft TOC): 20.85 TIME FINAL DEPTH TAKEN: 1500

SAMPLE ID: MW-2A/6W02 SAMPLE ID FOR QC: Dup-2/6W02

PARAMETERS REQUESTED FOR ANALYSIS: LCR Poll. II & IV & Diesel Fuel parameters

FERROUS IRON (mg/L): — IDW TOTAL: 4.13 gal

METER MODEL No.: YSI MPS556

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermann	Jonathan Hermann	4/24/17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 4/24/17 SITE: [illegible] PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: ______ WEATHER: 70s, mostly cloudy, 15-25 mph S

WELL NUMBER: MW-3

DEPTH TO WATER (ft): 23.65

TOTAL DEPTH (ft): 33.93 WELL DIAMETER (inches): 4

PURGING

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

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)
1525	I	500	6.67	13.36	0.857	11.4	87.1	3.37	23.65
1530	0.66	500	6.66	13.25	~~0.84~~ 1.042	6.26	93.5	1.93	23.65
1535	1.32	500	6.67	13.20	1.090	4.95	91.5	1.49	23.65
1540	1.98	500	6.67 ✓	13.22 ✓	1.092 ✓	4.40	89.8 ✓	1.26	23.65
1545	2.64	500	6.67 ✓	13.23 ✓	1.095 ✓	3.96	88.0 ✓	1.08	23.65
1550	3.30	500	6.68 ✓	13.23 ✓	1.096 ✓	3.71	86.8	1.13	23.65

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.
1600	3.30	6.68	13.23	1.096	3.71	86.8	1.13	23.65	—

FINAL DEPTH TO WATER (ft TOC): 23.65 TIME FINAL DEPTH TAKEN: 1555

SAMPLE ID: MW-3/6402 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: UR App. III + IV + Diesel Range [illegible]

FERROUS IRON (mg/L): — IDW TOTAL: 3.30 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	[illegible]	[signature]	4-24-17
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 4-24-17 SITE: Newmont - Leeds PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: ~~36.90~~ WEATHER: 60s, partly cloudy, 15-25 mph S

WELL NUMBER

MW-4

DEPTH TO WATER (ft): 20.31

TOTAL DEPTH (ft): 31.90 WELL DIAMETER (inches): 4

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)
1615	I	450	6.89	13.14	1.152	9.38	67.9	4.65	20.31
1620	6.59	450	6.71	13.05	1.227	5.11	80.6	3.70	20.31
1625	1.18	450	6.70	13.08	1.244	3.05	95.4	2.28	20.31
1630	1.77	450	6.70 ✓	13.09 ✓	1.243 ✓	2.25	103.6	1.70	20.31
1635	2.36	450	6.69 ✓	12.99 ✓	1.239 ✓	2.18	112.1 ✓	1.23	20.31
1640	2.95	450	6.69 ✓	12.93 ✓	1.240 ✓	2.07	114.7 ✓	1.19	20.31
1645	3.54	450	6.69 ✓	12.97 ✓	1.240 ✓	2.14	117.7 ✓	1.09 ✓	20.31

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.
1656	3.54	6.69	12.97	1.240	2.14	117.7	1.09	20.31	—

FINAL DEPTH TO WATER (ft TOC): 20.31 TIME FINAL DEPTH TAKEN: 1650

SAMPLE ID: MW-4/6MAY17 SAMPLE ID FOR QC: MW-4/6MAY17MS/MSD

PARAMETERS REQUESTED FOR ANALYSIS: CCR App. III + IV & Dissolved parameters

FERROUS IRON (mg/L): — IDW TOTAL: 3.54 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Higginson	Jonathan Higginson	4-24-17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 7/25/17 SITE: Bpu PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91865 / 88777 WEATHER: Sunny 95 °F

WELL NUMBER: MW-2A

DEPTH TO WATER (ft): 20.34 TOTAL DEPTH (ft): 31.69 WELL DIAMETER (inches): 2

PURGING

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

Equipment Used: ☒ Dedicated Bladder Pump ☐ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1435	I	350	6.83	18.99	0.667	33.6	1.7	6.55	20.35
1440	0.46	350	6.75	18.86	0.613	13.1	-38.5	2.17	20.35
1445	0.92	350	6.86	16.03	0.609	8.74	-39.5	1.09	20.35
1450	1.38	350	6.80	15.69	0.603	6.24	-38.7	0.98	20.35
1455	1.84	350	6.83	15.70	0.603	5.85	-39.4	0.83	20.35
1500	2.3	350	6.84	15.65	0.602	5.13	-40.6	0.81	20.35
1505	2.76	350	6.84	15.67	0.603	4.89	-37.9	0.78	20.35

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1515	2.76	6.84	15.67	0.603	4.89	-37.9	0.78	20.35	—

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 20.35 TIME FINAL DEPTH TAKEN: _____

SAMPLE ID: MW-2A SAMPLE ID FOR QC: Dup-1 For Appendix III/IV only

PARAMETERS REQUESTED FOR ANALYSIS: VOCs, KOH E-LRH, MRH, HRH, 40 CFR 257 Appendix III/IV.

IDW TOTAL: 2.76 Instrument Model: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Lewis Turner	LT	7/25/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 7/25/17 SITE: BPU PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91865/88777 WEATHER: Clear 90°F

WELL NUMBER: MW-3

DEPTH TO WATER (ft): 22.42 TOTAL DEPTH (ft): 34.05 WELL DIAMETER (inches): 4

PURGING

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

Equipment Used: ☒ Dedicated Bladder Pump ☐ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1545	I	350	6.65	15.65	0.919	1.92	61.1	2.04	22.42
1550	0.53	400	6.63	15.22	0.905	2.10	58.6	1.43	22.42
1555	1.06	400	6.62	15.16	0.896	1.17	49.6	1.02	22.42
1600	1.59	400	6.63	15.10	0.889	1.24	39.5	0.78	22.42
1605	2.12	400	6.63	15.06	0.884	1.16	34.0	0.67	22.42
1610	2.65	400	6.62	15.02	0.882	1.18	30.4	0.57	22.42
1615	3.18	400	6.63	15.04	0.881	1.21	30.6	0.54	22.42

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1620	3.18	6.63	15.04	0.881	1.21	30.6	0.54	22.42	—

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 22.42 TIME FINAL DEPTH TAKEN: 1628

SAMPLE ID: MW-3 SAMPLE ID FOR QC: NA

PARAMETERS REQUESTED FOR ANALYSIS: VOCs, KDHE-LRH, MRH, HRH, Kolar 257 Appendix III/IV

IDW TOTAL: 3.18 Instrument Model: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Lewis Turner		7/25/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 7/26/17 SITE: BPU PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91865/88777 WEATHER: cloudy 85 °F

WELL NUMBER: MW-4

DEPTH TO WATER (ft): 19.00 TOTAL DEPTH (ft): 31.93 WELL DIAMETER (inches): 4

PURGING

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

Equipment Used: ☒ Dedicated Bladder Pump ☐ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0905	I	400	6.84	15.11	0.939	1.59	61.2	4.47	19.00
0910	0.53	400	6.82	14.80	0.923	1.23	61.8	3.97	19.00
0915	1.06	400	6.78	14.74	0.935	1.17	63.1	2.37	19.00
0920	1.59	400	6.79	14.73	0.935	1.06	63.1	1.42	19.00
0925	2.12	400	6.78	14.74	0.941	1.11	63.4	1.37	19.00
0930	2.65	400	6.79	14.70	0.946	1.14	63.6	1.32	19.00

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
0935	2.65	6.79	14.70	0.946	1.14	63.6	1.32	19.00	—

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 19.00 TIME FINAL DEPTH TAKEN: 0945

SAMPLE ID: MW-4 SAMPLE ID FOR QC: MW-4 MS/MSD For 40 CFR 257 Appendix III/IV only

PARAMETERS REQUESTED FOR ANALYSIS: VOCs, KDHE LRH, MRH, HRH, 40 CFR 257 Appendix III/IV

IDW TOTAL: 2.65 Instrument Model: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Lewis Turner	LT	7/26/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 7/25/17 SITE: BPU PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 91865 / 88777 WEATHER: Sunny 90's

WELL NUMBER: MW-8A

DEPTH TO WATER (ft): 23.94 TOTAL DEPTH (ft): 35.21 WELL DIAMETER (inches): 2

PURGING

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

Equipment Used: ☒ Dedicated Bladder Pump ☐ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1145	±	400	6.79	15.86	1.094	66.4	-43.9	1.49	23.97
1150	0.53	400	6.73	15.33	1.083	25.9	-43.5	0.85	23.97
1155	1.06	400	6.71	15.00	1.076	12.71	-46.2	0.58	23.94
1200	1.59	400	6.73	15.01	1.075	8.25	-50.0	0.51	23.94
1205	2.12	400	6.74	14.95	1.072	6.65	-53.4	0.44	23.94
1210	2.65	400	6.74	14.92	1.070	5.44	-54.9	0.37	23.94
1215	3.18	400	6.73	14.90	1.070	4.15	-56.2	0.33	23.94

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1220	3.18	6.73	14.90	1.070	4.15	-56.2	0.33	23.94	—

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 23.94 TIME FINAL DEPTH TAKEN: 1228

SAMPLE ID: MW-8A SAMPLE ID FOR QC: NA

PARAMETERS REQUESTED FOR ANALYSIS: VOCs, KDHE LRH MRH, HRH, 40 CFR 257 Appendix III/IV

IDW TOTAL: 3.18 Instrument Model: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Lewis Turner	LT	7/25/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 7/25/17 SITE: BPU PID READING at WELL HEAD (ppm): --

PROJECT NUMBER: 91865 / 88777 WEATHER: Sunny 91°F

WELL NUMBER: MW-10

DEPTH TO WATER (ft): 18.55 TOTAL DEPTH (ft): 29.64 WELL DIAMETER (inches): 2

PURGING

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

Equipment Used: ☒ Dedicated Bladder Pump ☐ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1335	I	400	6.41	15.53	0.955	61.7	-4.2	1.57	18.55
1340	0.53	400	6.49	15.20	0.946	37.6	-5.2	0.90	18.55
1345	1.06	400	6.59	14.90	0.927	10.01	-7.5	0.88	18.55
1350	1.59	400	6.69	15.03	0.920	6.32	-8.8	0.62	18.55
1355	2.12	400	6.68	14.95	0.914	5.84	-11.7	0.60	18.55
1400	2.65	400	6.69	14.99	0.917	5.02	-14.6	0.61	18.55
1405	3.18	400	6.70	15.02	0.916	4.82	-15.5	0.62	18.55

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1410	3.18	6.70	15.02	0.916	4.82	-15.5	0.62	18.55	-

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 18.55 TIME FINAL DEPTH TAKEN: 1417

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

PARAMETERS REQUESTED FOR ANALYSIS: VOCs, KDHE LAH, MRH, HRH, CFR257 Appendix III/IV parameters.

IDW TOTAL: 3.18 Instrument Model: YSI 556 mps.

	NAME	SIGNATURE	DATE
PREPARED:	Lewis Turner	LT	7/25/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 9-14-2017 SITE: Nearman Creek Power Station PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: POS, 5-10 mph S, clear

WELL NUMBER: MW-4

DEPTH TO WATER (ft): 19.55 TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): 4

DEPTH TO TOP OF PUMP (ft): — DEPTH TO TOP OF YSI (ft): — (for downhole DO measurement)

PURGING

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

Equipment Used: ☐ Dedicated Bladder Pump ☑ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1310	1	400	6.63	19.50	1.108	10.2	120.5	7.00	19.60
1315	0.53	400	6.65	16.10	1.068	5.81	127.5	4.58	19.60
1320	1.06	400	6.68	15.90	1.060	1.83	128.2	3.71	19.60
1325	1.59	400	6.70	15.89	1.061	1.52	128.1	3.66	19.60
1330	2.12	400	6.70	15.86	1.061	1.61	127.9	3.51	19.60

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1335	2.12	6.70	15.86	1.061	1.61	127.9	3.51	19.60	—

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 19.60 TIME FINAL DEPTH TAKEN: 1330

SAMPLE ID: MW-4 SAMPLE ID FOR QC: MW-4 MS/MSD

PARAMETERS REQUESTED FOR ANALYSIS: Total Metals, TDS, Radium, Sulfate, Chloride, Fluoride

IDW TOTAL: 2.12 gal Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Heermann	Jonathan Heermann	9/14/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 9-14-2017 SITE: Nearman Creek Power Station PID READING at WELL HEAD (ppm): -

PROJECT NUMBER: 88777 WEATHER: 80s, 5-10mph S, Clear

WELL NUMBER: MW-3

DEPTH TO WATER (ft): 23.25 TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): 2

DEPTH TO TOP OF PUMP (ft): — DEPTH TO TOP OF YSI (ft): — (for downhole DO measurement)

PURGING

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

Equipment Used: ☐ Dedicated Bladder Pump ☒ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1435	1	400	6.64	18.21	1.095	27.3	111.9	6.00	23.25
1440	0.53	400	6.61	16.45	1.081	19.2	112.9	1.85	23.25
1445	1.06	400	6.60	16.21	1.081	11.6	109.0	1.37	23.25
1450	1.59	400	6.60	16.15	1.084	8.21	107.0	1.38	23.25
1455	2.12	400	6.60	16.11	1.085	5.74	104.5	1.35	23.25

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1500	2.12	6.60	16.11	1.085	5.74	104.5	1.35	23.25	—

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 23.25 TIME FINAL DEPTH TAKEN: 1455

SAMPLE ID: MW-3 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Total Metals, TDS, Radium, Sulfate, Chloride, Fluoride.

IDW TOTAL: 2.12 gal Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Hermanson	9/14/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 9-14-2017 SITE: Nearman Creek Power Station PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 80s, 5-10mphS, partly cloudy

WELL NUMBER: MW-2A

DEPTH TO WATER (ft): 21.07 TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): 2

DEPTH TO TOP OF PUMP (ft): — DEPTH TO TOP OF YSI (ft): — (for downhole DO measurement)

PURGING

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

Equipment Used: ☐ Dedicated Bladder Pump ☒ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1350	I	400	6.73	17.90	0.903	30.0	53.5	4.59	21.10
1355	0.53	400	6.77	16.52	0.884	20.4	27.8	1.38	21.10
1900	1.06	400	6.79	16.32	0.877	12.0	20.5	1.03	21.10
1905	1.59	400	6.80	16.30	0.876	9.89	17.7	0.89	21.10
1910	2.12	400	6.80	16.29	0.878	8.92	16.8	0.83	21.10

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1415	2.12	6.80	16.29	0.873	8.92	16.8	0.83	21.10	—

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 21.10 TIME FINAL DEPTH TAKEN: 1410

SAMPLE ID: MW-2A SAMPLE ID FOR QC: Dup-1

PARAMETERS REQUESTED FOR ANALYSIS: Total Metals, TDS, Radium, Sulfate, Chloride, Fluoride.

IDW TOTAL: 2.12 gal Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Heaverson	Jonathan Heaverson	9/14/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 9-14-2017 SITE: Nearman Creek Power Station PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 80s, S-1amph S, partly cloudy

WELL NUMBER: MW-10

DEPTH TO WATER (ft): 19.33 TOTAL DEPTH (ft): _____ WELL DIAMETER (inches): 2

DEPTH TO TOP OF PUMP (ft): — DEPTH TO TOP OF YSI (ft): — (for downhole DO measurement)

PURGING

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

Equipment Used: ☐ Dedicated Bladder Pump ☒ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1310	1	400	6.62	16.72	1.263	34.8	71.6	2.45	19.38
1315	0.53	400	6.62	16.37	1.263	22.6	70.3	0.73	19.38
1320	1.06	400	6.65	16.18	1.263	11.5	66.1	0.38	19.38
1325	1.59	400	6.66	16.15	1.262	8.45	62.2	0.32	19.38
1330	2.12	400	6.64	16.11	1.262	6.02	59.3	0.30	19.38

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1335	2.12	6.64	16.11	1.262	6.02	59.3	0.30	19.38	—

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 19.38 TIME FINAL DEPTH TAKEN: 1330

SAMPLE ID: MW-10 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Total Metals, TDS, Radium, Sulfate, Chloride, Fluoride

IDW TOTAL: 2.12 gal Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Hermanson	9/14/17
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 9-14-2017 SITE: Nearman Creek Power Station PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 80s, S 5-10mph S, partly cloudy

WELL NUMBER: MW-8A

DEPTH TO WATER (ft): 24.66 TOTAL DEPTH (ft): — WELL DIAMETER (inches): 2

DEPTH TO TOP OF PUMP (ft): — DEPTH TO TOP OF YSI (ft): — (for downhole DO measurement)

PURGING

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

Equipment Used: ☐ Dedicated Bladder Pump ☒ Nondedicated Bladder Pump ☐ Bailer ☐ Other _____

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1225	1	400	6.69	17.44	1.396	75.6	87.4	2.70	24.75
1230	0.53	400	6.71	17.27	1.382	54.1	60.6	0.79	24.75
1235	1.06	400	6.73	17.02	1.392	36.8	43.0	0.50	24.75
1240	1.59	400	6.82	17.00	1.396	24.3	30.1	0.40	24.75
1245	2.12	400	6.75	16.96	1.394	16.2	26.1	0.35	24.75
1250	2.65	400	6.74	16.95	1.395	12.68	21.0	0.32	24.75

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1255	2.65	6.74	16.95	1.395	12.68	21.0	0.32	24.75	—

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 24.75 TIME FINAL DEPTH TAKEN: 1250

SAMPLE ID: MW-8A SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Total Metals, TDS, Radium, Sulfate, Chloride, Fluoride.

IDW TOTAL: 2.65 gal Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Heimerson	Jonathan Heimerson	9/14/17
REVIEWED:			

APPENDIX E – LABORATORY ANALYTICAL DATA PACKAGES

ANALYTICAL REPORT

November 17, 2015

Kansas City Board of Public Utilities

Sample Delivery Group:	L798087
Samples Received:	10/31/2015
Project Number:	62801 BPU Nearman
Description:	groundwater
Site:	NEARMEN
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

MW-9 L798087-01 GW

Collected by: Tim Ducker
Collected date/time: 10/30/15 11:50
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826759	1	11/05/15 09:19	11/06/15 14:22	MF
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 18:46	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 15:31	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 02:45	CCE
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:07	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 13:57	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:04	JDG
Wet Chemistry by Method 2320 B-2011	WG828137	1	11/10/15 18:45	11/10/15 18:45	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:08	DR
Wet Chemistry by Method 9056MOD	WG826409	1	11/05/15 18:51	11/05/15 18:51	DJD
Wet Chemistry by Method 9056MOD	WG827715	10	11/09/15 22:26	11/09/15 22:26	DJD

MW-3 L798087-02 GW

Collected by: Tim Ducker
Collected date/time: 10/29/15 14:40
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826180	1	11/04/15 14:45	11/05/15 12:52	MF
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 18:48	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 15:47	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 02:48	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:10	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 13:59	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:06	JDG
Wet Chemistry by Method 2320 B-2011	WG828249	10	11/11/15 11:23	11/11/15 11:23	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:09	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826409	1	11/05/15 19:05	11/05/15 19:05	DJD
Wet Chemistry by Method 9056MOD	WG828378	10	11/12/15 06:40	11/12/15 06:40	DJD

MW-4 L798087-03 GW

Collected by: Tim Ducker
Collected date/time: 10/30/15 09:20
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826759	1	11/05/15 09:19	11/06/15 14:24	MF
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 18:50	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 15:49	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 02:51	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:13	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:06	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:09	JDG
Wet Chemistry by Method 2320 B-2011	WG828249	10	11/11/15 11:23	11/11/15 11:23	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:11	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826409	1	11/05/15 19:32	11/05/15 19:32	DJD
Wet Chemistry by Method 9056MOD	WG828378	10	11/12/15 06:55	11/12/15 06:55	DJD

MW-6 L798087-04 GW

Collected by: Tim Ducker
Collected date/time: 10/30/15 13:55
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826761	1	11/05/15 05:44	11/06/15 04:06	JM
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 18:52	TRB

MW-6 L798087-04 GW

Collected by: Tim Ducker
Collected date/time: 10/30/15 13:55
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 15:51	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 02:55	CCE
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:22	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:08	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:24	JDG
Wet Chemistry by Method 2320 B-2011	WG828249	10	11/11/15 11:23	11/11/15 11:23	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:12	DR
Wet Chemistry by Method 9056MOD	WG826409	1	11/05/15 20:14	11/05/15 20:14	DJD

MW-7 L798087-05 GW

Collected by: Tim Ducker
Collected date/time: 10/30/15 13:05
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826761	1	11/05/15 05:44	11/06/15 04:07	JM
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 18:54	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 15:54	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 02:58	CCE
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:25	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:11	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:41	JDG
Wet Chemistry by Method 2320 B-2011	WG828249	10	11/11/15 11:23	11/11/15 11:23	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:16	DR
Wet Chemistry by Method 9056MOD	WG826409	1	11/05/15 20:28	11/05/15 20:28	DJD
Wet Chemistry by Method 9056MOD	WG827715	10	11/09/15 23:08	11/09/15 23:08	DJD

MW-2A L798087-06 GW

Collected by: Tim Ducker
Collected date/time: 10/29/15 13:55
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826180	1	11/04/15 14:45	11/05/15 12:51	MF
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 18:57	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 15:56	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 03:01	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:29	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:13	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:44	JDG
Wet Chemistry by Method 2320 B-2011	WG828249	10	11/11/15 11:23	11/11/15 11:23	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:17	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826409	1	11/05/15 20:42	11/05/15 20:42	DJD
Wet Chemistry by Method 9056MOD	WG827715	10	11/09/15 23:22	11/09/15 23:22	DJD

MW-8A L798087-07 GW

Collected by: Tim Ducker
Collected date/time: 10/29/15 11:25
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826180	1	11/04/15 14:45	11/05/15 12:54	MF
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 18:59	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 15:58	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 03:04	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 00:56	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:15	JDG

MW-8A L798087-07 GW

Collected by: Tim Ducker
Collected date/time: 10/29/15 11:25
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:46	JDG
Wet Chemistry by Method 2320 B-2011	WG828137	1	11/10/15 18:45	11/10/15 18:45	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:40	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826410	1	11/04/15 12:40	11/04/15 12:40	DJD
Wet Chemistry by Method 9056MOD	WG826410	10	11/04/15 16:08	11/04/15 16:08	DJD

MW-10 L798087-08 GW

Collected by: Tim Ducker
Collected date/time: 10/29/15 13:00
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826180	1	11/04/15 14:45	11/05/15 12:51	MF
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 19:01	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 16:00	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 03:13	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:32	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:17	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:48	JDG
Wet Chemistry by Method 2320 B-2011	WG828249	10	11/11/15 11:23	11/11/15 11:23	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:20	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826410	1	11/04/15 17:04	11/04/15 17:04	DJD
Wet Chemistry by Method 9056MOD	WG826410	50	11/04/15 17:46	11/04/15 17:46	DJD

BA POND L798087-09 GW

Collected by: Tim Ducker
Collected date/time: 10/30/15 09:55
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826761	1	11/05/15 05:44	11/06/15 04:05	JM
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 19:03	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 16:02	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 03:16	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:35	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:20	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:50	JDG
Wet Chemistry by Method 2320 B-2011	WG828137	1	11/10/15 18:45	11/10/15 18:45	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:21	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826410	1	11/04/15 17:18	11/04/15 17:18	DJD
Wet Chemistry by Method 9056MOD	WG826410	50	11/04/15 18:00	11/04/15 18:00	DJD

DUP-1A L798087-10 GW

Collected by: Tim Ducker
Collected date/time: 10/29/15 00:00
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826180	1	11/04/15 14:45	11/05/15 12:53	MF
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 19:05	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 16:05	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 03:19	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:38	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 14:22	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 12:55	JDG

DUP-1A L798087-10 GW

Collected by: Tim Ducker
Collected date/time: 10/29/15 00:00
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 2320 B-2011	WG828137	1	11/10/15 18:45	11/10/15 18:45	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:22	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826410	1	11/04/15 17:32	11/04/15 17:32	DJD
Wet Chemistry by Method 9056MOD	WG826410	50	11/04/15 18:13	11/04/15 18:13	DJD

DUP-2 L798087-11 GW

Collected by: Tim Ducker
Collected date/time: 10/30/15 00:00
Received date/time: 10/31/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG826761	1	11/05/15 05:44	11/06/15 04:06	JM
Mercury by Method 7470A	WG826285	1	11/03/15 11:35	11/03/15 19:12	TRB
Mercury by Method 7470A	WG826292	1	11/03/15 14:59	11/04/15 16:07	TRB
Metals (ICP) by Method 6010B	WG826609	1	11/04/15 20:01	11/05/15 03:22	JDG
Metals (ICP) by Method 6010B	WG826611	1	11/04/15 17:10	11/05/15 01:41	CCE
Metals (ICPMS) by Method 6020	WG826588	1	11/04/15 09:44	11/04/15 13:45	JDG
Metals (ICPMS) by Method 6020	WG826615	1	11/04/15 20:05	11/05/15 13:53	JDG
Wet Chemistry by Method 2320 B-2011	WG828137	1	11/10/15 18:45	11/10/15 18:45	CSU
Wet Chemistry by Method 365.4	WG826817	1	11/05/15 12:16	11/06/15 13:24	DR
Wet Chemistry by Method 9040C	WG826090	1	11/04/15 09:45	11/04/15 09:45	SJM
Wet Chemistry by Method 9056MOD	WG826410	1	11/04/15 12:53	11/04/15 12:53	DJD
Wet Chemistry by Method 9056MOD	WG826410	10	11/04/15 16:22	11/04/15 16:22	DJD

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.

Linda Cashman
Technical Service Representative

Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
L798087-02	MW-3	9040C
L798087-03	MW-4	9040C
L798087-06	MW-2A	9040C
L798087-07	MW-8A	9040C
L798087-08	MW-10	9040C
L798087-09	BA POND	9040C
L798087-10	DUP-1A	9040C
L798087-11	DUP-2	9040C

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	847		10.0	1	11/06/2015 14:22	WG826759

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	107		20.0	1	11/10/2015 18:45	WG828137

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	0.376		0.100	1	11/06/2015 13:08	WG826817

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	30.2		1.00	1	11/05/2015 18:51	WG826409
Sulfate	556		50.0	10	11/09/2015 22:26	WG827715

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 15:31	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 18:46	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 02:45	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:07	WG826611
Barium	0.128		0.00500	1	11/05/2015 02:45	WG826609
Barium,Dissolved	0.126		0.00500	1	11/05/2015 01:07	WG826611
Beryllium	ND		0.00200	1	11/05/2015 02:45	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:07	WG826611
Cadmium	ND		0.00200	1	11/05/2015 02:45	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:07	WG826611
Calcium	129		1.00	1	11/05/2015 02:45	WG826609
Calcium,Dissolved	129		1.00	1	11/05/2015 01:07	WG826611
Chromium	ND		0.0100	1	11/05/2015 02:45	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:07	WG826611
Cobalt	ND		0.0100	1	11/05/2015 02:45	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:07	WG826611
Copper	ND		0.0100	1	11/05/2015 02:45	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:07	WG826611
Iron	6.00		0.100	1	11/05/2015 02:45	WG826609
Iron,Dissolved	5.31		0.100	1	11/05/2015 01:07	WG826611
Lead	ND		0.00500	1	11/05/2015 02:45	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:07	WG826611
Magnesium	26.4		1.00	1	11/05/2015 02:45	WG826609
Magnesium,Dissolved	26.1		1.00	1	11/05/2015 01:07	WG826611
Manganese	1.55		0.0100	1	11/05/2015 02:45	WG826609
Manganese,Dissolved	1.54		0.0100	1	11/05/2015 01:07	WG826611
Nickel	ND		0.0100	1	11/05/2015 02:45	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:07	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Potassium	6.62		1.00	1	11/05/2015 02:45	WG826609
Potassium,Dissolved	6.51		1.00	1	11/05/2015 01:07	WG826611
Selenium	ND		0.0100	1	11/05/2015 02:45	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:07	WG826611
Silver	ND		0.00500	1	11/05/2015 02:45	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:07	WG826611
Sodium	97.6		1.00	1	11/05/2015 02:45	WG826609
Sodium,Dissolved	97.2		1.00	1	11/05/2015 01:07	WG826611
Vanadium	ND		0.0200	1	11/05/2015 02:45	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:07	WG826611
Zinc	ND		0.0500	1	11/05/2015 02:45	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:07	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:04	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 13:57	WG826588
Arsenic	ND		0.00200	1	11/05/2015 13:04	WG826615
Arsenic,Dissolved	ND		0.00200	1	11/04/2015 13:57	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:04	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 13:57	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	717		10.0	1	11/05/2015 12:52	WG826180

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	514		200	10	11/11/2015 11:23	WG828249

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:09	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.83		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-02 WG826090: 6.83 at 22.9c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	4.45		1.00	1	11/05/2015 19:05	WG826409
Fluoride	0.158		0.100	1	11/05/2015 19:05	WG826409
Sulfate	109		50.0	10	11/12/2015 06:40	WG828378

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 15:47	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 18:48	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 02:48	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:10	WG826611
Barium	0.151		0.00500	1	11/05/2015 02:48	WG826609
Barium,Dissolved	0.149		0.00500	1	11/05/2015 01:10	WG826611
Beryllium	ND		0.00200	1	11/05/2015 02:48	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:10	WG826611
Boron	0.218		0.200	1	11/05/2015 02:48	WG826609
Cadmium	ND		0.00200	1	11/05/2015 02:48	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:10	WG826611
Calcium	194		1.00	1	11/05/2015 02:48	WG826609
Calcium,Dissolved	194		1.00	1	11/05/2015 01:10	WG826611
Chromium	ND		0.0100	1	11/05/2015 02:48	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:10	WG826611
Cobalt	ND		0.0100	1	11/05/2015 02:48	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:10	WG826611
Copper	ND		0.0100	1	11/05/2015 02:48	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:10	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	1.05		0.100	1	11/05/2015 02:48	WG826609
Iron,Dissolved	0.706		0.100	1	11/05/2015 01:10	WG826611
Lead	ND		0.00500	1	11/05/2015 02:48	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:10	WG826611
Lithium	0.0441		0.0150	1	11/05/2015 02:48	WG826609
Magnesium	40.2		1.00	1	11/05/2015 02:48	WG826609
Magnesium,Dissolved	40.1		1.00	1	11/05/2015 01:10	WG826611
Manganese	0.596		0.0100	1	11/05/2015 02:48	WG826609
Manganese,Dissolved	0.564		0.0100	1	11/05/2015 01:10	WG826611
Molybdenum	ND		0.00500	1	11/05/2015 02:48	WG826609
Nickel	ND		0.0100	1	11/05/2015 02:48	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:10	WG826611
Potassium	8.50		1.00	1	11/05/2015 02:48	WG826609
Potassium,Dissolved	8.45		1.00	1	11/05/2015 01:10	WG826611
Selenium	ND		0.0100	1	11/05/2015 02:48	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:10	WG826611
Silver	ND		0.00500	1	11/05/2015 02:48	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:10	WG826611
Sodium	17.0		1.00	1	11/05/2015 02:48	WG826609
Sodium,Dissolved	16.8		1.00	1	11/05/2015 01:10	WG826611
Vanadium	ND		0.0200	1	11/05/2015 02:48	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:10	WG826611
Zinc	ND		0.0500	1	11/05/2015 02:48	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:10	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:06	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 13:59	WG826588
Arsenic	0.00210		0.00200	1	11/05/2015 13:06	WG826615
Arsenic,Dissolved	ND		0.00200	1	11/04/2015 13:59	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:06	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 13:59	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	780		10.0	1	11/06/2015 14:24	WG826759

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	450		200	10	11/11/2015 11:23	WG828249

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:11	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.92		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-03 WG826090: 6.92 at 23.0c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	9.72		1.00	1	11/05/2015 19:32	WG826409
Fluoride	0.112		0.100	1	11/05/2015 19:32	WG826409
Sulfate	116		50.0	10	11/12/2015 06:55	WG828378

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 15:49	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 18:50	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 02:51	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:13	WG826611
Barium	0.160		0.00500	1	11/05/2015 02:51	WG826609
Barium,Dissolved	0.148		0.00500	1	11/05/2015 01:13	WG826611
Beryllium	ND		0.00200	1	11/05/2015 02:51	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:13	WG826611
Boron	ND		0.200	1	11/05/2015 02:51	WG826609
Cadmium	ND		0.00200	1	11/05/2015 02:51	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:13	WG826611
Calcium	200		1.00	1	11/05/2015 02:51	WG826609
Calcium,Dissolved	200		1.00	1	11/05/2015 01:13	WG826611
Chromium	ND		0.0100	1	11/05/2015 02:51	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:13	WG826611
Cobalt	ND		0.0100	1	11/05/2015 02:51	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:13	WG826611
Copper	ND		0.0100	1	11/05/2015 02:51	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:13	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	11/05/2015 02:51	WG826609
Iron,Dissolved	ND		0.100	1	11/05/2015 01:13	WG826611
Lead	ND		0.00500	1	11/05/2015 02:51	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:13	WG826611
Lithium	0.0372		0.0150	1	11/05/2015 02:51	WG826609
Magnesium	41.1		1.00	1	11/05/2015 02:51	WG826609
Magnesium,Dissolved	40.7		1.00	1	11/05/2015 01:13	WG826611
Manganese	0.226		0.0100	1	11/05/2015 02:51	WG826609
Manganese,Dissolved	0.0325		0.0100	1	11/05/2015 01:13	WG826611
Molybdenum	ND		0.00500	1	11/05/2015 02:51	WG826609
Nickel	ND		0.0100	1	11/05/2015 02:51	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:13	WG826611
Potassium	7.60		1.00	1	11/05/2015 02:51	WG826609
Potassium,Dissolved	7.51		1.00	1	11/05/2015 01:13	WG826611
Selenium	0.0423		0.0100	1	11/05/2015 02:51	WG826609
Selenium,Dissolved	0.0433		0.0100	1	11/05/2015 01:13	WG826611
Silver	ND		0.00500	1	11/05/2015 02:51	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:13	WG826611
Sodium	14.3		1.00	1	11/05/2015 02:51	WG826609
Sodium,Dissolved	14.4		1.00	1	11/05/2015 01:13	WG826611
Vanadium	ND		0.0200	1	11/05/2015 02:51	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:13	WG826611
Zinc	ND		0.0500	1	11/05/2015 02:51	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:13	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:09	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:06	WG826588
Arsenic	ND		0.00200	1	11/05/2015 13:09	WG826615
Arsenic,Dissolved	ND		0.00200	1	11/04/2015 14:06	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:09	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:06	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	676		10.0	1	11/06/2015 04:06	WG826761

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	606		200	10	11/11/2015 11:23	WG828249

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	1.18		0.100	1	11/06/2015 13:12	WG826817

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	5.43		1.00	1	11/05/2015 20:14	WG826409
Sulfate	ND		5.00	1	11/05/2015 20:14	WG826409

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 15:51	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 18:52	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 02:55	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:22	WG826611
Barium	0.513		0.00500	1	11/05/2015 02:55	WG826609
Barium,Dissolved	0.484		0.00500	1	11/05/2015 01:22	WG826611
Beryllium	ND		0.00200	1	11/05/2015 02:55	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:22	WG826611
Cadmium	ND		0.00200	1	11/05/2015 02:55	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:22	WG826611
Calcium	138		1.00	1	11/05/2015 02:55	WG826609
Calcium,Dissolved	132		1.00	1	11/05/2015 01:22	WG826611
Chromium	ND		0.0100	1	11/05/2015 02:55	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:22	WG826611
Cobalt	ND		0.0100	1	11/05/2015 02:55	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:22	WG826611
Copper	ND		0.0100	1	11/05/2015 02:55	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:22	WG826611
Iron	32.8		0.100	1	11/05/2015 02:55	WG826609
Iron,Dissolved	31.4		0.100	1	11/05/2015 01:22	WG826611
Lead	ND		0.00500	1	11/05/2015 02:55	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:22	WG826611
Magnesium	55.2		1.00	1	11/05/2015 02:55	WG826609
Magnesium,Dissolved	54.1		1.00	1	11/05/2015 01:22	WG826611
Manganese	0.349		0.0100	1	11/05/2015 02:55	WG826609
Manganese,Dissolved	0.327		0.0100	1	11/05/2015 01:22	WG826611
Nickel	ND		0.0100	1	11/05/2015 02:55	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:22	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Potassium	9.94		1.00	1	11/05/2015 02:55	WG826609
Potassium,Dissolved	9.82		1.00	1	11/05/2015 01:22	WG826611
Selenium	ND		0.0100	1	11/05/2015 02:55	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:22	WG826611
Silver	ND		0.00500	1	11/05/2015 02:55	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:22	WG826611
Sodium	41.5		1.00	1	11/05/2015 02:55	WG826609
Sodium,Dissolved	40.5		1.00	1	11/05/2015 01:22	WG826611
Vanadium	ND		0.0200	1	11/05/2015 02:55	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:22	WG826611
Zinc	ND		0.0500	1	11/05/2015 02:55	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:22	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:24	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:08	WG826588
Arsenic	0.350		0.00200	1	11/05/2015 13:24	WG826615
Arsenic,Dissolved	0.341		0.00200	1	11/04/2015 14:08	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:24	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:08	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1150		10.0	1	11/06/2015 04:07	WG826761

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	563		200	10	11/11/2015 11:23	WG828249

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	0.653		0.100	1	11/06/2015 13:16	WG826817

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	21.0		1.00	1	11/05/2015 20:28	WG826409
Sulfate	306		50.0	10	11/09/2015 23:08	WG827715

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 15:54	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 18:54	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 02:58	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:25	WG826611
Barium	0.105		0.00500	1	11/05/2015 02:58	WG826609
Barium,Dissolved	0.106		0.00500	1	11/05/2015 01:25	WG826611
Beryllium	ND		0.00200	1	11/05/2015 02:58	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:25	WG826611
Cadmium	ND		0.00200	1	11/05/2015 02:58	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:25	WG826611
Calcium	252		1.00	1	11/05/2015 02:58	WG826609
Calcium,Dissolved	259		1.00	1	11/05/2015 01:25	WG826611
Chromium	ND		0.0100	1	11/05/2015 02:58	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:25	WG826611
Cobalt	ND		0.0100	1	11/05/2015 02:58	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:25	WG826611
Copper	0.0112		0.0100	1	11/05/2015 02:58	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:25	WG826611
Iron	31.2		0.100	1	11/05/2015 02:58	WG826609
Iron,Dissolved	31.4		0.100	1	11/05/2015 01:25	WG826611
Lead	ND		0.00500	1	11/05/2015 02:58	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:25	WG826611
Magnesium	65.1		1.00	1	11/05/2015 02:58	WG826609
Magnesium,Dissolved	66.7		1.00	1	11/05/2015 01:25	WG826611
Manganese	1.88		0.0100	1	11/05/2015 02:58	WG826609
Manganese,Dissolved	1.90		0.0100	1	11/05/2015 01:25	WG826611
Nickel	ND		0.0100	1	11/05/2015 02:58	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:25	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Potassium	11.5		1.00	1	11/05/2015 02:58	WG826609
Potassium,Dissolved	11.6		1.00	1	11/05/2015 01:25	WG826611
Selenium	ND		0.0100	1	11/05/2015 02:58	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:25	WG826611
Silver	ND		0.00500	1	11/05/2015 02:58	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:25	WG826611
Sodium	28.3		1.00	1	11/05/2015 02:58	WG826609
Sodium,Dissolved	28.7		1.00	1	11/05/2015 01:25	WG826611
Vanadium	ND		0.0200	1	11/05/2015 02:58	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:25	WG826611
Zinc	ND		0.0500	1	11/05/2015 02:58	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:25	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:41	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:11	WG826588
Arsenic	0.0412		0.00200	1	11/05/2015 13:41	WG826615
Arsenic,Dissolved	0.0403		0.00200	1	11/04/2015 14:11	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:41	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:11	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	852		10.0	1	11/05/2015 12:51	WG826180

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	501		200	10	11/11/2015 11:23	WG828249

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:17	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.86		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-06 WG826090: 6.86 at 23.1c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	7.54		1.00	1	11/05/2015 20:42	WG826409
Fluoride	0.129		0.100	1	11/05/2015 20:42	WG826409
Sulfate	227		50.0	10	11/09/2015 23:22	WG827715

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 15:56	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 18:57	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 03:01	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:29	WG826611
Barium	0.127		0.00500	1	11/05/2015 03:01	WG826609
Barium,Dissolved	0.125		0.00500	1	11/05/2015 01:29	WG826611
Beryllium	ND		0.00200	1	11/05/2015 03:01	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:29	WG826611
Boron	ND		0.200	1	11/05/2015 03:01	WG826609
Cadmium	ND		0.00200	1	11/05/2015 03:01	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:29	WG826611
Calcium	223		1.00	1	11/05/2015 03:01	WG826609
Calcium,Dissolved	220		1.00	1	11/05/2015 01:29	WG826611
Chromium	ND		0.0100	1	11/05/2015 03:01	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:29	WG826611
Cobalt	0.0112		0.0100	1	11/05/2015 03:01	WG826609
Cobalt,Dissolved	0.0111		0.0100	1	11/05/2015 01:29	WG826611
Copper	ND		0.0100	1	11/05/2015 03:01	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:29	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	2.20		0.100	1	11/05/2015 03:01	WG826609
Iron,Dissolved	2.31		0.100	1	11/05/2015 01:29	WG826611
Lead	ND		0.00500	1	11/05/2015 03:01	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:29	WG826611
Lithium	0.0357		0.0150	1	11/05/2015 03:01	WG826609
Magnesium	35.0		1.00	1	11/05/2015 03:01	WG826609
Magnesium,Dissolved	34.3		1.00	1	11/05/2015 01:29	WG826611
Manganese	2.99		0.0100	1	11/05/2015 03:01	WG826609
Manganese,Dissolved	2.93		0.0100	1	11/05/2015 01:29	WG826611
Molybdenum	ND		0.00500	1	11/05/2015 03:01	WG826609
Nickel	0.0135		0.0100	1	11/05/2015 03:01	WG826609
Nickel,Dissolved	0.0125		0.0100	1	11/05/2015 01:29	WG826611
Potassium	9.53		1.00	1	11/05/2015 03:01	WG826609
Potassium,Dissolved	9.23		1.00	1	11/05/2015 01:29	WG826611
Selenium	ND		0.0100	1	11/05/2015 03:01	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:29	WG826611
Silver	ND		0.00500	1	11/05/2015 03:01	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:29	WG826611
Sodium	34.0		1.00	1	11/05/2015 03:01	WG826609
Sodium,Dissolved	33.1		1.00	1	11/05/2015 01:29	WG826611
Vanadium	ND		0.0200	1	11/05/2015 03:01	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:29	WG826611
Zinc	ND		0.0500	1	11/05/2015 03:01	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:29	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:44	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:13	WG826588
Arsenic	0.00361		0.00200	1	11/05/2015 13:44	WG826615
Arsenic,Dissolved	0.00375		0.00200	1	11/04/2015 14:13	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:44	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:13	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1180		10.0	1	11/05/2015 12:54	WG826180

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	329		20.0	1	11/10/2015 18:45	WG828137

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:40	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.94		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-07 WG826090: 6.94 at 23.5c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	26.5		1.00	1	11/04/2015 12:40	WG826410
Fluoride	0.540		0.100	1	11/04/2015 12:40	WG826410
Sulfate	491		50.0	10	11/04/2015 16:08	WG826410

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 15:58	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 18:59	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 03:04	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 00:56	WG826611
Barium	0.0730		0.00500	1	11/05/2015 03:04	WG826609
Barium,Dissolved	0.0706		0.00500	1	11/05/2015 00:56	WG826611
Beryllium	ND		0.00200	1	11/05/2015 03:04	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 00:56	WG826611
Boron	2.37		0.200	1	11/05/2015 03:04	WG826609
Cadmium	ND		0.00200	1	11/05/2015 03:04	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 00:56	WG826611
Calcium	186		1.00	1	11/05/2015 03:04	WG826609
Calcium,Dissolved	186		1.00	1	11/05/2015 00:56	WG826611
Chromium	ND		0.0100	1	11/05/2015 03:04	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 00:56	WG826611
Cobalt	ND		0.0100	1	11/05/2015 03:04	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 00:56	WG826611
Copper	ND		0.0100	1	11/05/2015 03:04	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 00:56	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	5.78		0.100	1	11/05/2015 03:04	WG826609
Iron,Dissolved	5.39		0.100	1	11/05/2015 00:56	WG826611
Lead	ND		0.00500	1	11/05/2015 03:04	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 00:56	WG826611
Lithium	0.0243		0.0150	1	11/05/2015 03:04	WG826609
Magnesium	31.4		1.00	1	11/05/2015 03:04	WG826609
Magnesium,Dissolved	31.0		1.00	1	11/05/2015 00:56	WG826611
Manganese	2.47		0.0100	1	11/05/2015 03:04	WG826609
Manganese,Dissolved	2.47		0.0100	1	11/05/2015 00:56	WG826611
Molybdenum	ND		0.00500	1	11/05/2015 03:04	WG826609
Nickel	0.0129		0.0100	1	11/05/2015 03:04	WG826609
Nickel,Dissolved	0.0124		0.0100	1	11/05/2015 00:56	WG826611
Potassium	9.08		1.00	1	11/05/2015 03:04	WG826609
Potassium,Dissolved	8.96		1.00	1	11/05/2015 00:56	WG826611
Selenium	ND		0.0100	1	11/05/2015 03:04	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 00:56	WG826611
Silver	ND		0.00500	1	11/05/2015 03:04	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 00:56	WG826611
Sodium	159		1.00	1	11/05/2015 03:04	WG826609
Sodium,Dissolved	158		1.00	1	11/05/2015 00:56	WG826611
Vanadium	ND		0.0200	1	11/05/2015 03:04	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 00:56	WG826611
Zinc	ND		0.0500	1	11/05/2015 03:04	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 00:56	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:46	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:15	WG826588
Arsenic	0.0120		0.00200	1	11/05/2015 13:46	WG826615
Arsenic,Dissolved	0.0120		0.00200	1	11/04/2015 14:15	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:46	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:15	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1130		10.0	1	11/05/2015 12:51	WG826180

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	502		200	10	11/11/2015 11:23	WG828249

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:20	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.82		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-08 WG826090: 6.82 at 22.9c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	30.2		1.00	1	11/04/2015 17:04	WG826410
Fluoride	0.327		0.100	1	11/04/2015 17:04	WG826410
Sulfate	623		250	50	11/04/2015 17:46	WG826410

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 16:00	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 19:01	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 03:13	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:32	WG826611
Barium	0.183		0.00500	1	11/05/2015 03:13	WG826609
Barium,Dissolved	0.181		0.00500	1	11/05/2015 01:32	WG826611
Beryllium	ND		0.00200	1	11/05/2015 03:13	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:32	WG826611
Boron	1.08		0.200	1	11/05/2015 03:13	WG826609
Cadmium	ND		0.00200	1	11/05/2015 03:13	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:32	WG826611
Calcium	217		1.00	1	11/05/2015 03:13	WG826609
Calcium,Dissolved	213		1.00	1	11/05/2015 01:32	WG826611
Chromium	ND		0.0100	1	11/05/2015 03:13	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:32	WG826611
Cobalt	ND		0.0100	1	11/05/2015 03:13	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:32	WG826611
Copper	ND		0.0100	1	11/05/2015 03:13	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:32	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	7.08		0.100	1	11/05/2015 03:13	WG826609
Iron,Dissolved	6.99		0.100	1	11/05/2015 01:32	WG826611
Lead	ND		0.00500	1	11/05/2015 03:13	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:32	WG826611
Lithium	0.0501		0.0150	1	11/05/2015 03:13	WG826609
Magnesium	42.0		1.00	1	11/05/2015 03:13	WG826609
Magnesium,Dissolved	41.2		1.00	1	11/05/2015 01:32	WG826611
Manganese	0.765		0.0100	1	11/05/2015 03:13	WG826609
Manganese,Dissolved	0.753		0.0100	1	11/05/2015 01:32	WG826611
Molybdenum	ND		0.00500	1	11/05/2015 03:13	WG826609
Nickel	ND		0.0100	1	11/05/2015 03:13	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:32	WG826611
Potassium	11.0		1.00	1	11/05/2015 03:13	WG826609
Potassium,Dissolved	10.8		1.00	1	11/05/2015 01:32	WG826611
Selenium	ND		0.0100	1	11/05/2015 03:13	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:32	WG826611
Silver	ND		0.00500	1	11/05/2015 03:13	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:32	WG826611
Sodium	51.5		1.00	1	11/05/2015 03:13	WG826609
Sodium,Dissolved	50.5		1.00	1	11/05/2015 01:32	WG826611
Vanadium	ND		0.0200	1	11/05/2015 03:13	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:32	WG826611
Zinc	ND		0.0500	1	11/05/2015 03:13	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:32	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:48	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:17	WG826588
Arsenic	0.00743		0.00200	1	11/05/2015 13:48	WG826615
Arsenic,Dissolved	0.00761		0.00200	1	11/04/2015 14:17	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:48	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:17	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	703		10.0	1	11/06/2015 04:05	WG826761

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	70.8		20.0	1	11/10/2015 18:45	WG828137

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:21	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.16		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-09 WG826090: 8.16 at 23.1c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	19.3		1.00	1	11/04/2015 17:18	WG826410
Fluoride	0.109		0.100	1	11/04/2015 17:18	WG826410
Sulfate	282		250	50	11/04/2015 18:00	WG826410

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 16:02	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 19:03	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.826		0.200	1	11/05/2015 03:16	WG826609
Aluminum,Dissolved	0.733		0.200	1	11/05/2015 01:35	WG826611
Barium	0.174		0.00500	1	11/05/2015 03:16	WG826609
Barium,Dissolved	0.168		0.00500	1	11/05/2015 01:35	WG826611
Beryllium	ND		0.00200	1	11/05/2015 03:16	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:35	WG826611
Boron	2.89		0.200	1	11/05/2015 03:16	WG826609
Cadmium	ND		0.00200	1	11/05/2015 03:16	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:35	WG826611
Calcium	128		1.00	1	11/05/2015 03:16	WG826609
Calcium,Dissolved	126		1.00	1	11/05/2015 01:35	WG826611
Chromium	ND		0.0100	1	11/05/2015 03:16	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:35	WG826611
Cobalt	ND		0.0100	1	11/05/2015 03:16	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:35	WG826611
Copper	ND		0.0100	1	11/05/2015 03:16	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:35	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	11/05/2015 03:16	WG826609
Iron,Dissolved	ND		0.100	1	11/05/2015 01:35	WG826611
Lead	ND		0.00500	1	11/05/2015 03:16	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:35	WG826611
Lithium	ND		0.0150	1	11/05/2015 03:16	WG826609
Magnesium	14.1		1.00	1	11/05/2015 03:16	WG826609
Magnesium,Dissolved	13.9		1.00	1	11/05/2015 01:35	WG826611
Manganese	ND		0.0100	1	11/05/2015 03:16	WG826609
Manganese,Dissolved	ND		0.0100	1	11/05/2015 01:35	WG826611
Molybdenum	0.0534		0.00500	1	11/05/2015 03:16	WG826609
Nickel	ND		0.0100	1	11/05/2015 03:16	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:35	WG826611
Potassium	9.70		1.00	1	11/05/2015 03:16	WG826609
Potassium,Dissolved	9.48		1.00	1	11/05/2015 01:35	WG826611
Selenium	ND		0.0100	1	11/05/2015 03:16	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:35	WG826611
Silver	ND		0.00500	1	11/05/2015 03:16	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:35	WG826611
Sodium	75.0		1.00	1	11/05/2015 03:16	WG826609
Sodium,Dissolved	73.2		1.00	1	11/05/2015 01:35	WG826611
Vanadium	ND		0.0200	1	11/05/2015 03:16	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:35	WG826611
Zinc	ND		0.0500	1	11/05/2015 03:16	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:35	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:50	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:20	WG826588
Arsenic	ND		0.00200	1	11/05/2015 13:50	WG826615
Arsenic,Dissolved	ND		0.00200	1	11/04/2015 14:20	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:50	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:20	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1130		10.0	1	11/05/2015 12:53	WG826180

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	322		20.0	1	11/10/2015 18:45	WG828137

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:22	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.97		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-10 WG826090: 6.97 at 23.2c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	30.3		1.00	1	11/04/2015 17:32	WG826410
Fluoride	0.318		0.100	1	11/04/2015 17:32	WG826410
Sulfate	598		250	50	11/04/2015 18:13	WG826410

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 16:05	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 19:05	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.200	1	11/05/2015 03:19	WG826609
Aluminum,Dissolved	ND		0.200	1	11/05/2015 01:38	WG826611
Barium	0.0738		0.00500	1	11/05/2015 03:19	WG826609
Barium,Dissolved	0.0711		0.00500	1	11/05/2015 01:38	WG826611
Beryllium	ND		0.00200	1	11/05/2015 03:19	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:38	WG826611
Boron	2.38		0.200	1	11/05/2015 03:19	WG826609
Cadmium	ND		0.00200	1	11/05/2015 03:19	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:38	WG826611
Calcium	185		1.00	1	11/05/2015 03:19	WG826609
Calcium,Dissolved	183		1.00	1	11/05/2015 01:38	WG826611
Chromium	ND		0.0100	1	11/05/2015 03:19	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:38	WG826611
Cobalt	ND		0.0100	1	11/05/2015 03:19	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:38	WG826611
Copper	ND		0.0100	1	11/05/2015 03:19	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:38	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	5.75		0.100	1	11/05/2015 03:19	WG826609
Iron,Dissolved	5.68		0.100	1	11/05/2015 01:38	WG826611
Lead	ND		0.00500	1	11/05/2015 03:19	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:38	WG826611
Lithium	0.0242		0.0150	1	11/05/2015 03:19	WG826609
Magnesium	31.2		1.00	1	11/05/2015 03:19	WG826609
Magnesium,Dissolved	30.9		1.00	1	11/05/2015 01:38	WG826611
Manganese	2.47		0.0100	1	11/05/2015 03:19	WG826609
Manganese,Dissolved	2.49		0.0100	1	11/05/2015 01:38	WG826611
Molybdenum	ND		0.00500	1	11/05/2015 03:19	WG826609
Nickel	0.0133		0.0100	1	11/05/2015 03:19	WG826609
Nickel,Dissolved	0.0120		0.0100	1	11/05/2015 01:38	WG826611
Potassium	9.00		1.00	1	11/05/2015 03:19	WG826609
Potassium,Dissolved	8.82		1.00	1	11/05/2015 01:38	WG826611
Selenium	ND		0.0100	1	11/05/2015 03:19	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:38	WG826611
Silver	ND		0.00500	1	11/05/2015 03:19	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:38	WG826611
Sodium	158		1.00	1	11/05/2015 03:19	WG826609
Sodium,Dissolved	155		1.00	1	11/05/2015 01:38	WG826611
Vanadium	ND		0.0200	1	11/05/2015 03:19	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:38	WG826611
Zinc	ND		0.0500	1	11/05/2015 03:19	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:38	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 12:55	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 14:22	WG826588
Arsenic	0.0132		0.00200	1	11/05/2015 12:55	WG826615
Arsenic,Dissolved	0.0127		0.00200	1	11/04/2015 14:22	WG826588
Thallium	ND		0.00200	1	11/05/2015 12:55	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 14:22	WG826588

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	716		10.0	1	11/06/2015 04:06	WG826761

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	67.0		20.0	1	11/10/2015 18:45	WG828137

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Phosphorus,Total	ND		0.100	1	11/06/2015 13:24	WG826817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.74		1	11/04/2015 09:45	WG826090

Sample Narrative:

9040C L798087-11 WG826090: 7.74 at 22.8c

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	26.4		1.00	1	11/04/2015 12:53	WG826410
Fluoride	0.535		0.100	1	11/04/2015 12:53	WG826410
Sulfate	490		50.0	10	11/04/2015 16:22	WG826410

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/04/2015 16:07	WG826292
Mercury,Dissolved	ND		0.000200	1	11/03/2015 19:12	WG826285

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.812		0.200	1	11/05/2015 03:22	WG826609
Aluminum,Dissolved	0.759		0.200	1	11/05/2015 01:41	WG826611
Barium	0.173		0.00500	1	11/05/2015 03:22	WG826609
Barium,Dissolved	0.168		0.00500	1	11/05/2015 01:41	WG826611
Beryllium	ND		0.00200	1	11/05/2015 03:22	WG826609
Beryllium,Dissolved	ND		0.00200	1	11/05/2015 01:41	WG826611
Boron	2.90		0.200	1	11/05/2015 03:22	WG826609
Cadmium	ND		0.00200	1	11/05/2015 03:22	WG826609
Cadmium,Dissolved	ND		0.00200	1	11/05/2015 01:41	WG826611
Calcium	127		1.00	1	11/05/2015 03:22	WG826609
Calcium,Dissolved	126		1.00	1	11/05/2015 01:41	WG826611
Chromium	ND		0.0100	1	11/05/2015 03:22	WG826609
Chromium,Dissolved	ND		0.0100	1	11/05/2015 01:41	WG826611
Cobalt	ND		0.0100	1	11/05/2015 03:22	WG826609
Cobalt,Dissolved	ND		0.0100	1	11/05/2015 01:41	WG826611
Copper	ND		0.0100	1	11/05/2015 03:22	WG826609
Copper,Dissolved	ND		0.0100	1	11/05/2015 01:41	WG826611

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	11/05/2015 03:22	WG826609
Iron,Dissolved	ND		0.100	1	11/05/2015 01:41	WG826611
Lead	ND		0.00500	1	11/05/2015 03:22	WG826609
Lead,Dissolved	ND		0.00500	1	11/05/2015 01:41	WG826611
Lithium	ND		0.0150	1	11/05/2015 03:22	WG826609
Magnesium	14.1		1.00	1	11/05/2015 03:22	WG826609
Magnesium,Dissolved	13.7		1.00	1	11/05/2015 01:41	WG826611
Manganese	ND		0.0100	1	11/05/2015 03:22	WG826609
Manganese,Dissolved	ND		0.0100	1	11/05/2015 01:41	WG826611
Molybdenum	0.0530		0.00500	1	11/05/2015 03:22	WG826609
Nickel	ND		0.0100	1	11/05/2015 03:22	WG826609
Nickel,Dissolved	ND		0.0100	1	11/05/2015 01:41	WG826611
Potassium	9.61		1.00	1	11/05/2015 03:22	WG826609
Potassium,Dissolved	9.47		1.00	1	11/05/2015 01:41	WG826611
Selenium	ND		0.0100	1	11/05/2015 03:22	WG826609
Selenium,Dissolved	ND		0.0100	1	11/05/2015 01:41	WG826611
Silver	ND		0.00500	1	11/05/2015 03:22	WG826609
Silver,Dissolved	ND		0.00500	1	11/05/2015 01:41	WG826611
Sodium	74.2		1.00	1	11/05/2015 03:22	WG826609
Sodium,Dissolved	73.4		1.00	1	11/05/2015 01:41	WG826611
Vanadium	ND		0.0200	1	11/05/2015 03:22	WG826609
Vanadium,Dissolved	ND		0.0200	1	11/05/2015 01:41	WG826611
Zinc	ND		0.0500	1	11/05/2015 03:22	WG826609
Zinc,Dissolved	ND		0.0500	1	11/05/2015 01:41	WG826611

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	11/05/2015 13:53	WG826615
Antimony,Dissolved	ND		0.00200	1	11/04/2015 13:45	WG826588
Arsenic	ND		0.00200	1	11/05/2015 13:53	WG826615
Arsenic,Dissolved	ND		0.00200	1	11/04/2015 13:45	WG826588
Thallium	ND		0.00200	1	11/05/2015 13:53	WG826615
Thallium,Dissolved	ND		0.00200	1	11/04/2015 13:45	WG826588

Method Blank (MB)

(MB) 11/05/15 12:53

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Dissolved Solids	ND		10.0

L797998-03 Original Sample (OS) • Duplicate (DUP)

(OS) 11/05/15 12:53 • (DUP) 11/05/15 12:53

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	1410	1410	1	0.142		5

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

(LCS) 11/05/15 12:53 • (LCSD) 11/05/15 12:54

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	%	%	%			%	%
Dissolved Solids	8800	8550	8500	97.2	96.6	85.0-115			0.587	5

Method Blank (MB)

(MB) 11/06/15 14:25

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Dissolved Solids	ND		10.0

L798019-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/06/15 14:22 • (DUP) 11/06/15 14:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1890	1880	1	0.531		5

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

(LCS) 11/06/15 14:23 • (LCSD) 11/06/15 14:24

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 %
Dissolved Solids	8800	8530	8680	96.9	98.6	85.0-115			1.74	5

Method Blank (MB)

(MB) 11/06/15 04:08

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Dissolved Solids	ND		10.0

L798511-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/06/15 04:06 • (DUP) 11/06/15 04:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1100	1050	1	4.09		5

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

(LCS) 11/06/15 04:07 • (LCSD) 11/06/15 04:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Dissolved Solids	8800	8470	8640	96.3	98.2	85.0-115			1.99	5

Method Blank (MB)

(MB) 11/10/15 18:45

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Alkalinity	ND		20.0

L797421-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/10/15 18:45 • (DUP) 11/10/15 18:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Alkalinity	39.6	39.5	1	0.253		20

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

(LCS) 11/10/15 18:45 • (LCSD) 11/10/15 18:45

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	%	%	%			%	%
Alkalinity	100	93.0	85.1	93.0	85.1	85.0-115			8.87	20

L797421-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/10/15 18:45 • (MS) 11/10/15 18:45 • (MSD) 11/10/15 18:45

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	%	%		%			%	%
Alkalinity	100	63.2	147	123	83.8	59.8	1	80.0-120		J6	17.8	20

Method Blank (MB)

(MB) 11/11/15 11:23

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Alkalinity	ND		20.0

L797754-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/11/15 11:23 • (DUP) 11/11/15 11:23

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

L798112-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/11/15 11:23 • (DUP) 11/11/15 11:23

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

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

(LCS) 11/11/15 11:23 • (LCSD) 11/11/15 11:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100	92.8	94.7	92.8	94.7	85.0-115			2.03	20

L798112-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/11/15 11:23 • (MS) 11/11/15 11:23 • (MSD) 11/11/15 11:23

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 %
Alkalinity	100	3.04	84.2	84.1	84.2	84.1	1	80.0-120			0.238	20

Method Blank (MB)

(MB) 11/06/15 12:53

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Phosphorus,Total	ND		0.100

L798087-11 Original Sample (OS) • Duplicate (DUP)

(OS) 11/06/15 13:24 • (DUP) 11/06/15 13:25

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

L797548-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/06/15 13:36 • (DUP) 11/06/15 13:38

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Phosphorus,Total	8.70	8.30	5	4.71		20

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

(LCS) 11/06/15 12:55 • (LCSD) 11/06/15 12:57

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 %
Phosphorus,Total	1.00	0.987	1.01	98.7	101	90.0-110			2.30	20

L798157-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/06/15 13:26 • (MS) 11/06/15 13:27 • (MSD) 11/06/15 13:29

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 %
Phosphorus,Total	2.50	0.209	2.74	2.71	101	100	1	90.0-110			1.10	20

L798045-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/04/15 09:45 • (DUP) 11/04/15 09:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.64	6.64	1	0.000		1

L798113-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/04/15 09:45 • (DUP) 11/04/15 09:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.12	8.11	1	0.123		1

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

(LCS) 11/04/15 09:45 • (LCSD) 11/04/15 09:45

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.72	6.69	6.69	99.6	99.6	98.5-102			0.000	1

Method Blank (MB)

(MB) 11/05/15 09:08

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Chloride	ND		1.00
Fluoride	ND		0.100
Sulfate	ND		5.00

L798032-04 Original Sample (OS) • Duplicate (DUP)

(OS) 11/05/15 13:13 • (DUP) 11/05/15 13:27

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	61.8	61.8	1	0		20
Fluoride	0.504	0.499	1	1		20
Sulfate	27.7	27.2	1	2		20

L798087-02 Original Sample (OS) • Duplicate (DUP)

(OS) 11/05/15 19:05 • (DUP) 11/05/15 19:19

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	4.45	4.43	1	0		20
Fluoride	0.158	0.149	1	6		20

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

(LCS) 11/05/15 09:22 • (LCSD) 11/05/15 09:36

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 %
Chloride	40.0	40.1	40.1	100	100	90-110			0	20
Fluoride	8.00	8.03	8.06	100	101	90-110			0	20
Sulfate	40.0	39.2	39.4	98	98	90-110			0	20

L798032-05 Original Sample (OS) • Matrix Spike (MS)

(OS) 11/05/15 13:41 • (MS) 11/05/15 13:55

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier

L798032-05 Original Sample (OS) • Matrix Spike (MS)

(OS) 11/05/15 13:41 • (MS) 11/05/15 13:55

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Fluoride	5.00	0.734	5.55	96	1	80-120	

L798032-05 Original Sample (OS) • Matrix Spike (MS)

(OS) 11/05/15 16:59 • (MS) 11/05/15 17:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	5.00	209	723	103	10	80-120	
Sulfate	5.00	213	678	93	10	80-120	

L798087-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/05/15 19:32 • (MS) 11/05/15 19:46 • (MSD) 11/05/15 20:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	9.72	61.6	61.8	104	104	1	80-120			0	20
Fluoride	5.00	0.112	5.23	5.27	102	103	1	80-120			1	20

Method Blank (MB)

(MB) 11/04/15 06:27

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Chloride	ND		1.00
Fluoride	ND		0.100
Sulfate	ND		5.00

L797190-03 Original Sample (OS) • Duplicate (DUP)

(OS) 11/04/15 10:49 • (DUP) 11/04/15 11:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	5.56	5.57	5	0		20
Fluoride	0.890	0.878	5	1		20
Sulfate	247	248	5	0		20

L797301-02 Original Sample (OS) • Duplicate (DUP)

(OS) 11/04/15 15:40 • (DUP) 11/04/15 15:54

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	8.88	8.80	10	0		20
Fluoride	0.322	0.300	10	0		20
Sulfate	758	759	10	0		20

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

(LCS) 11/04/15 06:41 • (LCSD) 11/04/15 06:55

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 %
Chloride	40.0	39.9	40.2	100	101	90-110			1	20
Fluoride	8.00	8.00	8.04	100	100	90-110			1	20
Sulfate	40.0	38.6	38.6	97	97	90-110			0	20

L797190-04 Original Sample (OS) • Matrix Spike (MS)

(OS) 11/04/15 11:16 • (MS) 11/04/15 11:30

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	10.0	8.40	254	98	5	80-120	
Fluoride	1.00	0.734	25.7	100	5	80-120	
Sulfate	10.0	186	420	93	5	80-120	

L797301-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/04/15 14:59 • (MS) 11/04/15 15:13 • (MSD) 11/04/15 15:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	10.0	5.25	258	258	101	101	5	80-120			0	20
Fluoride	1.00	0.558	26.1	26.2	102	102	5	80-120			0	20
Sulfate	10.0	311	536	537	90	90	5	80-120			0	20

Method Blank (MB)

(MB) 11/09/15 11:31

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Sulfate	ND		5.00

L798019-13 Original Sample (OS) • Duplicate (DUP)

(OS) 11/09/15 21:44 • (DUP) 11/09/15 21:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	2570	2630	50	2		20

L797938-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/10/15 00:03 • (DUP) 11/10/15 00:17

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	148	145	2	2		20

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

(LCS) 11/09/15 11:45 • (LCSD) 11/09/15 11:59

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 %
Sulfate	40.0	39.3	39.3	98	98	90-110			0	20

L797760-01 Original Sample (OS) • Matrix Spike (MS)

(OS) 11/09/15 20:49 • (MS) 11/09/15 21:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	25.0	1.08	94.2	93	2	80-120	

Method Blank (MB)

(MB) 11/12/15 05:28

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Sulfate	ND		5.00

L800369-03 Original Sample (OS) • Duplicate (DUP)

(OS) 11/12/15 10:10 • (DUP) 11/12/15 12:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	7.70	7.84	1	2		20

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

(LCS) 11/12/15 05:43 • (LCSD) 11/12/15 05:57

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 %
Sulfate	40.0	39.7	40.7	99	102	90-110			3	20

L800369-01 Original Sample (OS) • Matrix Spike (MS)

(OS) 11/12/15 10:25 • (MS) 11/12/15 12:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	5.13	56.5	103	1	80-120	

Method Blank (MB)

(MB) 11/03/15 18:21

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Mercury,Dissolved	ND		0.000200

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

(LCS) 11/03/15 18:23 • (LCSD) 11/03/15 20:28

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	%	%	%			%	%
Mercury,Dissolved	0.00300	0.00252	0.00267	84	89	80-120			6	20

L797173-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/03/15 18:28 • (MS) 11/03/15 18:30 • (MSD) 11/03/15 18:32

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	%	%		%			%	%
Mercury,Dissolved	0.00300	ND	0.00162	0.00166	54	55	1	75-125	J6	J6	3	20

Method Blank (MB)

(MB) 11/04/15 15:25

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Mercury	ND		0.000200

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

(LCS) 11/04/15 15:27 • (LCSD) 11/04/15 15:29

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	%	%	%			%	%
Mercury	0.00300	0.00292	0.00286	97	95	80-120			2	20

L798087-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/04/15 15:31 • (MS) 11/04/15 15:34 • (MSD) 11/04/15 15:36

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	%	%		%			%	%
Mercury	0.00300	ND	0.00291	0.00298	97	99	1	75-125			2	20

Method Blank (MB)

(MB) 11/05/15 02:19

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Aluminum	ND		0.200
Barium	ND		0.00500
Beryllium	ND		0.00200
Boron	ND		0.200
Cadmium	ND		0.00200
Calcium	ND		1.00
Chromium	ND		0.0100
Cobalt	ND		0.0100
Copper	ND		0.0100
Iron	ND		0.100
Lead	ND		0.00500
Lithium	ND		0.0150
Magnesium	ND		1.00
Manganese	ND		0.0100
Molybdenum	ND		0.00500
Nickel	ND		0.0100
Potassium	ND		1.00
Selenium	ND		0.0100
Silver	ND		0.00500
Sodium	ND		1.00
Vanadium	ND		0.0200
Zinc	ND		0.0500

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

(LCS) 11/05/15 02:22 • (LCSD) 11/05/15 02:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	1.00	0.945	0.958	94	96	80-120			1	20
Barium	1.00	1.04	1.05	104	105	80-120			1	20
Beryllium	1.00	1.06	1.07	106	107	80-120			1	20
Boron	1.00	1.05	1.06	105	106	80-120			0	20
Cadmium	1.00	1.05	1.06	105	106	80-120			1	20
Calcium	10.0	10.2	10.3	102	103	80-120			1	20
Chromium	1.00	1.06	1.07	106	107	80-120			1	20
Cobalt	1.00	1.05	1.06	105	106	80-120			1	20

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

(LCS) 11/05/15 02:22 • (LCSD) 11/05/15 02:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Copper	1.00	1.04	1.05	104	105	80-120			1	20
Iron	1.00	1.00	1.02	100	102	80-120			2	20
Lead	1.00	1.05	1.06	105	106	80-120			1	20
Lithium	1.00	1.03	1.04	103	104	80-120			1	20
Magnesium	10.0	10.7	10.7	107	107	80-120			1	20
Manganese	1.00	1.02	1.03	102	103	80-120			1	20
Molybdenum	1.00	1.04	1.05	104	105	80-120			1	20
Nickel	1.00	1.04	1.04	104	104	80-120			1	20
Potassium	10.0	10.2	10.3	102	103	80-120			1	20
Selenium	1.00	1.09	1.10	109	110	80-120			1	20
Silver	1.00	1.06	1.07	106	107	80-120			1	20
Sodium	10.0	10.4	10.5	104	105	80-120			1	20
Vanadium	1.00	1.07	1.08	107	108	80-120			1	20
Zinc	1.00	1.02	1.03	102	103	80-120			1	20

L798319-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/05/15 02:28 • (MS) 11/05/15 02:39 • (MSD) 11/05/15 02:42

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	1.00	ND	0.953	0.990	95	99	1	75-125			4	20
Barium	1.00	0.140	1.16	1.16	102	102	1	75-125			0	20
Beryllium	1.00	ND	1.06	1.06	106	106	1	75-125			0	20
Boron	1.00	0.141	1.20	1.20	106	106	1	75-125			0	20
Cadmium	1.00	ND	1.06	1.06	106	106	1	75-125			0	20
Calcium	10.0	83.7	93.7	93.6	100	100	1	75-125			0	20
Chromium	1.00	0.000882	1.05	1.05	104	105	1	75-125			0	20
Cobalt	1.00	0.000740	1.06	1.07	106	106	1	75-125			0	20
Copper	1.00	0.0566	1.09	1.09	103	104	1	75-125			0	20
Iron	1.00	0.0651	1.07	1.07	100	100	1	75-125			0	20
Lead	1.00	0.000870	1.05	1.05	105	105	1	75-125			0	20
Lithium	1.00	0.0370	1.06	1.07	103	103	1	75-125			1	20
Magnesium	10.0	25.9	36.4	36.0	105	102	1	75-125			1	20
Manganese	1.00	0.0456	1.04	1.05	100	100	1	75-125			0	20
Molybdenum	1.00	0.00339	1.04	1.04	104	104	1	75-125			0	20
Nickel	1.00	0.00227	1.05	1.05	105	105	1	75-125			0	20

L798319-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/05/15 02:28 • (MS) 11/05/15 02:39 • (MSD) 11/05/15 02:42

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 %
Potassium	10.0	6.68	16.9	16.8	102	102	1	75-125			0	20
Selenium	1.00	0.0000900	1.12	1.12	112	112	1	75-125			0	20
Silver	1.00	ND	1.07	1.08	107	108	1	75-125			0	20
Sodium	10.0	66.9	75.8	75.9	89	91	1	75-125			0	20
Vanadium	1.00	0.00236	1.08	1.07	107	107	1	75-125			0	20
Zinc	1.00	0.00217	1.02	1.02	102	102	1	75-125			0	20

Method Blank (MB)

(MB) 11/05/15 00:47

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Aluminum,Dissolved	ND		0.200
Barium,Dissolved	ND		0.00500
Beryllium,Dissolved	ND		0.00200
Cadmium,Dissolved	ND		0.00200
Calcium,Dissolved	ND		1.00
Chromium,Dissolved	ND		0.0100
Cobalt,Dissolved	ND		0.0100
Copper,Dissolved	ND		0.0100
Iron,Dissolved	ND		0.100
Lead,Dissolved	ND		0.00500
Magnesium,Dissolved	ND		1.00
Manganese,Dissolved	ND		0.0100
Nickel,Dissolved	ND		0.0100
Potassium,Dissolved	ND		1.00
Selenium,Dissolved	ND		0.0100
Silver,Dissolved	0.0113		0.00500
Sodium,Dissolved	ND		1.00
Vanadium,Dissolved	ND		0.0200
Zinc,Dissolved	ND		0.0500

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

(LCS) 11/05/15 00:50 • (LCSD) 11/05/15 00:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	1.00	0.951	0.941	95	94	80-120			1	20
Barium,Dissolved	1.00	1.03	1.02	103	102	80-120			0	20
Beryllium,Dissolved	1.00	1.04	1.05	104	105	80-120			0	20
Cadmium,Dissolved	1.00	1.04	1.04	104	104	80-120			0	20
Calcium,Dissolved	10.0	10.1	10.1	101	101	80-120			0	20
Chromium,Dissolved	1.00	1.05	1.05	105	105	80-120			0	20
Cobalt,Dissolved	1.00	1.04	1.03	104	103	80-120			1	20
Copper,Dissolved	1.00	1.02	1.02	102	102	80-120			0	20
Iron,Dissolved	1.00	0.998	0.995	100	100	80-120			0	20
Lead,Dissolved	1.00	1.04	1.04	104	104	80-120			0	20
Magnesium,Dissolved	10.0	10.5	10.4	105	104	80-120			1	20

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

(LCS) 11/05/15 00:50 • (LCSD) 11/05/15 00:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Manganese,Dissolved	1.00	1.01	1.00	101	100	80-120			0	20
Nickel,Dissolved	1.00	1.02	1.02	102	102	80-120			0	20
Potassium,Dissolved	10.0	10.0	10.1	100	101	80-120			0	20
Selenium,Dissolved	1.00	1.07	1.07	107	107	80-120			1	20
Silver,Dissolved	1.00	1.05	1.05	105	105	80-120			0	20
Sodium,Dissolved	10.0	10.3	10.3	103	103	80-120			0	20
Vanadium,Dissolved	1.00	1.05	1.05	105	105	80-120			0	20
Zinc,Dissolved	1.00	1.00	1.00	100	100	80-120			0	20

L798087-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/05/15 00:56 • (MS) 11/05/15 01:01 • (MSD) 11/05/15 01:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	1.00	ND	0.954	0.961	95	96	1	75-125			1	20
Barium,Dissolved	1.00	0.0706	1.09	1.08	102	101	1	75-125			0	20
Beryllium,Dissolved	1.00	0.0000360	1.06	1.05	106	105	1	75-125			0	20
Cadmium,Dissolved	1.00	ND	1.08	1.08	108	108	1	75-125			0	20
Calcium,Dissolved	10.0	186	195	195	92	90	1	75-125			0	20
Chromium,Dissolved	1.00	0.000301	1.05	1.04	105	104	1	75-125			0	20
Cobalt,Dissolved	1.00	0.00691	1.09	1.08	108	108	1	75-125			0	20
Copper,Dissolved	1.00	0.00248	1.04	1.04	104	104	1	75-125			0	20
Iron,Dissolved	1.00	5.39	6.34	6.36	95	97	1	75-125			0	20
Lead,Dissolved	1.00	ND	1.06	1.05	106	105	1	75-125			1	20
Magnesium,Dissolved	10.0	31.0	41.3	41.2	103	102	1	75-125			0	20
Manganese,Dissolved	1.00	2.47	3.44	3.43	98	96	1	75-125			0	20
Nickel,Dissolved	1.00	0.0124	1.07	1.07	106	106	1	75-125			0	20
Potassium,Dissolved	10.0	8.96	19.2	19.1	102	101	1	75-125			0	20
Selenium,Dissolved	1.00	0.00211	1.17	1.17	117	117	1	75-125			0	20
Silver,Dissolved	1.00	0.000517	1.10	1.09	110	109	1	75-125			1	20
Sodium,Dissolved	10.0	158	167	166	81	77	1	75-125			0	20
Vanadium,Dissolved	1.00	0.00255	1.07	1.08	106	107	1	75-125			1	20
Zinc,Dissolved	1.00	0.00521	1.01	1.01	101	101	1	75-125			0	20

Method Blank (MB)

(MB) 11/04/15 13:38

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Antimony,Dissolved	ND		0.00200
Arsenic,Dissolved	ND		0.00200
Thallium,Dissolved	ND		0.00200

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

(LCS) 11/04/15 13:41 • (LCSD) 11/04/15 14:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.0524	0.0525	105	105	80-120			0	20
Arsenic,Dissolved	0.0500	0.0481	0.0470	96	94	80-120			2	20
Thallium,Dissolved	0.0500	0.0498	0.0520	100	104	80-120			4	20

L798087-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/04/15 13:45 • (MS) 11/04/15 13:50 • (MSD) 11/04/15 13:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.00121	0.0546	0.0544	107	106	1	75-125			0	20
Arsenic,Dissolved	0.0500	0.00151	0.0527	0.0523	102	101	1	75-125			1	20
Thallium,Dissolved	0.0500	0.0000402	0.0490	0.0489	98	98	1	75-125			0	20

Method Blank (MB)

(MB) 11/05/15 12:47

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Antimony	ND		0.00200
Arsenic	ND		0.00200
Thallium	ND		0.00200

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

(LCS) 11/05/15 12:50 • (LCSD) 11/05/15 12:52

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	%	%	%			%	%
Antimony	0.0500	0.0530	0.0544	106	109	80-120			2	20
Arsenic	0.0500	0.0485	0.0498	97	100	80-120			3	20
Thallium	0.0500	0.0500	0.0512	100	102	80-120			2	20

L798087-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/05/15 12:55 • (MS) 11/05/15 12:59 • (MSD) 11/05/15 13:01

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	%	%		%			%	%
Antimony	0.0500	0.000412	0.0558	0.0555	111	110	1	75-125			1	20
Arsenic	0.0500	0.0132	0.0639	0.0639	101	101	1	75-125			0	20
Thallium	0.0500	0.0000933	0.0492	0.0494	98	99	1	75-125			0	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
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.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

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

ESC Lab Sciences 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.**

State Accreditations

Alabama	40660
Alaska	UST-080
Arizona	AZ0612
Arkansas	88-0469
California	01157CA
Colorado	TN00003
Conneticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1]	90010
Kentucky [2]	16
Louisiana	AI30792
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico	TN00003
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [2]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	221
South Carolina	84004
South Dakota	n/a
Tennessee [1 4]	2006
Texas	T 104704245-07-TX
Texas [5]	LAB0152
Utah	6157585858
Vermont	VT2006
Virginia	109
Washington	C1915
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

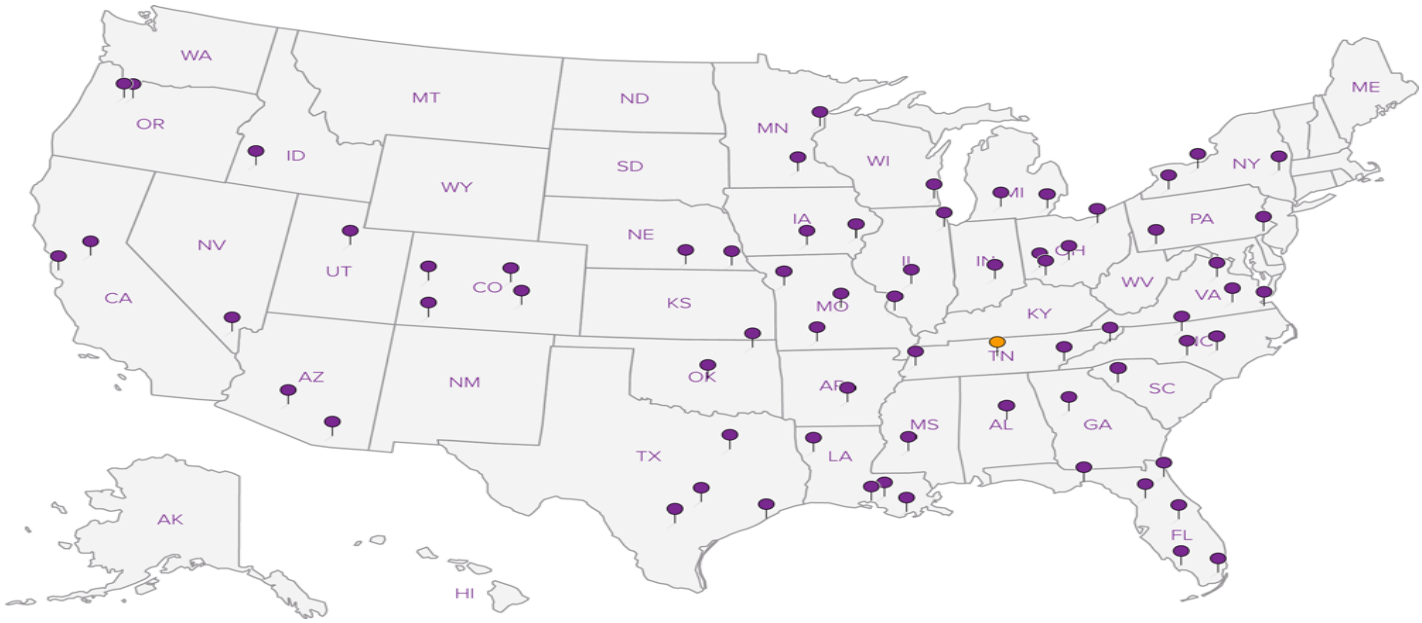
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA	100789
DOD	1461.01
USDA	S-67674

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Barb Toews

Email To: btoews@bpu.com

Project Description: groundwater

City/State Collected: KANSAS CITY KANSAS

Phone: 913-573-9806
Fax:

Client Project # 62801 BPU Nearman

Lab Project # KCKAN02-MW NEARMAN

Collected by (print): TIM DUCKER

Site/Facility ID # NEARMEN

P.O. # VISA-Leah Ellis

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Chloride,Sulfate,Alk 500mlHDPE-NoPres	Dissolved TAL Metals 500mlHDPE-HNO3	Phos, Total 250mlHDPE-H2SO4	Radium 226/228 1L-HDPE-Add HNO3	TDS 250mlHDPE-NoPres	TDS, Fluoride, pH 250mlHDPE-NoPres	Total TAL Metals 500mlHDPE-HNO3	Total TAL Metals+ 500mlHDPE-HNO3	Rem./Contaminant	Sample # (lab only)
~~HCW-1~~		~~GW~~				5	X	X	X		X		X			
MW-9		GW		10·30·15	1150	5	X	X	X		X		X			-01
MW-3		GW		10·29·15	1440	7	X	X	X	X		X		X		02
MW-4		GW		10·30·15	0920	7	X	X	X	X		X		X		03
MW-6		GW		10·30·15	1355	5	X	X	X		X		X			04
MW-7		GW		10·30·15	1305	5	X	X	X		X		X			05
~~MW-1B~~		~~GW~~				5	X	X	X		X		X			
MW-2A		GW		10·29·15	1355	7	X	X	X	X		X		X		06
MW-8A		GW		10·29·15	1125	7	X	X	X	X		X		X		07
MW-10		GW		10·29·15	1300	7	X	X	X	X		X		X		08

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	10·30·15	1500	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.6 °C Bottles Received: 71

Date: 10/31/15 Time: 900

Hold #

Condition: (lab use only) JW7

COC Seal Intact: ___Y ___N ___NA

pH Checked: 12 NCF:

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L798087

H171

Acctnum: KCKAN02
Template: T106697
Prelogin: P528513
TSR: 650 - Linda Cashman
PB:
Shipped Via: FedEX Ground

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Barb Toews

Email To: btoews@bpu.com

Project Description: groundwater

City/State Collected: KANSAS CITY KANSAS

Phone: 913-573-9806
Fax:

Client Project # 62801 BPU Nearman

Lab Project # KCKAN02-MW NEARMAN

Collected by (print): TIM DOCKER

Site/Facility ID # NEARMAN

P.O. # VISA-Leah Ellis

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Chloride,Sulfate,Alk 500mlHDPE-NoPres	Dissolved TAL Metals 500mlHDPE-HNO3	Phos, Total 250mlHDPE-H2SO4	Radium 226/228 1L-HDPE-Add HNO3	TDS 250mlHDPE-NoPres	TDS, Fluoride, pH 250mlHDPE-NoPres	Total TAL Metals 500mlHDPE-HNO3	Total TAL Metals+ 500mlHDPE-HNO3	Rem./Contaminant	Sample # (lab only)
~~MW-11~~		~~GW~~				7	X	X	X	X		X		X		
BA POND	—	GW	—	10-30-15	0955	7	X	X	X	X		X		X		-09
~~FA POND~~		~~GW~~				5	X	X	X		X		X			
DUP-1A	—	GW	—	10-29-15	—	7	X	X	X	X		X		X		10
DUP-2	—	GW	—	10-30-15	—	7	X	X	X	X		X		X		11

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L798087

Table #

Acctnum: KCKAN02
Template: T106697
Prelogin: P528513
TSR: 650 - Linda Cashman
PB:

Shipped Via: FedEX Ground

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	10-30-15	1500	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.6 °C Bottles Received: 71

Date: 10/31/15 Time: 900

Condition: (lab use only) JW

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

ESC LAB SCIENCES
YOUR LAB OF CHOICE

ANALYTICAL REPORT

November 25, 2015

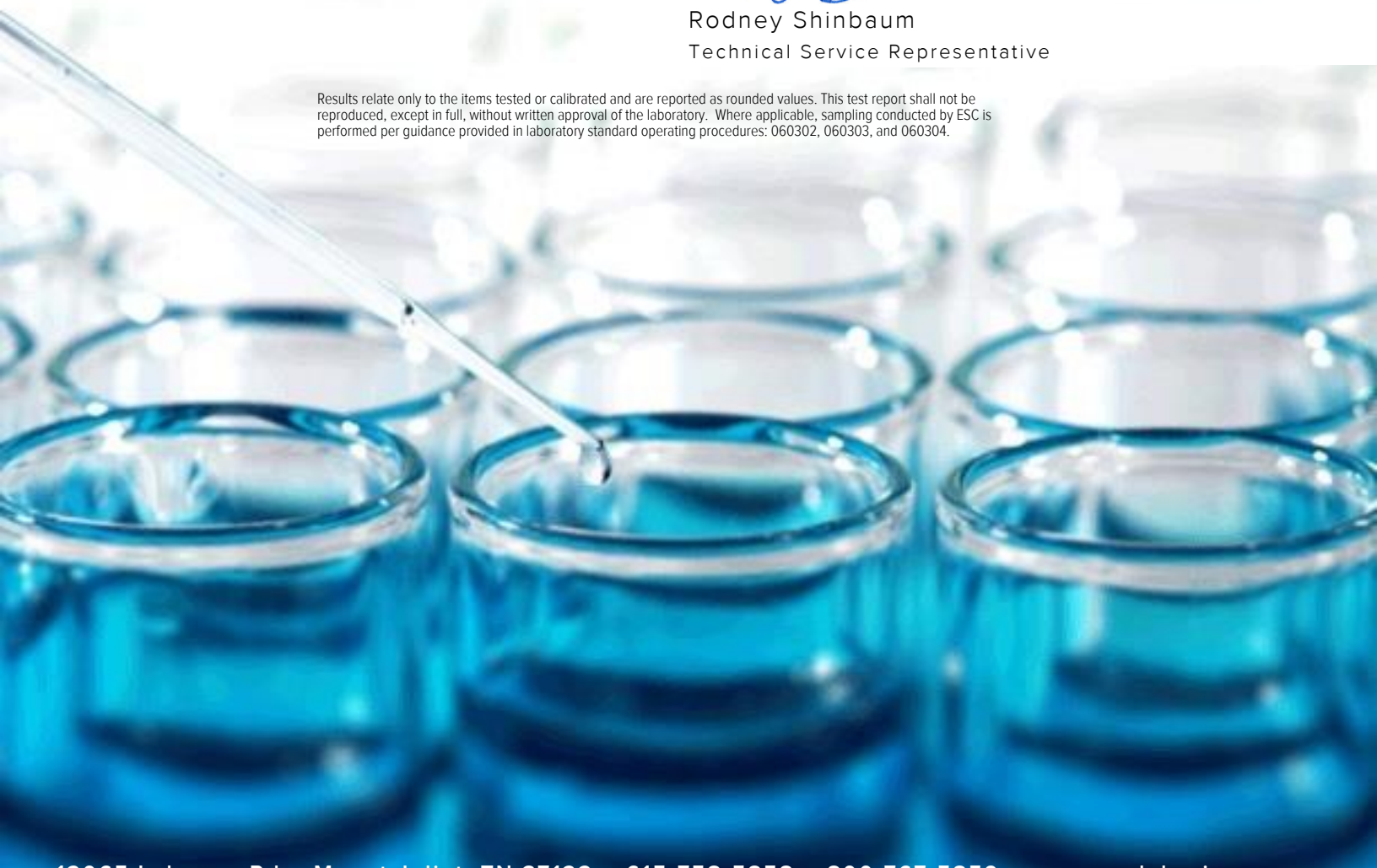
myESC
REAL TIME DATA ACCESS

Kansas City Board of Public Utilities

Sample Delivery Group:	L798090
Samples Received:	10/31/2015
Project Number:	62801 BPU Nearman
Description:	groundwater
Site:	NEARMEN
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Rodney Shinbaum
Technical Service Representative



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. 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.

Rodney Shinbaum
Technical Service Representative

Project Narrative

L798090 -01, -02, -03, -04, -05, -06, -07, -08 contains subout data that is included after the chain of custody.

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
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.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description

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

ESC Lab Sciences 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.**

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

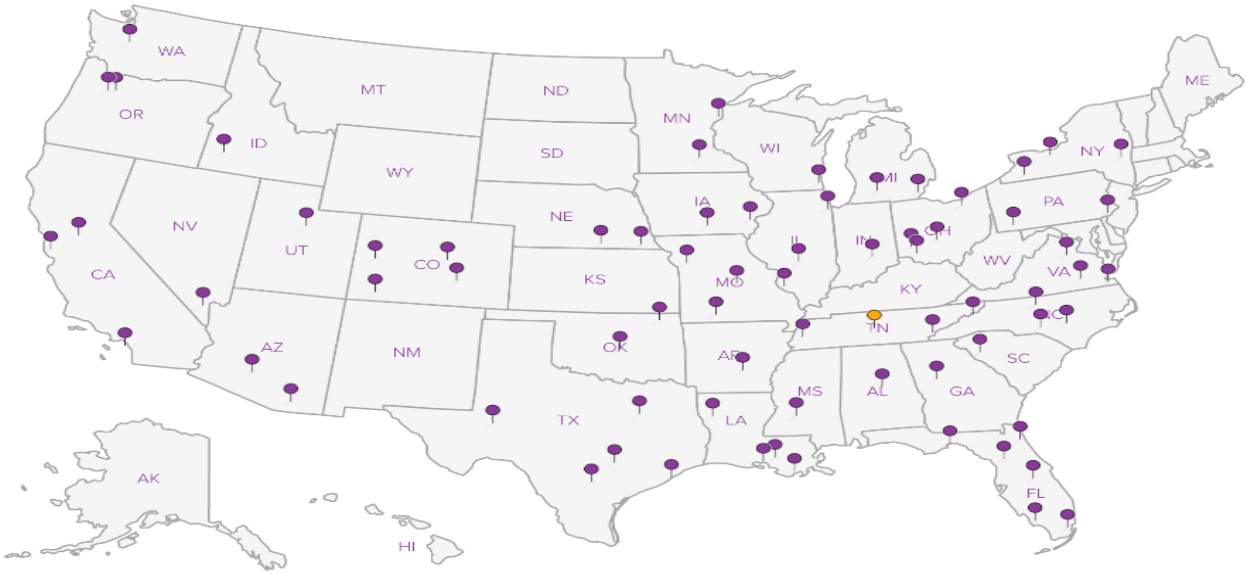
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Barb Toews

Email To: btoews@bpu.com

Project Description: groundwater

City/State Collected: KANSAS CITY KANSAS

Phone: 913-573-9806
Fax:

Client Project # 62801 BPU Nearman

Lab Project # KCKAN02-MW NEARMAN

Collected by (print): TIM DUCKER

Site/Facility ID # NEARMEN

P.O. # VISA-Leah Ellis

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Chloride,Sulfate,Alk 500mlHDPE-NoPres	Dissolved TAL Metals 500mlHDPE-HNO3	Phos, Total 250mlHDPE-H2SO4	Radium 226/228 1L-HDPE-Add HNO3	TDS 250mlHDPE-NoPres	TDS, Fluoride, pH 250mlHDPE-NoPres	Total TAL Metals 500mlHDPE-HNO3	Total TAL Metals+ 500mlHDPE-HNO3	Rem./Contaminant	Sample # (lab only)
~~HCW-1~~		~~GW~~				5	X	X	X		X		X			
MW-9		GW		10-30-15	1150	5	X	X	X		X		X			
MW-3		GW		10-29-15	1440	7	X	X	X	X		X		X		-01
MW-4		GW		10-30-15	0920	7	X	X	X	X		X		X		02
MW-6		GW		10-30-15	1355	5	X	X	X		X		X			
MW-7		GW		10-30-15	1305	5	X	X	X		X		X			
~~MW-1B~~		~~GW~~				5	X	X	X		X		X			
MW-2A		GW		10-29-15	1355	7	X	X	X	X		X		X		03
MW-8A		GW		10-29-15	1125	7	X	X	X	X		X		X		04
MW-10		GW		10-29-15	1300	7	X	X	X	X		X		X		05

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Refer to L798087

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	10-30-15	1500	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.6 °C Bottles Received: 71

Date: 10/31/15 Time: 900

Hold #

Condition: (lab use only) JW7

COC Seal Intact: ___Y ___N ___NA

pH Checked: L2 NCF:

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L798090

H171

Acctnum: KCKAN02
Template: T106697
Prelogin: P528513
TSR: 650 - Linda Cashman
PB:
Shipped Via: FedEx Ground

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Barb Toews

Email To: btoews@bpu.com

Project Description: groundwater

City/State Collected: KANSAS CITY KANSAS

Phone: 913-573-9806
Fax:

Client Project # 62801 BPU Nearman

Lab Project # KCKAN02-MW NEARMAN

Collected by (print): TIM DUCKER

Site/Facility ID # NEARMAN

P.O. # VISA-Leah Ellis

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Chloride,Sulfate,Alk 500mlHDPE-NoPres	Dissolved TAL Metals 500mlHDPE-HNO3	Phos, Total 250mlHDPE-H2SO4	Radium 226/228 1L-HDPE-Add HNO3	TDS 250mlHDPE-NoPres	TDS, Fluoride, pH 250mlHDPE-NoPres	Total TAL Metals 500mlHDPE-HNO3	Total TAL Metals+ 500mlHDPE-HNO3	Rem./Contaminant	Sample # (lab only)
~~MW-11~~		~~GW~~				7	X	X	X	X		X		X		
BA POND	—	GW	—	10.30.15	0955	7	X	X	X	X		X		X		-06
~~FA POND~~		~~GW~~				5	X	X	X		X		X			
DUP-1A	—	GW	—	10.29.15	—	7	X	X	X	X		X		X		07
DUP-2	—	GW	—	10.30.15	—	7	X	X	X	X		X		X		08

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	10.30.15	1500	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.6 °C Bottles Received: 71

Date: 10/31/15 Time: 900

Condition: (lab use only) JW1

COC Seal Intact: ___Y ___N ___NA

pH Checked: LL NCF:

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L798090

Table #

Acctnum: KCKAN02
Template: T106697
Prelogin: P528513
TSR: 650 - Linda Cashman
PB:

Shipped Via: FedEX Ground

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

November 24, 2015

Ms. Janice Cozby
Environmental Science Corporation
12065 Lebanon Road
Mount Juliet, Tennessee 37122

Re: Radiochemistry Analysis - Level 2
Work Order: 384567

Dear Ms. Cozby:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 03, 2015. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Julie Robinson

Julie Robinson
Project Manager

Purchase Order: S22734
Chain of Custody: WG826064
Enclosures

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis Report
for

ENVL001 Environmental Science Corporation

Client SDG: 384567 GEL Work Order: 384567

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by Julie Roberson

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company :	Environmental Science Corporation
Address :	12065 Lebanon Road
	Mount Juliet, Tennessee 37122
Contact:	Ms. Janice Cozby
Project:	Radiochemistry Analysis - Level 2

Client Sample ID:	L798090-01	Project:	ENVL00307
Sample ID:	384567001	Client ID:	ENVL001
Matrix:	Drinking Water (Potable)		
Collect Date:	29-OCT-15 14:40		
Receive Date:	03-NOV-15		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228		0.620	+/-0.312	0.447	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226	U	0.0166	+/-0.134	0.268	1.00	pCi/L		CXP3	11/16/15	1040	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			95	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			109	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company :	Environmental Science Corporation
Address :	12065 Lebanon Road
	Mount Juliet, Tennessee 37122
Contact:	Ms. Janice Cozby
Project:	Radiochemistry Analysis - Level 2

Client Sample ID:	L798090-02	Project:	ENVL00307
Sample ID:	384567002	Client ID:	ENVL001
Matrix:	Drinking Water (Potable)		
Collect Date:	30-OCT-15 09:20		
Receive Date:	03-NOV-15		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	-0.17	+/-0.199	0.444	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226		0.266	+/-0.145	0.159	1.00	pCi/L		CXP3	11/16/15	1040	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			84.8	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			110	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L798090-03
Sample ID: 384567003
Matrix: Drinking Water (Potable)
Collect Date: 29-OCT-15 13:55
Receive Date: 03-NOV-15
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	0.561	+/-0.483	0.790	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226		0.203	+/-0.140	0.192	1.00	pCi/L		CXP3	11/16/15	1040	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			93.1	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			92.2	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company :	Environmental Science Corporation
Address :	12065 Lebanon Road
	Mount Juliet, Tennessee 37122
Contact:	Ms. Janice Cozby
Project:	Radiochemistry Analysis - Level 2

Client Sample ID:	L798090-04	Project:	ENVL00307
Sample ID:	384567004	Client ID:	ENVL001
Matrix:	Drinking Water (Potable)		
Collect Date:	29-OCT-15 11:25		
Receive Date:	03-NOV-15		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	-1.18	+/-0.296	0.811	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226		0.360	+/-0.168	0.164	1.00	pCi/L		CXP3	11/16/15	1110	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			81.7	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			95.8	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L798090-05
Sample ID: 384567005
Matrix: Drinking Water (Potable)
Collect Date: 29-OCT-15 13:00
Receive Date: 03-NOV-15
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	0.133	+/-0.435	0.772	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226		0.309	+/-0.155	0.139	1.00	pCi/L		CXP3	11/16/15	1110	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			87.4	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			98.2	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company :	Environmental Science Corporation
Address :	12065 Lebanon Road
	Mount Juliet, Tennessee 37122
Contact:	Ms. Janice Cozby
Project:	Radiochemistry Analysis - Level 2

Client Sample ID:	L798090-06	Project:	ENVL00307
Sample ID:	384567006	Client ID:	ENVL001
Matrix:	Drinking Water (Potable)		
Collect Date:	30-OCT-15 09:55		
Receive Date:	03-NOV-15		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	0.305	+/-0.334	0.556	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226	U	0.0487	+/-0.115	0.217	1.00	pCi/L		CXP3	11/16/15	1110	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			87.8	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			83.9	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L798090-07
Project: ENVL00307
Sample ID: 384567007
Client ID: ENVL001
Matrix: Drinking Water (Potable)
Collect Date: 29-OCT-15 00:00
Receive Date: 03-NOV-15
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	0.156	+/-0.307	0.547	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226	U	0.142	+/-0.128	0.194	1.00	pCi/L		CXP3	11/16/15	1110	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			87.8	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			88.5	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 24, 2015

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L798090-08
Project: ENVL00307
Sample ID: 384567008
Client ID: ENVL001
Matrix: Drinking Water (Potable)
Collect Date: 30-OCT-15 00:00
Receive Date: 03-NOV-15
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	-0.272	+/-0.416	0.832	1.00	pCi/L		AXM6	11/06/15	1537	1520099	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226	U	0.0782	+/-0.111	0.192	1.00	pCi/L		CXP3	11/16/15	1110	1520274	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			83.2	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			84.1	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

QC Summary

Report Date: November 24, 2015

Environmental Science Corporation
12065 Lebanon Road
Mount Juliet, Tennessee

Contact: **Ms. Janice Cozby**

Workorder: **384567**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch 1520099											
QC1203425007 382871001 DUP											
Radium-228	U	0.230	U	0.573	pCi/L	N/A		N/A	AXM6	11/06/15	15:36
	Uncertainty	+/-0.297		+/-0.459							
QC1203425009 LCS											
Radium-228	8.81			8.91	pCi/L		101	(80%-120%)		11/06/15	15:36
	Uncertainty			+/-1.01							
QC1203425006 MB											
Radium-228			U	0.345	pCi/L					11/06/15	15:37
	Uncertainty			+/-0.361							
QC1203425008 382871001 MS											
Radium-228	88.9 U	0.230		74.6	pCi/L		83.9	(70%-130%)		11/06/15	15:36
	Uncertainty	+/-0.297		+/-7.75							
Rad Ra-226											
Batch 1520274											
QC1203425375 384646001 DUP											
Radium-226	U	0.102	U	0.103	pCi/L	N/A		N/A	CXP3	11/16/15	11:45
	Uncertainty	+/-0.141		+/-0.126							
QC1203425377 LCS											
Radium-226	12.2			12.7	pCi/L		104	(90%-110%)		11/16/15	11:45
	Uncertainty			+/-0.909							
QC1203425374 MB											
Radium-226			U	0.00	pCi/L					11/16/15	11:10
	Uncertainty			+/-0.0901							
QC1203425376 384646001 MS											
Radium-226	12.2 U	0.102		10.6	pCi/L		87.1	(80%-120%)		11/16/15	11:45
	Uncertainty	+/-0.141		+/-0.818							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD

QC Summary

Workorder: **384567**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

M REMP Result > MDC/CL and < RDL

N/A RPD or %Recovery limits do not apply.

N1 See case narrative

ND Analyte concentration is not detected above the detection limit

NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.

R Sample results are rejected

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

UI Gamma Spectroscopy--Uncertain identification

UJ Gamma Spectroscopy--Uncertain identification

UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Other specific qualifiers were required to properly define the results. Consult case narrative.

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

There are no "Data Exception Reports" associated with this analytical report.

Chain of Custody and Supporting Documentation

Sub-Contract Chain of Custody

384507

Environmental Science Corp
12065 Lebanon Road
Mt. Juliet, TN 37122
(615) 773-9756 (615) 758-5859 fax

Sub-Contract Lab : __GEL___
City / State : _____Chrleston, SC_____
Results Needed by : ___11/24/15_____
ESC Purchase Order # : __S22734_____

Send Reports To : ____Janice Cozby jcozby@esclabsciences.com____

WORKGROUP	WG826064
Date Created :	110215

SAMPLENO / Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
L798090-01	DW	102915 1440	Radium 226	RA226	7500Ra B-2001	
19401351 19401350						
L798090-01	DW	↓	Radium 228	RA228	7500Ra D-2001	
19401350 19401351						
L798090-02	DW	103015 0920	Radium 226	RA226	7500Ra B-2001	
19401357 19401358						
L798090-02	DW	↓	Radium 228	RA228	7500Ra D-2001	
19401358 19401357						
L798090-03	DW	102915 1355	Radium 226	RA226	7500Ra B-2001	
19401379 19401380						
L798090-03	DW	↓	Radium 228	RA228	7500Ra D-2001	
19401379 19401380						
L798090-04	DW	1125	Radium 226	RA226	7500Ra B-2001	
19401386 19401387						
L798090-04	DW	↓	Radium 228	RA228	7500Ra D-2001	
19401386 19401387						
L798090-05	DW	1300	Radium 226	RA226	7500Ra B-2001	
19401394 19401393						
L798090-05	DW	↓	Radium 228	RA228	7500Ra D-2001	

Relinquished by _____ Date: 110215
Received by : _____ Date: 110315 0915
Relinquished by _____ Date: _____
Received by : _____ Date: _____

Sub-Contract Lab : __GEL___
City / State : _____Chrleston, SC_____
Results Needed by : ___11/24/15_____
ESC Purchase Order # : __S22734_____
Send Reports To : ____Janice Cozby jcozby@esclabsciences.com____

WORKGROUP	WG826064
Date Created :	

SAMPLENO / Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
19401393						
19401394						
L798090-06	DW	103015 0955	Radium 226	RA226	7500Ra B-2001	
19401408						
19401407						
L798090-06	DW		Radium 228	RA228	7500Ra D-2001	
19401408						
19401407						
L798090-07	DW	102915 0000	Radium 226	RA226	7500Ra B-2001	
19401420						
19401419						
L798090-07	DW		Radium 228	RA228	7500Ra D-2001	
19401419						
19401420						
L798090-08	DW	103015 0000	Radium 226	RA226	7500Ra B-2001	
19401427						
19401426						
L798090-08	DW		Radium 228	RA228	7500Ra D-2001	
19401426						
19401427						

Relinquished by _____ Date: _____
Received by : _____ Date: 110315 0915
Relinquished by _____ Date: _____
Received by : _____ Date: _____

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: ENVL		**SDG/AR/COC/Work Order:**	384567
Received By: H Taylor		**Date Received:**	110315

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts):
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample containers < action levels? cpm
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		✓		Preservation Method: Ice bags Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 16
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	✓			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?		✓		Sample ID's and containers affected:
7	VOA vials contain acid preservation?		✓		(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
9	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	✓			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
13	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?			✓	
15	COC form is properly signed in relinquished/received sections?	HT		✓	Page 2 not signed
16	Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other 6503 7156 9888

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials HT Date 110315 Page 1 of 1 GL-CHL-SR-001 Rev 2

Laboratory Certifications

List of current GEL Certifications as of 24 November 2015

State	Certification
Alaska	UST−110
Arkansas	88−0651
CLIA	42D0904046
California	2940 Interim
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC000122013−10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013−10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA150001
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC000122013−10
Nebraska	NE−OS−26−13
Nevada	SC000122016−1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−15−10
Utah NELAP	SC000122015−19
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

ANALYTICAL REPORT

February 09, 2016

Kansas City Board of Public Utilities

Sample Delivery Group:	L814632
Samples Received:	01/29/2016
Project Number:	KCBPU Nearman
Description:	GW-Creek Bottom Ash Pond
Site:	BA POND
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

MW-2A L814632-01 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 13:25
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:14	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 00:38	LTB
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:23	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 14:28	02/02/16 14:28	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 21:06	02/02/16 21:06	CM

MW-3 L814632-02 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 14:25
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:21	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 00:41	LTB
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:26	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 14:44	02/02/16 14:44	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 21:22	02/02/16 21:22	CM

MW-4 L814632-03 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 15:15
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:24	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 00:50	LTB
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:28	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 15:00	02/02/16 15:00	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 21:38	02/02/16 21:38	CM

MW-8A L814632-04 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 11:50
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:26	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 00:53	LTB
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:31	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 15:16	02/02/16 15:16	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 21:54	02/02/16 21:54	CM

MW-10 L814632-05 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 12:35
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:29	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 00:56	LTB

MW-10 L814632-05 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 12:35
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:33	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 15:32	02/02/16 15:32	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 22:10	02/02/16 22:10	CM

BA POND L814632-06 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 15:40
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:36	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 00:59	LTB
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:35	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 15:48	02/02/16 15:48	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 22:25	02/02/16 22:25	CM

DUP-1 L814632-07 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 00:00
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:39	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 01:02	LTB
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:38	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 16:04	02/02/16 16:04	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 22:41	02/02/16 22:41	CM

DUP-2 L814632-08 GW

Collected by: Tim Ducker
Collected date/time: 01/27/16 00:00
Received date/time: 01/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG845982	1	02/02/16 01:21	02/02/16 03:54	JM
Mercury by Method 7470A	WG846360	1	02/02/16 19:09	02/03/16 07:41	BRJ
Metals (ICP) by Method 6010B	WG845971	1	02/02/16 15:18	02/03/16 01:05	LTB
Metals (ICPMS) by Method 6020	WG846236	1	02/03/16 09:27	02/03/16 13:40	JDG
Wet Chemistry by Method 9040C	WG845761	1	01/30/16 16:03	01/30/16 16:03	AMC
Wet Chemistry by Method 9056A	WG846262	1	02/02/16 16:19	02/02/16 16:19	CM
Wet Chemistry by Method 9056A	WG846262	10	02/02/16 22:57	02/02/16 22:57	CM

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.

Linda Cashman
Technical Service Representative

Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
L814632-01	MW-2A	9040C
L814632-02	MW-3	9040C
L814632-03	MW-4	9040C
L814632-04	MW-8A	9040C
L814632-05	MW-10	9040C
L814632-06	BA POND	9040C
L814632-07	DUP-1	9040C
L814632-08	DUP-2	9040C

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	811		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.91		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-01 WG845761: 6.91 at 11.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	5.81		1.00	1	02/02/2016 14:28	WG846262
Fluoride	0.159		0.100	1	02/02/2016 14:28	WG846262
Sulfate	180		50.0	10	02/02/2016 21:06	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:14	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.125		0.00500	1	02/03/2016 00:38	WG845971
Beryllium	ND		0.00200	1	02/03/2016 00:38	WG845971
Boron	ND		0.200	1	02/03/2016 00:38	WG845971
Cadmium	ND		0.00200	1	02/03/2016 00:38	WG845971
Calcium	208		1.00	1	02/03/2016 00:38	WG845971
Chromium	ND		0.0100	1	02/03/2016 00:38	WG845971
Cobalt	ND		0.0100	1	02/03/2016 00:38	WG845971
Lithium	0.0395		0.0150	1	02/03/2016 00:38	WG845971
Molybdenum	ND		0.00500	1	02/03/2016 00:38	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:23	WG846236
Arsenic	0.00468		0.00200	1	02/03/2016 13:23	WG846236
Lead	ND		0.00200	1	02/03/2016 13:23	WG846236
Selenium	ND		0.00200	1	02/03/2016 13:23	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:23	WG846236

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	749		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.93		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-02 WG845761: 6.93 at 11.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	4.65		1.00	1	02/02/2016 14:44	WG846262
Fluoride	0.125		0.100	1	02/02/2016 14:44	WG846262
Sulfate	114		50.0	10	02/02/2016 21:22	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:21	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.152		0.00500	1	02/03/2016 00:41	WG845971
Beryllium	ND		0.00200	1	02/03/2016 00:41	WG845971
Boron	0.219		0.200	1	02/03/2016 00:41	WG845971
Cadmium	ND		0.00200	1	02/03/2016 00:41	WG845971
Calcium	199		1.00	1	02/03/2016 00:41	WG845971
Chromium	ND		0.0100	1	02/03/2016 00:41	WG845971
Cobalt	ND		0.0100	1	02/03/2016 00:41	WG845971
Lithium	0.0525		0.0150	1	02/03/2016 00:41	WG845971
Molybdenum	ND		0.00500	1	02/03/2016 00:41	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:26	WG846236
Arsenic	0.00269		0.00200	1	02/03/2016 13:26	WG846236
Lead	ND		0.00200	1	02/03/2016 13:26	WG846236
Selenium	0.00576		0.00200	1	02/03/2016 13:26	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:26	WG846236

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	736		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.02		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-03 WG845761: 7.02 at 11.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	8.98		1.00	1	02/02/2016 15:00	WG846262
Fluoride	0.120		0.100	1	02/02/2016 15:00	WG846262
Sulfate	109		50.0	10	02/02/2016 21:38	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:24	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.148		0.00500	1	02/03/2016 00:50	WG845971
Beryllium	ND		0.00200	1	02/03/2016 00:50	WG845971
Boron	ND		0.200	1	02/03/2016 00:50	WG845971
Cadmium	ND		0.00200	1	02/03/2016 00:50	WG845971
Calcium	191		1.00	1	02/03/2016 00:50	WG845971
Chromium	ND		0.0100	1	02/03/2016 00:50	WG845971
Cobalt	ND		0.0100	1	02/03/2016 00:50	WG845971
Lithium	0.0439		0.0150	1	02/03/2016 00:50	WG845971
Molybdenum	ND		0.00500	1	02/03/2016 00:50	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:28	WG846236
Arsenic	ND		0.00200	1	02/03/2016 13:28	WG846236
Lead	ND		0.00200	1	02/03/2016 13:28	WG846236
Selenium	0.0562		0.00200	1	02/03/2016 13:28	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:28	WG846236

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1060		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.04		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-04 WG845761: 7.04 at 13.0c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	30.4		1.00	1	02/02/2016 15:16	WG846262
Fluoride	0.267		0.100	1	02/02/2016 15:16	WG846262
Sulfate	471		50.0	10	02/02/2016 21:54	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:26	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0635		0.00500	1	02/03/2016 00:53	WG845971
Beryllium	ND		0.00200	1	02/03/2016 00:53	WG845971
Boron	2.48		0.200	1	02/03/2016 00:53	WG845971
Cadmium	ND		0.00200	1	02/03/2016 00:53	WG845971
Calcium	168		1.00	1	02/03/2016 00:53	WG845971
Chromium	ND		0.0100	1	02/03/2016 00:53	WG845971
Cobalt	ND		0.0100	1	02/03/2016 00:53	WG845971
Lithium	0.0309		0.0150	1	02/03/2016 00:53	WG845971
Molybdenum	ND		0.00500	1	02/03/2016 00:53	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:31	WG846236
Arsenic	0.0127		0.00200	1	02/03/2016 13:31	WG846236
Lead	ND		0.00200	1	02/03/2016 13:31	WG846236
Selenium	ND		0.00200	1	02/03/2016 13:31	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:31	WG846236

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	916		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.89		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-05 WG845761: 6.89 at 12.4c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	17.0		1.00	1	02/02/2016 15:32	WG846262
Fluoride	0.104		0.100	1	02/02/2016 15:32	WG846262
Sulfate	227		50.0	10	02/02/2016 22:10	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:29	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.106		0.00500	1	02/03/2016 00:56	WG845971
Beryllium	ND		0.00200	1	02/03/2016 00:56	WG845971
Boron	0.907		0.200	1	02/03/2016 00:56	WG845971
Cadmium	ND		0.00200	1	02/03/2016 00:56	WG845971
Calcium	213		1.00	1	02/03/2016 00:56	WG845971
Chromium	ND		0.0100	1	02/03/2016 00:56	WG845971
Cobalt	ND		0.0100	1	02/03/2016 00:56	WG845971
Lithium	0.0571		0.0150	1	02/03/2016 00:56	WG845971
Molybdenum	ND		0.00500	1	02/03/2016 00:56	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:33	WG846236
Arsenic	0.00489		0.00200	1	02/03/2016 13:33	WG846236
Lead	ND		0.00200	1	02/03/2016 13:33	WG846236
Selenium	ND		0.00200	1	02/03/2016 13:33	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:33	WG846236

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	674		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.19		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-06 WG845761: 8.19 at 11.5c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	24.3		1.00	1	02/02/2016 15:48	WG846262
Fluoride	0.407		0.100	1	02/02/2016 15:48	WG846262
Sulfate	323		50.0	10	02/02/2016 22:25	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:36	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.240		0.00500	1	02/03/2016 00:59	WG845971
Beryllium	ND		0.00200	1	02/03/2016 00:59	WG845971
Boron	1.81		0.200	1	02/03/2016 00:59	WG845971
Cadmium	ND		0.00200	1	02/03/2016 00:59	WG845971
Calcium	126		1.00	1	02/03/2016 00:59	WG845971
Chromium	ND		0.0100	1	02/03/2016 00:59	WG845971
Cobalt	ND		0.0100	1	02/03/2016 00:59	WG845971
Lithium	0.0249		0.0150	1	02/03/2016 00:59	WG845971
Molybdenum	0.0326		0.00500	1	02/03/2016 00:59	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:35	WG846236
Arsenic	0.00224		0.00200	1	02/03/2016 13:35	WG846236
Lead	ND		0.00200	1	02/03/2016 13:35	WG846236
Selenium	ND		0.00200	1	02/03/2016 13:35	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:35	WG846236

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	783		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.93		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-07 WG845761: 6.93 at 11.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	5.92		1.00	1	02/02/2016 16:04	WG846262
Fluoride	0.154		0.100	1	02/02/2016 16:04	WG846262
Sulfate	182		50.0	10	02/02/2016 22:41	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:39	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.126		0.00500	1	02/03/2016 01:02	WG845971
Beryllium	ND		0.00200	1	02/03/2016 01:02	WG845971
Boron	0.221		0.200	1	02/03/2016 01:02	WG845971
Cadmium	ND		0.00200	1	02/03/2016 01:02	WG845971
Calcium	206		1.00	1	02/03/2016 01:02	WG845971
Chromium	ND		0.0100	1	02/03/2016 01:02	WG845971
Cobalt	ND		0.0100	1	02/03/2016 01:02	WG845971
Lithium	0.0400		0.0150	1	02/03/2016 01:02	WG845971
Molybdenum	ND		0.00500	1	02/03/2016 01:02	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:38	WG846236
Arsenic	0.00465		0.00200	1	02/03/2016 13:38	WG846236
Lead	ND		0.00200	1	02/03/2016 13:38	WG846236
Selenium	ND		0.00200	1	02/03/2016 13:38	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:38	WG846236

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	678		10.0	1	02/02/2016 03:54	WG845982

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.07		1	01/30/2016 16:03	WG845761

Sample Narrative:

9040C L814632-08 WG845761: 8.07 at 13.7

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	24.4		1.00	1	02/02/2016 16:19	WG846262
Fluoride	0.405		0.100	1	02/02/2016 16:19	WG846262
Sulfate	315		50.0	10	02/02/2016 22:57	WG846262

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	02/03/2016 07:41	WG846360

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.238		0.00500	1	02/03/2016 01:05	WG845971
Beryllium	ND		0.00200	1	02/03/2016 01:05	WG845971
Boron	1.80		0.200	1	02/03/2016 01:05	WG845971
Cadmium	ND		0.00200	1	02/03/2016 01:05	WG845971
Calcium	127		1.00	1	02/03/2016 01:05	WG845971
Chromium	ND		0.0100	1	02/03/2016 01:05	WG845971
Cobalt	ND		0.0100	1	02/03/2016 01:05	WG845971
Lithium	0.0226		0.0150	1	02/03/2016 01:05	WG845971
Molybdenum	0.0327		0.00500	1	02/03/2016 01:05	WG845971

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2016 13:40	WG846236
Arsenic	0.00205		0.00200	1	02/03/2016 13:40	WG846236
Lead	ND		0.00200	1	02/03/2016 13:40	WG846236
Selenium	ND		0.00200	1	02/03/2016 13:40	WG846236
Thallium	ND		0.00200	1	02/03/2016 13:40	WG846236

Method Blank (MB)

(MB) 02/02/16 03:54

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Dissolved Solids	ND		10.0

L814632-08 Original Sample (OS) • Duplicate (DUP)

(OS) 02/02/16 03:54 • (DUP) 02/02/16 03:54

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	678	673	1	0.740		5

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

(LCS) 02/02/16 03:54 • (LCSD) 02/02/16 03:54

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 %
Dissolved Solids	8800	8130	8540	92.4	97.0	85.0-115			4.92	5

L814487-02 Original Sample (OS) • Duplicate (DUP)

(OS) 01/30/16 16:03 • (DUP) 01/30/16 16:03

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.38	7.40	1	0.271		1

L814681-04 Original Sample (OS) • Duplicate (DUP)

(OS) 01/30/16 16:03 • (DUP) 01/30/16 16:03

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	3.05	3.04	1	0.328		1

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

(LCS) 01/30/16 16:03 • (LCSD) 01/30/16 16:03

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.31	6.30	6.29	99.8	99.7	98.5-102			0.159	1

Method Blank (MB)

(MB) 02/02/16 06:31

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Chloride	ND		1.00
Fluoride	ND		0.100
Sulfate	ND		5.00

L814707-03 Original Sample (OS) • Duplicate (DUP)

(OS) 02/02/16 20:02 • (DUP) 02/02/16 20:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	4.94	5.08	1	3		15
Fluoride	0.184	0.176	1	4		15
Sulfate	68.8	68.7	1	0		15

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

(LCS) 02/02/16 06:47 • (LCSD) 02/02/16 07:03

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 %
Chloride	40.0	39.6	39.6	99	99	80-120			0	15
Fluoride	8.00	7.82	7.80	98	98	80-120			0	15
Sulfate	40.0	39.4	39.4	99	98	80-120			0	15

L814407-02 Original Sample (OS) • Matrix Spike (MS)

(OS) 02/02/16 13:56 • (MS) 02/02/16 14:12

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	16.5	263	99	5	80-120	
Fluoride	5.00	0.145	25.4	101	5	80-120	
Sulfate	50.0	115	358	97	5	80-120	

L814707-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 02/02/16 19:14 • (MS) 02/02/16 19:30 • (MSD) 02/02/16 19:46

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 %
Chloride	50.0	3.72	52.8	54.0	98	101	1	80-120			2	15
Fluoride	5.00	0.130	5.14	5.27	100	103	1	80-120			2	15
Sulfate	50.0	26.0	73.9	75.3	96	99	1	80-120			2	15

Method Blank (MB)

(MB) 02/03/16 07:06

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Mercury	ND		0.000200

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

(LCS) 02/03/16 07:08 • (LCSD) 02/03/16 07:11

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	0.00311	0.00274	104	91	80-120			12	20

L814632-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 02/03/16 07:14 • (MS) 02/03/16 07:16 • (MSD) 02/03/16 07:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00304	0.00317	101	106	1	75-125			4	20

Method Blank (MB)

(MB) 02/03/16 00:14

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Barium	ND		0.00500
Beryllium	ND		0.00200
Boron	ND		0.200
Cadmium	ND		0.00200
Calcium	ND		1.00
Chromium	ND		0.0100
Cobalt	ND		0.0100
Lithium	ND		0.0150
Molybdenum	ND		0.00500

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

(LCS) 02/03/16 00:17 • (LCSD) 02/03/16 00:20

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 %
Barium	1.00	1.04	1.04	104	104	80-120			0	20
Beryllium	1.00	1.05	1.05	105	105	80-120			0	20
Boron	1.00	1.05	1.01	105	101	80-120			4	20
Cadmium	1.00	1.05	1.05	105	105	80-120			0	20
Calcium	10.0	10.2	10.1	102	101	80-120			1	20
Chromium	1.00	1.04	1.03	104	103	80-120			1	20
Cobalt	1.00	1.06	1.06	106	106	80-120			0	20
Lithium	1.00	1.02	1.02	102	102	80-120			0	20
Molybdenum	1.00	0.984	0.988	98	99	80-120			0	20

L814581-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 02/03/16 00:23 • (MS) 02/03/16 00:29 • (MSD) 02/03/16 00:32

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 %
Barium	1.00	0.00832	1.02	1.02	102	101	1	75-125			0	20
Beryllium	1.00	0.0000458	1.05	1.05	105	104	1	75-125			0	20
Boron	1.00	0.0990	1.12	1.12	102	102	1	75-125			0	20
Cadmium	1.00	0.000247	1.05	1.05	105	105	1	75-125			0	20
Calcium	10.0	98.4	107	107	85	85	1	75-125			0	20

L814581-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 02/03/16 00:23 • (MS) 02/03/16 00:29 • (MSD) 02/03/16 00:32

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 %
Chromium	1.00	0.00149	1.02	1.02	102	102	1	75-125			0	20
Cobalt	1.00	0.000175	1.07	1.07	107	107	1	75-125			1	20
Lithium	1.00	0.00694	1.01	1.01	100	100	1	75-125			0	20
Molybdenum	1.00	0.00673	0.981	0.977	97	97	1	75-125			0	20

Method Blank (MB)

(MB) 02/03/16 12:20

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Antimony	ND		0.00200
Arsenic	ND		0.00200
Lead	ND		0.00200
Selenium	ND		0.00200
Thallium	ND		0.00200

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

(LCS) 02/03/16 12:22 • (LCSD) 02/03/16 12:25

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	%	%	%			%	%
Antimony	0.0500	0.0536	0.0524	107	105	80-120			2	20
Arsenic	0.0500	0.0476	0.0456	95	91	80-120			4	20
Lead	0.0500	0.0486	0.0485	97	97	80-120			0	20
Selenium	0.0500	0.0467	0.0486	93	97	80-120			4	20
Thallium	0.0500	0.0485	0.0486	97	97	80-120			0	20

L814415-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 02/03/16 12:27 • (MS) 02/03/16 12:32 • (MSD) 02/03/16 12:34

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	%	%		%			%	%
Antimony	0.0500	0.000241	0.0533	0.0554	106	110	1	75-125			4	20
Arsenic	0.0500	0.0173	0.0648	0.0638	95	93	1	75-125			2	20
Lead	0.0500	0.000350	0.0496	0.0492	99	98	1	75-125			1	20
Selenium	0.0500	0.000218	0.0482	0.0480	96	96	1	75-125			0	20
Thallium	0.0500	0.0000674	0.0494	0.0483	99	97	1	75-125			2	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
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.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

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

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

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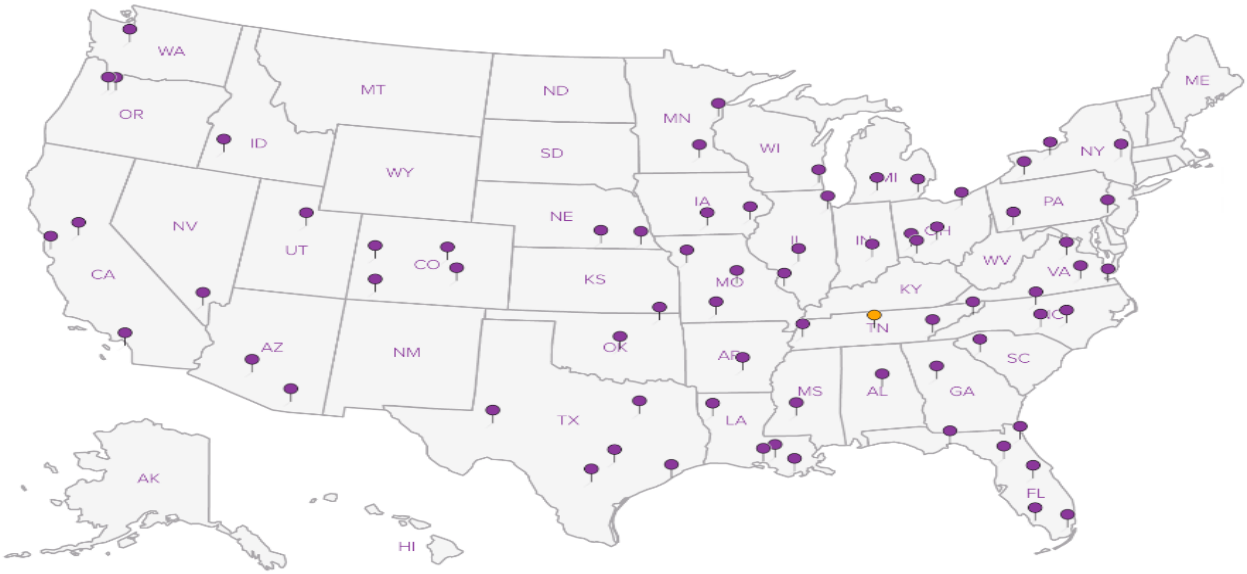

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Ingrid Setzler

Email To: isetzler@bpu.com;bhoye@burnsmcd.com;rkrysl@b

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: KANSAS CITY KS GROUNDWATER

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

Client Project #: KCBPU Nearman

Lab Project #: KCKAN02-MW NEARMAN2

Collected by (print): TIM DUCKER

Site/Facility ID #: BA POND

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 500mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Total Radium-226/228 1L-HDPE-Add HNO3						Rem./Contaminant	Sample # (lab only)
MW-2A		DW		1·27·16	1325	5	X	X	X	X							-01
MW-3		GW		1·27·16	1425	5	X	X	X	X							02
MW-4		GW		1·27·16	1515	5	X	X	X	X							03
MW-8A		GW		1·27·16	1150	5	X	X	X	X							04
MW-10		GW		1·27·16	1235	5	X	X	X	X							05
BA POND		GW		1·27·16	1540	5	X	X	X	X							06
DUP-1		GW		1·27·16		5	X	X	X	X							07
DUP-2		GW		1·27·16		5	X	X	X	X							08

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORIES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L814632
G126

Acctnum: KCKAN02
Template: T109043
Prelogin: P539028
TSR: 650 - Linda Cashman
PB: 1·21

Shipped Via: FedEX Ground

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: 636101907153 | 636101907164

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	1·28·16	1030	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	1/28/16	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☒ _____

Temp: 2.1°C Bottles Received: 40

Date: 1/29/16 Time: 0900

Condition: (lab use only) Tol

COC Seal Intact: ___Y ___N ___NA ✓

pH Checked: NCF:

ANALYTICAL REPORT

March 01, 2016

Kansas City Board of Public Utilities

Sample Delivery Group:	L814633
Samples Received:	01/29/2016
Project Number:	KCBPU Nearman
Description:	GW-Creek Bottom Ash Pond
Site:	BA POND
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. 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.

Linda Cashman
Technical Service Representative

Project Narrative

L814633 -01, -02, -03, -04, -05, -06, -07, -08 contains subout data that is included after the chain of custody.

Abbreviations and Definitions

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Kansas	E-10277	South Carolina	84004
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Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

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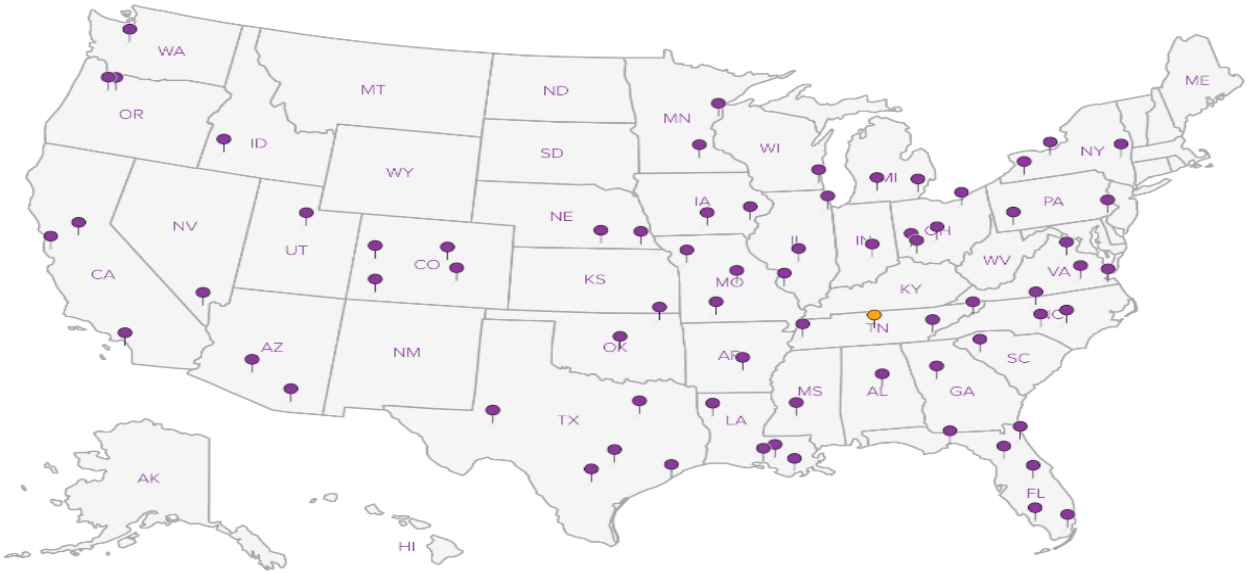

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Ingrid Setzler

Email To: isetzler@bpu.com;bhoye@burnsmcd.com;rkrysl@b

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: KANSAS CITY KS GROUNDWATER

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

Client Project # KCBPU Nearman

Lab Project # KCKAN02-MW NEARMAN2

Collected by (print): TIM DUCKER

Site/Facility ID # BA POND

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORIES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L814633

G126

Acctnum: KCKAN02
Template: T109043
Prelogin: P539028
TSR: 650 - Linda Cashman
PB: 1-21-16
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 500mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Total Radium-226/228 1L-HDPE-Add HNO3	Rem./Contaminant	Sample # (lab only)
MW-2A		DW		1.27.16	1325	5	X	X	X	X		-01
MW-3		GW		1.27.16	1425	5	X	X	X	X		02
MW-4		GW		1.27.16	1515	5	X	X	X	X		03
MW-8A		GW		1.27.16	1150	5	X	X	X	X		04
MW-10		GW		1.27.16	1235	5	X	X	X	X		05
BA POND		GW		1.27.16	1540	5	X	X	X	X		06
DUP-1		GW		1.27.16		5	X	X	X	X		07
DUP-2		GW		1.27.16		5	X	X	X	X		08

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: 636101907153 | 636101907164

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	1.28.16	1030	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	1/28/16	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☒ _____

Temp: 2.1°C Bottles Received: 40

Date: 1/29/16 Time: 0900

Condition: (lab use only) TOI

COC Seal Intact: ___Y ___N ___NA ✓

pH Checked: NCF:

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

February 27, 2016

Ms. Janice Cozby
Environmental Science Corporation
12065 Lebanon Road
Mount Juliet, Tennessee 37122

Re: Radiochemistry Analysis - Level 2
Work Order: 390438

Dear Ms. Cozby:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 02, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Julie Robinson

Julie Robinson
Project Manager

Purchase Order: S23195
Chain of Custody: WG846055
Enclosures

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis Report
for

ENVL001 Environmental Science Corporation

Client SDG: 390438 GEL Work Order: 390438

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by Julie Roberson

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-01
Sample ID: 390438001
Matrix: Ground Water
Collect Date: 27-JAN-16 13:25
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228		1.65	+/-0.991	1.49	3.00	pCi/L		AXM6	02/19/16	1535	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		2.45				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226		0.801	+/-0.414	0.539	1.00	pCi/L		CXP3	02/08/16	0605	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			91.9	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-02
Sample ID: 390438002
Matrix: Ground Water
Collect Date: 27-JAN-16 14:25
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	0.922	+/-1.05	1.76	3.00	pCi/L		AXM6	02/19/16	1535	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.63				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226		0.707	+/-0.337	0.407	1.00	pCi/L		CXP3	02/08/16	0605	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			99.7	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-03
Sample ID: 390438003
Matrix: Ground Water
Collect Date: 27-JAN-16 15:15
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	0.602	+/-0.709	1.19	3.00	pCi/L		AXM6	02/19/16	1535	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.16				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226		0.554	+/-0.330	0.443	1.00	pCi/L		CXP3	02/08/16	0605	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			101	(15%-125%)

Notes:
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GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-04
Sample ID: 390438004
Matrix: Ground Water
Collect Date: 27-JAN-16 11:50
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	0.935	+/-0.812	1.30	3.00	pCi/L		AXM6	02/19/16	1535	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.44				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226		0.504	+/-0.334	0.479	1.00	pCi/L		CXP3	02/08/16	0605	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			92.5	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-05
Sample ID: 390438005
Matrix: Ground Water
Collect Date: 27-JAN-16 12:35
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	1.19	+/-1.26	2.11	3.00	pCi/L		AXM6	02/19/16	1535	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		2.32				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226		1.14	+/-0.424	0.472	1.00	pCi/L		CXP3	02/08/16	0650	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			93.9	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-06
Sample ID: 390438006
Matrix: Ground Water
Collect Date: 27-JAN-16 15:40
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	0.741	+/-0.795	1.32	3.00	pCi/L		AXM6	02/19/16	1649	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.02				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226	U	0.275	+/-0.330	0.555	1.00	pCi/L		CXP3	02/08/16	0650	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			89.4	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-07
Sample ID: 390438007
Matrix: Ground Water
Collect Date: 27-JAN-16 00:00
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	0.950	+/-1.09	1.84	3.00	pCi/L		AXM6	02/19/16	1535	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.21				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226	U	0.256	+/-0.256	0.414	1.00	pCi/L		CXP3	02/08/16	0650	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			105	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 27, 2016

Company : Environmental Science Corporation
Address : 12065 Lebanon Road

Mount Juliet, Tennessee 37122
Contact: Ms. Janice Cozby
Project: Radiochemistry Analysis - Level 2

Client Sample ID: L814633-08
Sample ID: 390438008
Matrix: Ground Water
Collect Date: 27-JAN-16 00:00
Receive Date: 02-FEB-16
Collector: Client

Project: ENVL00307
Client ID: ENVL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	0.478	+/-0.830	1.46	3.00	pCi/L		AXM6	02/19/16	1535	1543259	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		0.720				pCi/L	1	TON1	02/23/16	1209	1543306	2
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226	U	0.242	+/-0.264	0.435	1.00	pCi/L		CXP3	02/08/16	0650	1541921	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			91.4	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

QC Summary

Report Date: February 27, 2016

Environmental Science Corporation
12065 Lebanon Road
Mount Juliet, Tennessee

Contact: **Ms. Janice Cozby**

Workorder: **390438**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 1543259										
QC1203484921 390438008 DUP										
Radium-228	U	0.478	U	1.41	pCi/L	N/A		N/A	AXM6	02/19/16 15:35
Uncertainty		+/-0.830		+/-1.38						
QC1203484923 LCS										
Radium-228	47.4			45.3	pCi/L		95.5	(75%-125%)		02/19/16 15:35
Uncertainty				+/-3.04						
QC1203484920 MB										
Radium-228			U	0.800	pCi/L					02/19/16 15:35
Uncertainty				+/-1.34						
QC1203484922 390438008 MS										
Radium-228	286 U	0.478		244	pCi/L		85.1	(75%-125%)		02/19/16 15:35
Uncertainty		+/-0.830		+/-17.3						
Rad Ra-226										
Batch 1541921										
QC1203480819 390483001 DUP										
Radium-226		1.16		1.44	pCi/L	21.9		(0% - 100%)	CXP3	02/08/16 08:30
Uncertainty		+/-0.492		+/-0.547						
QC1203480821 LCS										
Radium-226	24.4			19.5	pCi/L		79.7	(75%-125%)		02/08/16 08:30
Uncertainty				+/-1.43						
QC1203480818 MB										
Radium-226			U	0.286	pCi/L					02/08/16 07:25
Uncertainty				+/-0.285						
QC1203480820 390483001 MS										
Radium-226	122	1.16		142	pCi/L		115	(75%-125%)		02/08/16 08:30
Uncertainty		+/-0.492		+/-8.75						

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD

QC Summary

Workorder: **390438**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

M REMP Result > MDC/CL and < RDL

N/A RPD or %Recovery limits do not apply.

N1 See case narrative

ND Analyte concentration is not detected above the detection limit

NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.

R Sample results are rejected

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

UI Gamma Spectroscopy--Uncertain identification

UJ Gamma Spectroscopy--Uncertain identification

UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Other specific qualifiers were required to properly define the results. Consult case narrative.

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

There are no "Data Exception Reports" associated with this analytical report.

Sub-Contract Chain of Custody

Environmental Science Corp
12065 Lebanon Road
Mt. Juliet, TN 37122
(615) 773-9756 (615) 758-5859 fax

Sub-Contract Lab : __GEL____
City / State : _____Charleston, SC_____
Results Needed by : ___3/2/16_____
ESC Purchase Order # : __S23195_____

Send Reports To : ____Janice Cozby jcozby@esclabsciences.com____

WORKGROUP	WG846055
Date Created :	2/1/16

SAMPLENO / Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
L814633-01	DW	012716 1325	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837166 19837165						
L814633-01	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total
19837165 19837166						
L814633-02	DW	1425	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837167 19837168						
L814633-02	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total
19837167 19837168						
L814633-03	DW	1515	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837169 19837170						
L814633-03	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total
19837170 19837169						
L814633-04	DW	1150	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837172 19837171						
L814633-04	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total
19837171 19837172						
L814633-05	DW	1235	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837173 19837174						
L814633-05	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total

Relinquished by _____ Date: 020116
Received by : _____ Date: 2/2/16 0845
Relinquished by _____ Date: _____
Received by : _____ Date: _____

Page : 1

Sub-Contract Lab : __GEL____
City / State : _____Charleston, SC_____
Results Needed by : ___3/2/16_____
ESC Purchase Order # : __S23195_____

Send Reports To : ____Janice Cozby jcozby@esclabsciences.com____

WORKGROUP	WG846055
Date Created :	2/1/16

SAMPLENO / Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
19837173 19837174	GW					
L814633-06	DW	012716 1540	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837175 19837176						
L814633-06	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total
19837175 19837176						
L814633-07	DW	0000	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837178 19837177						
L814633-07	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total
19837178 19837177						
L814633-08	DW	0000	Radium 226	RA226	7500Ra B-2001	Plus Ra226 and Ra228 Combined Total
19837179 19837180						
L814633-08	DW		Radium 228	RA228	7500Ra D-2001	Plus Ra226 and Ra228 Combined Total
19837180 19837179						

Relinquished by _____ Date: _____
Received by : Zac [illegible] Date: 2/2/16 8:45
Relinquished by _____ Date: _____
Received by : _____ Date: _____

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: ENVL			**SDG/AR/COC/Work Order:** 390438	
Received By: ZKW			**Date Received:** 2/2/16	
Suspected Hazard Information	**Yes**	**No**	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
COC/Samples marked as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts):	0cpm
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?		✓		
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.	
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped:	UN#:
Samples identified as Foreign Soil?		✓		

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		✓		Preservation Method: Ice bags Blue ice Dry ice (None) Other (describe) *all temperatures are recorded in Celsius 21 C
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): 130462944
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	✓			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?		✓		Sample ID's and containers affected:
7	VOA vials contain acid preservation?		✓		(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
9	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	✓			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
13	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?			✓	
15	COC form is properly signed in relinquished/received sections?	✓			
16	Carrier and tracking number.	✓			Circle Applicable: (FedEx Air) FedEx Ground UPS Field Services Courier Other 6617 3609 8624

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KP Date 2/3/16 Page 1 of 1 GL-CHL-SR-001 Rev 2

List of current GEL Certifications as of 27 February 2016

State	Certification
Alaska	UST−110
Arkansas	88−0651
CLIA	42D0904046
California	2940 Interim
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC000122013−10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013−10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA150001
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC000122013−10
Nebraska	NE−OS−26−13
Nevada	SC000122016−1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−16−11
Utah NELAP	SC000122016−20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Case Narrative

Lab No: 20160407

This report contains the analytical results for the 12 sample(s) received under chain of custody by ESC Lab Sciences on 04/29/16 11:15:09. These samples are associated with your . project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted below:

The test results in this report meet all NELAC requirements unless noted below:

This report shall not be reproduced, except in full, without the written approval of ESC Lab Sciences.

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.

Results have been reviewed by the Director of Radiochemistry or their designees and is approved for release.

Observations / Nonconformances

The following QC parameters are outside method control limits:
Ra-226 MSD RPD SDG-R1079

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20160407-01								
Client ID : MW-2A								
Date Sampled : 04/27/16 14:40:00								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		1.33 +/- 1.05	1.34	pCi/l				
Radium-226	SM 7500 Ra B M*	0.222 +/- 0.220	0.318	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	1.11 +/- 0.827	1.02	pCi/l		05/25/16	06/10/16	JR
Lab ID : 20160407-02								
Client ID : MW-3								
Date Sampled : 04/27/16 13:50:00								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		2.09 +/- 1.09	1.28	pCi/l				
Radium-226	SM 7500 Ra B M*	0.146 +/- 0.149	0.189	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	1.94 +/- 0.939	1.09	pCi/l		05/25/16	06/02/16	JR
Lab ID : 20160407-03								
Client ID : MW-4								
Date Sampled : 04/27/16 13:00:00								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.460 +/- 0.831	1.11	pCi/l				
Radium-226	SM 7500 Ra B M*	0.027 +/- 0.168	0.291	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	0.433 +/- 0.663	0.820	pCi/l		05/25/16	06/02/16	JR
Lab ID : 20160407-04								
Client ID : MW-8A								
Date Sampled : 04/28/16 09:25:00								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.673 +/- 0.950	1.19	pCi/l				
Radium-226	SM 7500 Ra B M*	0.297 +/- 0.181	0.225	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	0.376 +/- 0.769	0.961	pCi/l		05/25/16	06/02/16	JR

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20160407-05**								
Client ID : **MW-10**								
Date Sampled : **04/27/16 15:50:00**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		1.77 +/- 1.16	1.51	pCi/l				
Radium-226	SM 7500 Ra B M*	0.178 +/- 0.151	0.189	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	1.59 +/- 1.01	1.32	pCi/l		05/25/16	06/02/16	JR
Lab ID : **20160407-06**								
Client ID : **BA POND**								
Date Sampled : **04/27/16 11:20:00**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.541 +/- 1.00	1.33	pCi/l				
Radium-226	SM 7500 Ra B M*	0.073 +/- 0.121	0.191	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	0.468 +/- 0.883	1.14	pCi/l		05/25/16	06/02/16	JR
Lab ID : **20160407-07**								
Client ID : **DUP-1**								
Date Sampled : **04/27/16**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		1.16 +/- 1.05	1.62	pCi/l				
Radium-226	SM 7500 Ra B M*	0.030 +/- 0.102	0.211	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	1.13 +/- 0.943	1.41	pCi/l		05/25/16	06/02/16	JR
Lab ID : **20160407-08**								
Client ID : **DUP-2**								
Date Sampled : **04/28/16**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.127 +/- 0.911	1.26	pCi/l				
Radium-226	SM 7500 Ra B M*	0.127 +/- 0.100	0.123	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	-0.253 +/- 0.811	1.14	pCi/l		05/25/16	06/02/16	JR

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20160407-09**								
Client ID : **MATRIX SPIKE**								
Date Sampled : **04/27/16 14:40:00**								
Matrix : **NPW**								
		Radiochemical Analyses						
Radium-226	SM 7500 Ra B M*	104		% Rec		05/12/16	05/12/16	AK
Radium-228	EPA 904*/9320*	94.7%		% Rec		06/07/16	06/10/16	JR
Lab ID : **20160407-10**								
Client ID : **MATRIX SPIKE DUPLICATE**								
Date Sampled : **04/27/16 14:40:00**								
Matrix : **NPW**								
		Radiochemical Analyses						
Radium-226	SM 7500 Ra B M*	5.3		RPD		05/12/16	05/12/16	AK
Radium-228	EPA 904*/9320*	2.62		RPD		06/07/16	06/10/16	JR
Lab ID : **20160407-11**								
Client ID : **MO RIVER**								
Date Sampled : **04/27/16 11:40:00**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		1.28 +/- 1.14	1.44	pCi/l				
Radium-226	SM 7500 Ra B M*	0.773 +/- 0.265	0.212	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	0.510 +/- 0.871	1.23	pCi/l		05/25/16	06/06/16	JR
Lab ID : **20160407-12**								
Client ID : **MW-1B**								
Date Sampled : **04/28/16 10:35:00**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.383 +/- 1.10	1.73	pCi/l				
Radium-226	SM 7500 Ra B M*	0.383 +/- 0.239	0.273	pCi/l		05/03/16	05/05/16	AK
Radium-228	EPA 904*/9320*	-0.145 +/- 0.857	1.46	pCi/l		05/25/16	06/06/16	JR

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	RER, NAD or DER	MS %REC	MSD %REC	MSD RPD	Date
Radium-226	-0.025	91.0			NC	0.169	94.0	122.0	25.6	05/05/16
Radium-228	-0.205	94.5			NC	0.012	96.7	95.4	1.2	06/02/16

Lab Approval: 

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information:

Maxine Kline
300 N 65th St
Kansas City, KS 66102

Report to: Ingrid Setzler

Email To: isetzler@bpu.com;bhoye@burnsmcd.com;rkrysl@b...

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: Kansas City Kansas

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

Client Project # KCBPU Nearman

Lab Project # KCKAN02-MW NEARMAN2

Collected by (print): Tim Ducker

Site/Facility ID # KCBPU

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y X

Rush? (Lab MUST Be Notified)
____ Same Day 200%
____ Next Day 100%
____ Two Day 50%
____ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3										
MW-2A	GRAB	GW		4.27.16	1440	2	X										
MW-3	GRAB	GW		4.27.16	1350	2	X										
MW-4	GRAB	GW		4.27.16	1300	2	X										
MW-8A	GRAB	GW		4.28.16	0925	2	X										
MW-10	GRAB	GW		4.27.16	1550	2	X										
BA POND	GRAB	GW		4.27.16	1120	2	X										
DUP-1	GRAB	GW		4.27.16		2	X										
DUP-2	GRAB	GW		4.28.16		2	X										
MATRIX SPIKE	GRAB	GW		4.27.16	1440	2	X										
MATRIX SPIKE DUPLICATE	GRAB	GW		4.27.16	1440	2	X										

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORIES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 832433

Table #

Acctnum: KCKAN02
Template: T111575
Prelogin: P550202
TSR: 650 - Linda Cashman
PB: 4/19/16 ar

Shipped Via: FedEX Ground

Rem./Contaminant	Sample # (lab only)

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC 4/18/16

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	4.28.16	1130	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	4/28/16	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: °C Bottles Received:

Date: 4/29/16 Time: 10:15

Condition: Good (lab use only)

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

2016-04057

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Ingrid Setzler

Email To: isetzler@bpu.com;bhoye@burnsmcd.com;rkrysl@b...

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: KANSAS CITY KANSAS

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

Client Project # KCBPU Nearman

Lab Project # KCKAN02-MW NEARMAN2

Collected by (print): Tim Ducker

Site/Facility ID # KCBP

P.O. #

Collected by (signature): TIM DUCKER

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3										Rem./Contaminant	Sample # (lab only)
MO RIVER	Grab	GW		4-27-16	1140	2	X											

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # 832433

Table #

Acctnum: KCKAN02
Template: T111575
Prelogin: P550202
TSR: 650 - Linda Cashman
PB: 4/28/16 mc
Shipped Via: FedEx Ground

*Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC 4/18/16

pH _____ Temp _____
Flow _____ Other _____

Hold #

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	4-28-16	1130	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	4/28/16	1700	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____
Temp: °C Bottles Received:

Condition: Good (lab use only)
COC Seal Intact: ___Y ___N ___NA

Date: 4/29/16 Time: 10:15
pH Checked: NCF:

201604027

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information:

Maxine Kline
300 N 65th St
Kansas City, KS 66102

Report to: Ingrid Setzler

Email To: isetzler@bpu.com;bhoye@burnsmcd.com;rkrysl@b...

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: KANSAS CITY KANSAS

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

Client Project # KCBPU Nearman

Lab Project # KCKAN02-MW NEARMAN2

Collected by (print): TIM DUGGER

Site/Facility ID # KCBPU

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3								Rem./Contaminant	Sample # (lab only)
~~KCKAN02-MW NEARMAN~~		~~GW~~				~~2~~	~~X~~									
MW-1B	GRAB	GW		4.20.16	1035	2	X									

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Relinquished by : (Signature) — Date: 4.28.16 — Time: 1130 — Received by: (Signature)

Relinquished by : (Signature) — Date: 4/28/16 — Time: 1700 — Received by: (Signature)

Relinquished by : (Signature) — Date: — Time: — Received for lab by: (Signature) — Date: 4/29/16 — Time: 10:15

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: °C Bottles Received:

Condition: Good (lab use only)

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

Hold #

Chain of Custody Page ___ of ___

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

L # 832433

Table #

Acctnum: KCKAN02

Template: T111663

Prelogin: P550431

TSR: 650 - Linda Cashman

PB: 4-20-16 KH

Shipped Via: FedEx Ground

SAMPLE LOGIN

Date Received: *04/29/16 11:15:09*

Lab Number: 20160407

Due: 05/27/16

Sample Number	Client Sample ID	Matrix	Date Sampled	Container Type	Container Size	Preservation	Preserved Upon Receipt	Custody Seal	Seal Intact
20160407-01 B	MW-2A	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-01 A	MW-2A	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-02 A	MW-3	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-02 B	MW-3	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-03 A	MW-4	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-03 B	MW-4	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-04 A	MW-8A	NPW	04/28/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-04 B	MW-8A	NPW	04/28/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-05 A	MW-10	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-05 B	MW-10	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-06 B	BA POND	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-06 A	BA POND	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-07 B	DUP-1	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-07 A	DUP-1	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						

20160407-08 A	DUP-2	NPW	04/28/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-08 B	DUP-2	NPW	04/28/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-09 A	MATRIX SPIKE	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-09 B	MATRIX SPIKE	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-10 A	MATRIX SPIKE DUPLICATE	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-10 B	MATRIX SPIKE DUPLICATE	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-11 A	MO RIVER	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-11 B	MO RIVER	NPW	04/27/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160407-12 B	MW-1B	NPW	04/28/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160407-12 A	MW-1B	NPW	04/28/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						

CONTAINER INSPECTION

Coolers 2 Custody Seals Broken ND Temperature: C Ice Radiation Survey: <300 cpm

SAMPLE INSPECTION

Sample Seal Broken ND Chain of Custody Record ✓ Labels in Tact ✓ Radiation Survey Complete ☐

Anomalies

Sample 12's ID on CoC Does not Match Label - label matches the marked through ID on CoC.

Inspected By: _____ DATE 4/29/16

QA or Designee Review: Raymond Thomas DATE 04/29/16

Sample Custodian Review: _____ DATE _____

Project Notes:

ANALYTICAL REPORT

May 17, 2016

Kansas City Board of Public Utilities

Sample Delivery Group:	L832453
Samples Received:	04/29/2016
Project Number:	KCBPU Nearman
Description:	GW-Creek Bottom Ash Pond
Site:	KCBPU
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

MW-2A L832453-01 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 14:40
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869541	1	05/04/16 03:25	05/04/16 03:49	JM
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 13:16	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 14:25	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 22:34	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 18:16	05/10/16 18:16	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 19:01	05/15/16 19:01	CM

MW-3 L832453-02 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 13:50
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869541	1	05/04/16 03:25	05/04/16 03:49	JM
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 13:43	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 14:59	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 22:57	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 18:32	05/10/16 18:32	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 18:32	05/15/16 18:32	CM

MW-4 L832453-03 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 13:00
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869541	1	05/04/16 03:25	05/04/16 03:49	JM
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 13:45	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:02	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:00	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 18:48	05/10/16 18:48	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 20:13	05/15/16 20:13	CM

MW-8A L832453-04 GW

Collected by: Tim Ducker
Collected date/time: 04/28/16 09:25
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869816	1	05/04/16 17:40	05/04/16 18:17	MMF
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 13:48	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:05	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:02	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 19:52	05/10/16 19:52	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 20:41	05/15/16 20:41	CM

MW-10 L832453-05 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 15:50
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869541	1	05/04/16 03:25	05/04/16 03:49	JM
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 13:51	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:07	ST

MW-10 L832453-05 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 15:50
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:04	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 20:08	05/10/16 20:08	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 20:56	05/15/16 20:56	CM

BA POND L832453-06 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 11:20
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869541	1	05/04/16 03:25	05/04/16 03:49	JM
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 13:54	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:10	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:07	JDG
Wet Chemistry by Method 2130 B-2011	WG869260	1	05/02/16 16:13	05/02/16 16:13	KK
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 20:55	05/10/16 20:55	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 21:10	05/15/16 21:10	CM

DUP-1 L832453-07 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 00:00
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869541	1	05/04/16 03:25	05/04/16 03:49	JM
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 13:57	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:13	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:09	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 21:11	05/10/16 21:11	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 21:25	05/15/16 21:25	CM

DUP-2 L832453-08 GW

Collected by: Tim Ducker
Collected date/time: 04/28/16 00:00
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869816	1	05/04/16 17:40	05/04/16 18:17	MMF
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 14:00	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:16	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:11	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 21:27	05/10/16 21:27	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 21:39	05/15/16 21:39	CM

MO RIVER L832453-09 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 11:40
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869541	1	05/04/16 03:25	05/04/16 03:49	JM
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 14:03	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:19	ST
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:14	JDG
Wet Chemistry by Method 2130 B-2011	WG869260	1	05/02/16 16:13	05/02/16 16:13	KK

MO RIVER L832453-09 GW

Collected by: Tim Ducker
Collected date/time: 04/27/16 11:40
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 21:43	05/10/16 21:43	CM
Wet Chemistry by Method 9056A	WG871783	10	05/15/16 21:53	05/15/16 21:53	CM

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.

Linda Cashman
Technical Service Representative

Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
L832453-01	MW-2A	9040C
L832453-02	MW-3	9040C
L832453-03	MW-4	9040C
L832453-04	MW-8A	9040C
L832453-05	MW-10	9040C
L832453-06	BA POND	2130 B-2011, 9040C
L832453-07	DUP-1	9040C
L832453-08	DUP-2	9040C
L832453-09	MO RIVER	2130 B-2011, 9040C

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	848		10.0	1	05/04/2016 03:49	WG869541

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.85		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-01 WG868780: 6.85 at 13.5c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	6.47		1.00	1	05/10/2016 18:16	WG869679
Fluoride	0.158		0.100	1	05/10/2016 18:16	WG869679
Sulfate	153		50.0	10	05/15/2016 19:01	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 13:16	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.120		0.00500	1	05/03/2016 14:25	WG869111
Beryllium	ND		0.00200	1	05/03/2016 14:25	WG869111
Boron	0.353		0.200	1	05/03/2016 14:25	WG869111
Cadmium	ND		0.00200	1	05/03/2016 14:25	WG869111
Calcium	200	V	1.00	1	05/03/2016 14:25	WG869111
Chromium	ND		0.0100	1	05/03/2016 14:25	WG869111
Cobalt	ND		0.0100	1	05/03/2016 14:25	WG869111
Lithium	0.0442		0.0150	1	05/03/2016 14:25	WG869111
Molybdenum	ND		0.00500	1	05/03/2016 14:25	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 22:34	WG869298
Arsenic	0.00416		0.00200	1	05/05/2016 22:34	WG869298
Lead	ND		0.00200	1	05/05/2016 22:34	WG869298
Selenium	ND		0.00200	1	05/05/2016 22:34	WG869298
Thallium	ND		0.00200	1	05/05/2016 22:34	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	771		10.0	1	05/04/2016 03:49	WG869541

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.82		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-02 WG868780: 6.82 at 12.2c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	4.64		1.00	1	05/10/2016 18:32	WG869679
Fluoride	0.139		0.100	1	05/10/2016 18:32	WG869679
Sulfate	121		50.0	10	05/15/2016 18:32	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 13:43	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.154		0.00500	1	05/03/2016 14:59	WG869111
Beryllium	ND		0.00200	1	05/03/2016 14:59	WG869111
Boron	0.244		0.200	1	05/03/2016 14:59	WG869111
Cadmium	ND		0.00200	1	05/03/2016 14:59	WG869111
Calcium	201		1.00	1	05/03/2016 14:59	WG869111
Chromium	ND		0.0100	1	05/03/2016 14:59	WG869111
Cobalt	ND		0.0100	1	05/03/2016 14:59	WG869111
Lithium	0.0528		0.0150	1	05/03/2016 14:59	WG869111
Molybdenum	ND		0.00500	1	05/03/2016 14:59	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 22:57	WG869298
Arsenic	ND		0.00200	1	05/05/2016 22:57	WG869298
Lead	ND		0.00200	1	05/05/2016 22:57	WG869298
Selenium	0.00406		0.00200	1	05/05/2016 22:57	WG869298
Thallium	ND		0.00200	1	05/05/2016 22:57	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	755		10.0	1	05/04/2016 03:49	WG869541

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.84		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-03 WG868780: 6.84 at 11.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	13.4		1.00	1	05/10/2016 18:48	WG869679
Fluoride	0.108		0.100	1	05/10/2016 18:48	WG869679
Sulfate	128		50.0	10	05/15/2016 20:13	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 13:45	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.152		0.00500	1	05/03/2016 15:02	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:02	WG869111
Boron	ND		0.200	1	05/03/2016 15:02	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:02	WG869111
Calcium	206		1.00	1	05/03/2016 15:02	WG869111
Chromium	ND		0.0100	1	05/03/2016 15:02	WG869111
Cobalt	ND		0.0100	1	05/03/2016 15:02	WG869111
Lithium	0.0418		0.0150	1	05/03/2016 15:02	WG869111
Molybdenum	ND		0.00500	1	05/03/2016 15:02	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:00	WG869298
Arsenic	ND		0.00200	1	05/05/2016 23:00	WG869298
Lead	ND		0.00200	1	05/05/2016 23:00	WG869298
Selenium	0.00642		0.00200	1	05/05/2016 23:00	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:00	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1170		10.0	1	05/04/2016 18:17	WG869816

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.93		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-04 WG868780: 6.93 at 16.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	30.2		1.00	1	05/10/2016 19:52	WG869679
Fluoride	0.339		0.100	1	05/10/2016 19:52	WG869679
Sulfate	520		50.0	10	05/15/2016 20:41	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 13:48	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0937		0.00500	1	05/03/2016 15:05	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:05	WG869111
Boron	2.61		0.200	1	05/03/2016 15:05	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:05	WG869111
Calcium	186		1.00	1	05/03/2016 15:05	WG869111
Chromium	ND		0.0100	1	05/03/2016 15:05	WG869111
Cobalt	ND		0.0100	1	05/03/2016 15:05	WG869111
Lithium	0.0298		0.0150	1	05/03/2016 15:05	WG869111
Molybdenum	0.00584		0.00500	1	05/03/2016 15:05	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:02	WG869298
Arsenic	0.0308		0.00200	1	05/05/2016 23:02	WG869298
Lead	ND		0.00200	1	05/05/2016 23:02	WG869298
Selenium	ND		0.00200	1	05/05/2016 23:02	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:02	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	797		10.0	1	05/04/2016 03:49	WG869541

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.92		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-05 WG868780: 6.92 at 15.9c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	21.9		1.00	1	05/10/2016 20:08	WG869679
Fluoride	0.125		0.100	1	05/10/2016 20:08	WG869679
Sulfate	220		50.0	10	05/15/2016 20:56	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 13:51	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0871		0.00500	1	05/03/2016 15:07	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:07	WG869111
Boron	1.35		0.200	1	05/03/2016 15:07	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:07	WG869111
Calcium	179		1.00	1	05/03/2016 15:07	WG869111
Chromium	ND		0.0100	1	05/03/2016 15:07	WG869111
Cobalt	ND		0.0100	1	05/03/2016 15:07	WG869111
Lithium	0.0450		0.0150	1	05/03/2016 15:07	WG869111
Molybdenum	ND		0.00500	1	05/03/2016 15:07	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:04	WG869298
Arsenic	0.0135		0.00200	1	05/05/2016 23:04	WG869298
Lead	ND		0.00200	1	05/05/2016 23:04	WG869298
Selenium	ND		0.00200	1	05/05/2016 23:04	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:04	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	518		10.0	1	05/04/2016 03:49	WG869541

Wet Chemistry by Method 2130 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	NTU			date / time	
Turbidity	2.93		1	05/02/2016 16:13	WG869260

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.29		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-06 WG868780: 8.29 at 14.8c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	25.6		1.00	1	05/10/2016 20:55	WG869679
Fluoride	0.413		0.100	1	05/10/2016 20:55	WG869679
Sulfate	271		50.0	10	05/15/2016 21:10	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 13:54	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0822		0.00500	1	05/03/2016 15:10	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:10	WG869111
Boron	1.51		0.200	1	05/03/2016 15:10	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:10	WG869111
Calcium	76.3		1.00	1	05/03/2016 15:10	WG869111
Chromium	ND		0.0100	1	05/03/2016 15:10	WG869111
Cobalt	ND		0.0100	1	05/03/2016 15:10	WG869111
Lithium	0.0216		0.0150	1	05/03/2016 15:10	WG869111
Molybdenum	0.0315		0.00500	1	05/03/2016 15:10	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:07	WG869298
Arsenic	ND		0.00200	1	05/05/2016 23:07	WG869298
Lead	ND		0.00200	1	05/05/2016 23:07	WG869298
Selenium	ND		0.00200	1	05/05/2016 23:07	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:07	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	820		10.0	1	05/04/2016 03:49	WG869541

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.96		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-07 WG868780: 6.96 at 13.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	21.8		1.00	1	05/10/2016 21:11	WG869679
Fluoride	0.105		0.100	1	05/10/2016 21:11	WG869679
Sulfate	226		50.0	10	05/15/2016 21:25	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 13:57	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0857		0.00500	1	05/03/2016 15:13	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:13	WG869111
Boron	1.35		0.200	1	05/03/2016 15:13	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:13	WG869111
Calcium	178		1.00	1	05/03/2016 15:13	WG869111
Chromium	ND		0.0100	1	05/03/2016 15:13	WG869111
Cobalt	ND		0.0100	1	05/03/2016 15:13	WG869111
Lithium	0.0446		0.0150	1	05/03/2016 15:13	WG869111
Molybdenum	ND		0.00500	1	05/03/2016 15:13	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:09	WG869298
Arsenic	0.0115		0.00200	1	05/05/2016 23:09	WG869298
Lead	ND		0.00200	1	05/05/2016 23:09	WG869298
Selenium	ND		0.00200	1	05/05/2016 23:09	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:09	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1170		10.0	1	05/04/2016 18:17	WG869816

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.88		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-08 WG868780: 6.88 at 14.6c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	30.1		1.00	1	05/10/2016 21:27	WG869679
Fluoride	0.339		0.100	1	05/10/2016 21:27	WG869679
Sulfate	522		50.0	10	05/15/2016 21:39	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 14:00	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0924		0.00500	1	05/03/2016 15:16	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:16	WG869111
Boron	2.67		0.200	1	05/03/2016 15:16	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:16	WG869111
Calcium	182		1.00	1	05/03/2016 15:16	WG869111
Chromium	ND		0.0100	1	05/03/2016 15:16	WG869111
Cobalt	ND		0.0100	1	05/03/2016 15:16	WG869111
Lithium	0.0298		0.0150	1	05/03/2016 15:16	WG869111
Molybdenum	0.00591		0.00500	1	05/03/2016 15:16	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:11	WG869298
Arsenic	0.0299		0.00200	1	05/05/2016 23:11	WG869298
Lead	ND		0.00200	1	05/05/2016 23:11	WG869298
Selenium	ND		0.00200	1	05/05/2016 23:11	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:11	WG869298

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	386		10.0	1	05/04/2016 03:49	WG869541

Wet Chemistry by Method 2130 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	NTU			date / time	
Turbidity	628		1	05/02/2016 16:13	WG869260

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.97		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832453-09 WG868780: 7.97 at 15.5c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	18.1		1.00	1	05/10/2016 21:43	WG869679
Fluoride	0.379		0.100	1	05/10/2016 21:43	WG869679
Sulfate	116		50.0	10	05/15/2016 21:53	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 14:03	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.453		0.00500	1	05/03/2016 15:19	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:19	WG869111
Boron	ND		0.200	1	05/03/2016 15:19	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:19	WG869111
Calcium	75.6		1.00	1	05/03/2016 15:19	WG869111
Chromium	0.0210		0.0100	1	05/03/2016 15:19	WG869111
Cobalt	0.0140		0.0100	1	05/03/2016 15:19	WG869111
Lithium	0.0394		0.0150	1	05/03/2016 15:19	WG869111
Molybdenum	ND		0.00500	1	05/03/2016 15:19	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:14	WG869298
Arsenic	0.0151		0.00200	1	05/05/2016 23:14	WG869298
Lead	0.0238		0.00200	1	05/05/2016 23:14	WG869298
Selenium	0.00355		0.00200	1	05/05/2016 23:14	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:14	WG869298

Method Blank (MB)

(MB) R3133873-1 05/04/16 03:49

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

L832453-01 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-01 05/04/16 03:49 • (DUP) R3133873-4 05/04/16 03:49

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	848	835	1	1.58		5

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

(LCS) R3133873-2 05/04/16 03:49 • (LCSD) R3133873-3 05/04/16 03:49

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	%	%	%			%	%
Dissolved Solids	8800	8920	8690	101	98.8	85.0-115			2.61	5

Method Blank (MB)

(MB) R3134195-1 05/04/16 18:17

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

L832422-21 Original Sample (OS) • Duplicate (DUP)

(OS) L832422-21 05/04/16 18:17 • (DUP) R3134195-4 05/04/16 18:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	3050	3020	1	0.824		5

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

(LCS) R3134195-2 05/04/16 18:17 • (LCSD) R3134195-3 05/04/16 18:17

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	%	%	%			%	%
Dissolved Solids	8800	8450	8500	96.0	96.6	85.0-115			0.590	5

Method Blank (MB)

(MB) WG869260-1 05/02/16 16:13

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	NTU		NTU	NTU
Turbidity	U		0.0310	0.100

L832453-06 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-06 05/02/16 16:13 • (DUP) WG869260-4 05/02/16 16:13

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	NTU	NTU		%		%
Turbidity	2.93	2.92	1	0.342		20

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

(LCS) WG869260-2 05/02/16 16:13 • (LCSD) WG869260-3 05/02/16 16:13

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	NTU	NTU	NTU	%	%	%			%	%
Turbidity	40.0	39.9	39.9	99.8	99.8	90.0-110			0.000	20

L832391-10 Original Sample (OS) • Duplicate (DUP)

(OS) L832391-10 04/30/16 10:56 • (DUP) WG868780-9 04/30/16 10:56

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.63	8.63	1	0.000		1

L832536-02 Original Sample (OS) • Duplicate (DUP)

(OS) L832536-02 04/30/16 10:56 • (DUP) WG868780-12 04/30/16 10:56

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	9.17	9.18	1	0.109		1

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

(LCS) WG868780-10 04/30/16 10:56 • (LCSD) WG868780-11 04/30/16 10:56

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.43	6.39	6.38	99.4	99.2	98.5-102			0.157	1

Method Blank (MB)

(MB) R3135625-1 05/10/16 10:22

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100

L832435-15 Original Sample (OS) • Duplicate (DUP)

(OS) L832435-15 05/10/16 11:53 • (DUP) R3135625-4 05/10/16 12:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	17.2	17.3	1	1		15
Fluoride	0.893	0.943	1	5		15

L832453-03 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-03 05/10/16 18:48 • (DUP) R3135625-6 05/10/16 19:36

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	13.4	13.4	1	0		15
Fluoride	0.108	0.109	1	1		15

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

(LCS) R3135625-2 05/10/16 10:38 • (LCSD) R3135625-3 05/10/16 10:54

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	%	%	%			%	%
Chloride	40.0	39.0	39.1	98	98	80-120			0	15
Fluoride	8.00	7.64	7.65	95	96	80-120			0	15

L832450-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L832450-02 05/10/16 15:37 • (MS) R3135625-5 05/10/16 15:53

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Fluoride	5.00	1.96	6.01	81	1	80-120	

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/10/16 18:16 • (MS) R3135625-7 05/10/16 20:24 • (MSD) R3135625-8 05/10/16 20:40

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	6.47	56.7	57.0	101	101	1	80-120			0	15
Fluoride	5.00	0.158	5.05	5.07	98	98	1	80-120			0	15

Method Blank (MB)

(MB) R3136840-1 05/15/16 08:29

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Sulfate	U		0.0774	5.00

L832453-02 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-02 05/15/16 18:32 • (DUP) R3136840-5 05/15/16 18:46

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	121	119	10	1		15

L832453-03 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-03 05/15/16 20:13 • (DUP) R3136840-8 05/15/16 20:27

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	128	125	10	2		15

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

(LCS) R3136840-2 05/15/16 08:44 • (LCSD) R3136840-3 05/15/16 08:58

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	%	%	%			%	%
Sulfate	40.0	39.8	39.7	99	99	80-120			0	15

L832435-16 Original Sample (OS) • Matrix Spike (MS)

(OS) L832435-16 05/15/16 15:39 • (MS) R3136840-4 05/15/16 15:53

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Sulfate	50.0	39.9	88.8	98	1	80-120	

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/15/16 19:01 • (MS) R3136840-6 05/15/16 19:15 • (MSD) R3136840-7 05/15/16 19:58

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 %
Sulfate	50.0	153	625	625	94	94	10	80-120			0	15

Method Blank (MB)

(MB) R3133323-1 05/03/16 13:07

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3133323-2 05/03/16 13:10 • (LCSD) R3133323-3 05/03/16 13:13

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	%	%	%			%	%
Mercury	0.00300	0.00284	0.00305	95	102	80-120			7	20

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/03/16 13:16 • (MS) R3133323-4 05/03/16 13:19 • (MSD) R3133323-5 05/03/16 13:22

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	%	%		%			%	%
Mercury	0.00300	ND	0.00285	0.00257	95	86	1	75-125			10	20

Method Blank (MB)

(MB) R3133419-8 05/03/16 21:14

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Barium	U		0.0017	0.00500
Beryllium	U		0.0007	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.0007	0.00200
Calcium	0.0536		0.0463	1.00
Chromium	U		0.0014	0.0100
Cobalt	U		0.0023	0.0100
Lithium	U		0.0053	0.0150
Molybdenum	U		0.0016	0.00500

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

(LCS) R3133419-2 05/03/16 14:20 • (LCSD) R3133419-3 05/03/16 14:22

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	1.04	102	104	80-120			2	20
Beryllium	1.00	1.01	1.03	101	103	80-120			2	20
Boron	1.00	1.05	1.04	105	104	80-120			1	20
Cadmium	1.00	1.04	1.05	104	105	80-120			1	20
Calcium	10.0	10.2	10.3	102	103	80-120			0	20
Chromium	1.00	1.02	1.02	102	102	80-120			1	20
Cobalt	1.00	1.02	1.04	102	104	80-120			1	20
Lithium	1.00	1.00	1.02	100	102	80-120			2	20
Molybdenum	1.00	1.04	1.05	104	105	80-120			1	20

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/03/16 14:25 • (MS) R3133419-5 05/03/16 14:31 • (MSD) R3133419-6 05/03/16 14:33

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	0.120	1.14	1.12	102	100	1	75-125			1	20
Beryllium	1.00	ND	1.03	1.02	103	102	1	75-125			2	20
Boron	1.00	0.353	1.38	1.39	103	104	1	75-125			1	20
Cadmium	1.00	ND	1.08	1.07	108	107	1	75-125			1	20
Calcium	10.0	200	208	204	75	40	1	75-125		V	2	20

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/03/16 14:25 • (MS) R3133419-5 05/03/16 14:31 • (MSD) R3133419-6 05/03/16 14:33

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium	1.00	ND	1.03	1.03	103	103	1	75-125			0	20
Cobalt	1.00	ND	1.06	1.05	105	104	1	75-125			1	20
Lithium	1.00	0.0442	1.09	1.06	104	101	1	75-125			3	20
Molybdenum	1.00	ND	1.05	1.04	105	104	1	75-125			0	20

Method Blank (MB)

(MB) R3134286-1 05/05/16 22:26

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Antimony	0.000503		0.00021	0.00200
Arsenic	U		0.00025	0.00200
Lead	U		0.00024	0.00200
Selenium	U		0.00038	0.00200
Thallium	U		0.00019	0.00200

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

(LCS) R3134286-2 05/05/16 22:29 • (LCSD) R3134286-3 05/05/16 22:31

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	%	%	%			%	%
Antimony	0.0500	0.0550	0.0547	110	109	80-120			0	20
Arsenic	0.0500	0.0496	0.0499	99	100	80-120			1	20
Lead	0.0500	0.0506	0.0499	101	100	80-120			2	20
Selenium	0.0500	0.0474	0.0481	95	96	80-120			2	20
Thallium	0.0500	0.0494	0.0492	99	98	80-120			0	20

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/05/16 22:34 • (MS) R3134286-5 05/05/16 22:38 • (MSD) R3134286-6 05/05/16 22:41

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	%	%		%			%	%
Antimony	0.0500	ND	0.0554	0.0546	110	108	1	75-125			1	20
Arsenic	0.0500	0.00416	0.0552	0.0544	102	100	1	75-125			2	20
Lead	0.0500	ND	0.0493	0.0487	99	97	1	75-125			1	20
Selenium	0.0500	ND	0.0497	0.0488	99	98	1	75-125			2	20
Thallium	0.0500	ND	0.0493	0.0487	99	97	1	75-125			1	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
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.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

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

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

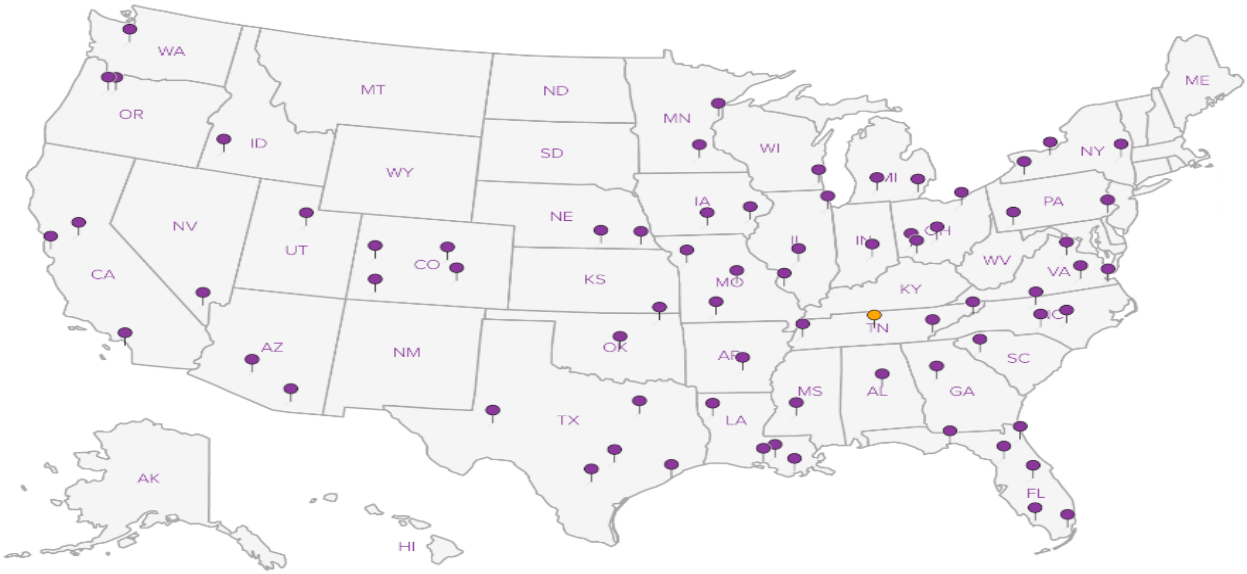
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Ingrid Setzler

Email To: isetzler@bpu.com;bhoye@burnsmcd.com;rkrysl@b...

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: KANSAS CITY KANSAS

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

Client Project # KCBPU Nearman

Lab Project # KCKAN02-MW NEARMAN2

Collected by (print): TIM DUCKER

Site/Facility ID # KCBPU

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 500mlHDPE-HNO3 <2	TDS, pH 250mlHDPE-NoPres								Rem./Contaminant	Sample # (lab only)
MW-2A	GRAB	GW		4.27.16	1440	3	X	X	X									-01
MW-3	GRAB	GW		4.27.16	1350	3	X	X	X									-02
MW-4	GRAB	GW		4.27.16	1300	3	X	X	X									-03
MW-8A	GRAB	GW		4.28.16	0925	3	X	X	X									-04
MW-10	GRAB	GW		4.27.16	1550	3	X	X	X									-05
BA POND	GRAB	GW		4.27.16	1120	3	X	X	X									-06
DUP-1	GRAB	GW		4.27.16		3	X	X	X									-07
DUP-2	GRAB	GW		4.28.16		3	X	X	X									-08
MATRIX SPIKE	GRAB	GW		4.27.16	1440	3	X	X	X									-01
MATRIX SPIKE DUPLICATE	GRAB	GW		4.27.16	1440	3	X	X	X									-01

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

6645 0389 5712

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L832453

L196

Acctnum: KCKAN02
Template: T109043
Prelogin: P550201
TSR: 650 - Linda Cashman
PB: 4/12/16
Shipped Via: FedEx Ground

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	4-28-16	1700	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	4/28/16	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 2.1 °C Bottles Received: 30

Date: 4-29-16 Time: 9:00

Condition: (lab use only) MK

COC Seal Intact: ___Y ___N ___NA OK

pH Checked: <2 NCF:

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 500mlHDPE-HNO3 (<2)	TDS, pH 250mlHDPE-NoPres	Rem./Contaminant	Sample # (lab only)
MO RIVER	GRAB	GW		4-27-16	1140	3	X	X	X		-09

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

6645 0389 5712

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	4-28-16	1130	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	4/28/16	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.1 °C Bottles Received: 3

Date: 4-29-16 Time: 9:00

Chain of Custody Page ___ of ___

ESC LABS
YOUR LAB OF CHOICE

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

L # L198

Acctnum: KCKAN02
Template: T109043
Prelogin: P550201
TSR: 650 - Linda Cashman
PB: 4/28/16 DR
Shipped Via: FedEx Ground

Hold #

Condition: (lab use only) OK MT

COC Seal Intact: ___Y ___N ___NA

pH Checked: <2 NCF:

Andy Vann

From: Linda Cashman
Sent: Monday, May 02, 2016 3:12 PM
To: Login; Due WetLab
Subject: KCKAN02 L832453 -06 and -09 add TURB

Please add TURB to these 2 samples only

We have the following unpreserved containers:

125mlHDPE-NoPres for Chloride, Fluoride and Sulfate

250mlHDPE-NoPres for TDS and pH

Thank you,

Linda

Linda Cashman | Senior Technical Service Representative
ESC Lab Sciences
12065 Lebanon Road | Mt. Juliet, TN 37122
Office: 615-773-9671 | Cell: 615-417-8450 | Fax: 615-758-5859
ESC Lab Sciences, Your Lab of Choice
lcashman@esclabsciences.com | www.esclabsciences.com

ANALYTICAL REPORT

May 17, 2016

Kansas City Board of Public Utilities

Sample Delivery Group:	L832454
Samples Received:	04/29/2016
Project Number:	KCBPU Nearman
Description:	GW-Creek Bottom Ash Pond
Site:	KCBPU
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

MW-1B L832454-01 GW

Collected by: Tim Ducker
Collected date/time: 04/28/16 10:35
Received date/time: 04/29/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG869816	1	05/04/16 17:40	05/04/16 18:17	MMF
Mercury by Method 7470A	WG869163	1	05/02/16 11:47	05/03/16 14:12	NJB
Metals (ICP) by Method 6010B	WG869111	1	05/02/16 18:45	05/03/16 15:21	ST
Metals (ICP) by Method 6010B	WG869561	1	05/03/16 20:14	05/04/16 02:31	CCE
Metals (ICPMS) by Method 6020	WG869298	1	05/05/16 18:40	05/05/16 23:16	JDG
Wet Chemistry by Method 9040C	WG868780	1	04/30/16 10:56	04/30/16 10:56	MAJ
Wet Chemistry by Method 9056A	WG869679	1	05/10/16 22:34	05/10/16 22:34	CM
Wet Chemistry by Method 9056A	WG871783	5	05/15/16 22:37	05/15/16 22:37	CM

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.

Linda Cashman
Technical Service Representative

Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
L832454-01	MW-1B	9040C

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	772		10.0	1	05/04/2016 18:17	WG869816

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.80		1	04/30/2016 10:56	WG868780

Sample Narrative:

9040C L832454-01 WG868780: 6.80 at 14.9c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	60.0		1.00	1	05/10/2016 22:34	WG869679
Fluoride	0.108		0.100	1	05/10/2016 22:34	WG869679
Sulfate	82.5		25.0	5	05/15/2016 22:37	WG871783

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/03/2016 14:12	WG869163

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.317		0.00500	1	05/03/2016 15:21	WG869111
Beryllium	ND		0.00200	1	05/03/2016 15:21	WG869111
Boron	ND		0.200	1	05/03/2016 15:21	WG869111
Cadmium	ND		0.00200	1	05/03/2016 15:21	WG869111
Calcium	220		1.00	1	05/03/2016 15:21	WG869111
Chromium	ND		0.0100	1	05/03/2016 15:21	WG869111
Cobalt	ND		0.0100	1	05/03/2016 15:21	WG869111
Lithium	0.0276		0.0150	1	05/04/2016 02:31	WG869561
Molybdenum	ND		0.00500	1	05/03/2016 15:21	WG869111

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/05/2016 23:16	WG869298
Arsenic	ND		0.00200	1	05/05/2016 23:16	WG869298
Lead	ND		0.00200	1	05/05/2016 23:16	WG869298
Selenium	ND		0.00200	1	05/05/2016 23:16	WG869298
Thallium	ND		0.00200	1	05/05/2016 23:16	WG869298

Method Blank (MB)

(MB) R3134195-1 05/04/16 18:17

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

L832422-21 Original Sample (OS) • Duplicate (DUP)

(OS) L832422-21 05/04/16 18:17 • (DUP) R3134195-4 05/04/16 18:17

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	3050	3020	1	0.824		5

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

(LCS) R3134195-2 05/04/16 18:17 • (LCSD) R3134195-3 05/04/16 18:17

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 %
Dissolved Solids	8800	8450	8500	96.0	96.6	85.0-115			0.590	5

L832391-10 Original Sample (OS) • Duplicate (DUP)

(OS) L832391-10 04/30/16 10:56 • (DUP) WG868780-9 04/30/16 10:56

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.63	8.63	1	0.000		1

L832536-02 Original Sample (OS) • Duplicate (DUP)

(OS) L832536-02 04/30/16 10:56 • (DUP) WG868780-12 04/30/16 10:56

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	9.17	9.18	1	0.109		1

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

(LCS) WG868780-10 04/30/16 10:56 • (LCSD) WG868780-11 04/30/16 10:56

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.43	6.39	6.38	99.4	99.2	98.5-102			0.157	1

Method Blank (MB)

(MB) R3135625-1 05/10/16 10:22

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100

L832435-15 Original Sample (OS) • Duplicate (DUP)

(OS) L832435-15 05/10/16 11:53 • (DUP) R3135625-4 05/10/16 12:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	17.2	17.3	1	1		15
Fluoride	0.893	0.943	1	5		15

L832453-03 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-03 05/10/16 18:48 • (DUP) R3135625-6 05/10/16 19:36

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	13.4	13.4	1	0		15
Fluoride	0.108	0.109	1	1		15

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

(LCS) R3135625-2 05/10/16 10:38 • (LCSD) R3135625-3 05/10/16 10:54

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	%	%	%			%	%
Chloride	40.0	39.0	39.1	98	98	80-120			0	15
Fluoride	8.00	7.64	7.65	95	96	80-120			0	15

L832450-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L832450-02 05/10/16 15:37 • (MS) R3135625-5 05/10/16 15:53

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Fluoride	5.00	1.96	6.01	81	1	80-120	

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/10/16 18:16 • (MS) R3135625-7 05/10/16 20:24 • (MSD) R3135625-8 05/10/16 20:40

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	6.47	56.7	57.0	101	101	1	80-120			0	15
Fluoride	5.00	0.158	5.05	5.07	98	98	1	80-120			0	15

Method Blank (MB)

(MB) R3136840-1 05/15/16 08:29

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.0774	5.00

L832453-02 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-02 05/15/16 18:32 • (DUP) R3136840-5 05/15/16 18:46

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	121	119	10	1		15

L832453-03 Original Sample (OS) • Duplicate (DUP)

(OS) L832453-03 05/15/16 20:13 • (DUP) R3136840-8 05/15/16 20:27

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	128	125	10	2		15

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

(LCS) R3136840-2 05/15/16 08:44 • (LCSD) R3136840-3 05/15/16 08:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Sulfate	40.0	39.8	39.7	99	99	80-120			0	15

L832435-16 Original Sample (OS) • Matrix Spike (MS)

(OS) L832435-16 05/15/16 15:39 • (MS) R3136840-4 05/15/16 15:53

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	39.9	88.8	98	1	80-120	

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/15/16 19:01 • (MS) R3136840-6 05/15/16 19:15 • (MSD) R3136840-7 05/15/16 19:58

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 %
Sulfate	50.0	153	625	625	94	94	10	80-120			0	15

Method Blank (MB)

(MB) R3133323-1 05/03/16 13:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3133323-2 05/03/16 13:10 • (LCSD) R3133323-3 05/03/16 13:13

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	0.00284	0.00305	95	102	80-120			7	20

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/03/16 13:16 • (MS) R3133323-4 05/03/16 13:19 • (MSD) R3133323-5 05/03/16 13:22

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00285	0.00257	95	86	1	75-125			10	20

Method Blank (MB)

(MB) R3133419-8 05/03/16 21:14

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium	U		0.0017	0.00500
Beryllium	U		0.0007	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.0007	0.00200
Calcium	0.0536		0.0463	1.00
Chromium	U		0.0014	0.0100
Cobalt	U		0.0023	0.0100
Molybdenum	U		0.0016	0.00500

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

(LCS) R3133419-2 05/03/16 14:20 • (LCSD) R3133419-3 05/03/16 14:22

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 %
Barium	1.00	1.02	1.04	102	104	80-120			2	20
Beryllium	1.00	1.01	1.03	101	103	80-120			2	20
Boron	1.00	1.05	1.04	105	104	80-120			1	20
Cadmium	1.00	1.04	1.05	104	105	80-120			1	20
Calcium	10.0	10.2	10.3	102	103	80-120			0	20
Chromium	1.00	1.02	1.02	102	102	80-120			1	20
Cobalt	1.00	1.02	1.04	102	104	80-120			1	20
Molybdenum	1.00	1.04	1.05	104	105	80-120			1	20

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/03/16 14:25 • (MS) R3133419-5 05/03/16 14:31 • (MSD) R3133419-6 05/03/16 14:33

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	1.00	0.120	1.14	1.12	102	100	1	75-125			1	20
Beryllium	1.00	ND	1.03	1.02	103	102	1	75-125			2	20
Boron	1.00	0.353	1.38	1.39	103	104	1	75-125			1	20
Cadmium	1.00	ND	1.08	1.07	108	107	1	75-125			1	20
Calcium	10.0	200	208	204	75	40	1	75-125		V	2	20
Chromium	1.00	ND	1.03	1.03	103	103	1	75-125			0	20
Cobalt	1.00	ND	1.06	1.05	105	104	1	75-125			1	20
Molybdenum	1.00	ND	1.05	1.04	105	104	1	75-125			0	20

Method Blank (MB)

(MB) R3133463-1 05/04/16 02:12

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Lithium	U		0.0053	0.0150

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

(LCS) R3133463-2 05/04/16 02:15 • (LCSD) R3133463-3 05/04/16 02:17

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	%	%	%			%	%
Lithium	1.00	1.00	0.986	100	99	80-120			1	20

L832675-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832675-12 05/04/16 02:20 • (MS) R3133463-5 05/04/16 02:26 • (MSD) R3133463-6 05/04/16 02:28

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	%	%		%			%	%
Lithium	1.00	0.0148	1.01	1.00	100	99	1	75-125			1	20

Method Blank (MB)

(MB) R3134286-1 05/05/16 22:26

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	0.000503		0.00021	0.00200
Arsenic	U		0.00025	0.00200
Lead	U		0.00024	0.00200
Selenium	U		0.00038	0.00200
Thallium	U		0.00019	0.00200

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

(LCS) R3134286-2 05/05/16 22:29 • (LCSD) R3134286-3 05/05/16 22:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	0.0550	0.0547	110	109	80-120			0	20
Arsenic	0.0500	0.0496	0.0499	99	100	80-120			1	20
Lead	0.0500	0.0506	0.0499	101	100	80-120			2	20
Selenium	0.0500	0.0474	0.0481	95	96	80-120			2	20
Thallium	0.0500	0.0494	0.0492	99	98	80-120			0	20

L832453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L832453-01 05/05/16 22:34 • (MS) R3134286-5 05/05/16 22:38 • (MSD) R3134286-6 05/05/16 22:41

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	0.0554	0.0546	110	108	1	75-125			1	20
Arsenic	0.0500	0.00416	0.0552	0.0544	102	100	1	75-125			2	20
Lead	0.0500	ND	0.0493	0.0487	99	97	1	75-125			1	20
Selenium	0.0500	ND	0.0497	0.0488	99	98	1	75-125			2	20
Thallium	0.0500	ND	0.0493	0.0487	99	97	1	75-125			1	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
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.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

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

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

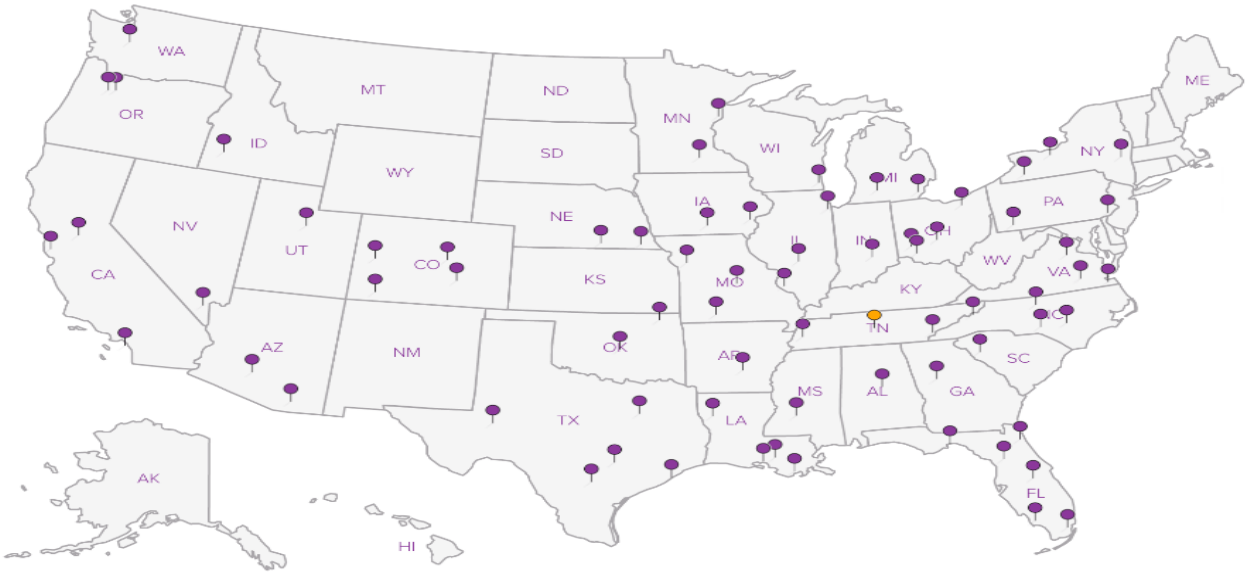
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to: Ingrid Setzler

Email To: isetzler@bpu.com;bhoye@burnsmcd.com;rkrys...@b...

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: KANSAS CITY KANSAS

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

Client Project #: KCBPU Nearman

Lab Project #: KCKAN02-MW NEARMAN2

Collected by (print): TIM DUCKER

Site/Facility ID #: KCBPU

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 500mlHDPE-HNO3 <?	TDS, pH 250mlHDPE-NoPres								Rem./Contaminant	Sample # (lab only)
MW-1B	GRAB	GW		4.28.16	1035	3	X	X	X									-01

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORIES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # L832454

L197

Acctnum: KCKAN02
Template: T111656
Prelogin: P550432
TSR: 650 - Linda Cashman
PB: 4-20-16 KM
Shipped Via: FedEx Ground

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

6645 0389 5712

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	4.28.16	1130	
Relinquished by : (Signature)	Date: 4/28/16	Time: 1700	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.1 °C Bottles Received: 3

Date: 4-29-16 Time: 9:00

Condition: OK MF (lab use only)

COC Seal Intact: ___Y ___N ___NA

pH Checked: ~2 NCF:

Case Narrative

Lab No: 20160702

This report contains the analytical results for the 12 sample(s) received under chain of custody by ESC Lab Sciences on 7/27/1100. These samples are associated with your GW-Creek Bottom Ash Pond project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted below:

The test results in this report meet all NELAC requirements unless noted below:

This report shall not be reproduced, except in full, without the written approval of ESC Lab Sciences.

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.

Results have been reviewed by the Director of Radiochemistry or their designees and is approved for release.

Observations / Nonconformances

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20160702-01								
Client ID : MW-2A								
Date Sampled : 7/25/2016 3:25:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		1.68 +/- 0.603	0.681	pCi/l				
Radium-226	SM 7500 Ra B M*	0.266 +/- 0.192	0.207	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	1.42 +/- 0.411	0.474	pCi/l		08/03/16	08/08/16	JR
Lab ID : 20160702-02								
Client ID : MW-3								
Date Sampled : 7/25/2016 4:10:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.630 +/- 0.768	0.979	pCi/l				
Radium-226	SM 7500 Ra B M*	0.116 +/- 0.186	0.299	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	0.514 +/- 0.581	0.680	pCi/l		08/03/16	08/08/16	JR
Lab ID : 20160702-03								
Client ID : MW-4								
Date Sampled : 7/25/2016 4:45:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.700 +/- 0.692	0.917	pCi/l				
Radium-226	SM 7500 Ra B M*	0.217 +/- 0.294	0.456	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	0.483 +/- 0.398	0.461	pCi/l		08/03/16	08/08/16	JR
Lab ID : 20160702-04								
Client ID : MW-8A								
Date Sampled : 7/25/2016 1:30:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		1.45 +/- 0.853	1.11	pCi/l				
Radium-226	SM 7500 Ra B M*	0.719 +/- 0.310	0.308	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	0.732 +/- 0.542	0.801	pCi/l		08/03/16	08/08/16	JR

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20160702-05**								
Client ID : **MW-10**								
Date Sampled : **7/25/2016 2:20:00 PM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.550 +/- 0.781	1.09	pCi/l				
Radium-226	SM 7500 Ra B M*	-0.066 +/- 0.258	0.497	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	0.550 +/- 0.523	0.596	pCi/l		08/03/16	08/08/16	JR
Lab ID : **20160702-06**								
Client ID : **MW-1B**								
Date Sampled : **7/26/2016 9:25:00 AM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		2.09 +/- 0.819	0.947	pCi/l				
Radium-226	SM 7500 Ra B M*	0.478 +/- 0.194	0.195	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	1.62 +/- 0.625	0.751	pCi/l		08/03/16	08/08/16	JR
Lab ID : **20160702-07**								
Client ID : **BA POND**								
Date Sampled : **7/25/2016 5:15:00 PM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.110 +/- 0.611	0.852	pCi/l				
Radium-226	SM 7500 Ra B M*	-0.085 +/- 0.116	0.233	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	0.110 +/- 0.495	0.619	pCi/l		08/03/16	08/08/16	JR
Lab ID : **20160702-08**								
Client ID : **DUP-1**								
Date Sampled : **7/25/2016**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.520 +/- 0.917	1.37	pCi/l				
Radium-226	SM 7500 Ra B M*	0.237 +/- 0.332	0.512	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	0.283 +/- 0.585	0.855	pCi/l		08/03/16	08/08/16	JR

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Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20160702-09**								
Client ID : **DUP-2**								
Date Sampled : **7/25/2016**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.457 +/- 0.613	0.763	pCi/l				
Radium-226	SM 7500 Ra B M*	0.148 +/- 0.102	0.112	pCi/l		07/28/16	07/30/16	AK
Radium-228	EPA 904*/9320*	0.309 +/- 0.512	0.651	pCi/l		08/03/16	08/08/16	JR
Lab ID : **20160702-10**								
Client ID : **MATRIX SPIKE**								
Date Sampled : **7/25/2016 4:45:00 PM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		24.8 +/- 1.98	1.06	pCi/l				
Radium-226	SM 7500 Ra B M*	18.5 +/- 1.33	0.407	pCi/l		07/28/16	07/30/16	AK
Radium-226	SM 7500 Ra B M*	92.0		% Rec				AK
Radium-228	EPA 904*/9320*	81.8		% Rec				JR
Radium-228	EPA 904*/9320*	6.32 +/- 0.656	0.648	pCi/l		08/03/16	08/08/16	JR
Lab ID : **20160702-11**								
Client ID : **MATRIX SPIKE DUPLICATE**								
Date Sampled : **7/25/2016 4:45:00 PM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		27.0 +/- 2.21	0.757	pCi/l				
Radium-226	SM 7500 Ra B M*	19.9 +/- 1.64	0.246	pCi/l		07/28/16	07/30/16	AK
Radium-226	SM 7500 Ra B M*	7.5		RPD				AK
Radium-228	EPA 904*/9320*	11.0		RPD				JR
Radium-228	EPA 904*/9320*	7.06 +/- 0.576	0.511	pCi/l		08/03/16	08/08/16	JR
Lab ID : **20160702-12**								
Client ID : **MO RIVER**								
Date Sampled : **7/26/2016 10:20:00 AM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.474 +/- 0.742	0.862	pCi/l				
Radium-226	SM 7500 Ra B M*	0.404 +/- 0.160	0.148	pCi/l		07/28/16	07/30/16	AK

*NELAC Certified Parameter BDL = Below Detection Limit

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Radium-228	EPA 904*/9320*	0.070 +/- 0.582	0.714	pCi/l		08/03/16	08/08/16	JR

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	RER, NAD or DER	MS %REC	MSD %REC	MSD RPD	Batch ID
Radium-226	0.019	102.0			NC	0.882	92.0	99.2	7.5	R1113
Radium-228	0.063	93.6			NC	0.116	81.8	92.1	11.0	R3838

Lab Approval:

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information:

Maxine Kline
300 N 65th St
Kansas City, KS 66102

Report to: Ingrid Setzler

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

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): K. Schutte

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 850403 (2160702)

Table #

Acctnum: KCKAN02
Template: T111575
Prelogin: P561433
TSR: 650 - Linda Cashman
PB: 7-18-16

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L HDPE-Add HNO3								Rem./Contaminant	Sample # (lab only)
MW-2A		GW		7-25	1525	2	X									
MW-3		GW		7-25	1610	2	X									
MW-4		GW		7-25	1648	2	X									
MW-8A		GW		7-25	1330	2	X									
MW-10		GW		7-25	1420	2	X									
MW-1B		GW		7-26	0925	2	X									
BA POND		GW		7-25	1715	2	X									
DUP-1		GW		7-25	—	2	X									
DUP-2		GW		7-25	—	2	X									
MATRIX SPIKE		GW		7-25	1645	2	X									

COPY

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:ESC ORL Lab: Report Radium 226/228 combined-LLC 4/18/16

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____
	7-26	1400	Alan Nelson	7-26-16 1430
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp °C Bottles Received:
	7/26/16	1700	Amber Taylor	Amb
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
			Amber Taylor	7/27/16 1100

Condition: (lab use only)

COC Seal Intact: ___Y ___N X NA

pH Checked: NCF:

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information:

Maxine Kline
300 N 65th St
Kansas City, KS 66102

Report to: Ingrid Setzler

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

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): Keith Schuttle

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABS SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 88403/2683

Table #

Acctnum: KCKAN02
Template: T111575
Prelogin: P561433
TSR: 650 - Linda Cashman
PB: 7-18-16

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3								Rem./Contaminant	Sample # (lab only)
MATRIX SPIKE DUPLICATE		GW		7-25	1645	2	X									
MO RIVER		GW		7-26	1020	2	X									

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:ESC ORL Lab: Report Radium 226/228 combined-LLC 4/18/16

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____
	7-26	1400	7-26-16 1430	
Relinquished by : (Signature)	Date: 7/26/16	Time: 700	Received by: (Signature)	Temp: Amb °C Bottles Received:
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/27/16 Time: 1100

Condition: (lab use only)

COC Seal Intact: ___Y ___N X NA

pH Checked: NCF:

SAMPLE LOGIN

Date Received: *7/27/1100* **Lab Number:** 20160702 **Due:** 8/24/2016

Sample Number	Client Sample ID	Matrix	Date Sampled	Container Type	Container Size	Preservation	Preserved Upon Receipt	Custody Seal	Seal Intact
20160702-01 B	MW-2A	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-01 A	MW-2A	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-02 A	MW-3	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-02 B	MW-3	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-03 A	MW-4	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-03 B	MW-4	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-04 A	MW-8A	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-04 B	MW-8A	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-05 A	MW-10	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-05 B	MW-10	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-06 B	MW-1B	NPW	07/26/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-06 A	MW-1B	NPW	07/26/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-07 B	BA POND	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-07 A	BA POND	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						

20160702-08 A	DUP-1	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-08 B	DUP-1	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-09 A	DUP-2	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-09 B	DUP-2	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-10 A	MATRIX SPIKE	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-10 B	MATRIX SPIKE	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-11 A	MATRIX SPIKE DUPLICAT	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-11 B	MATRIX SPIKE DUPLICAT	NPW	07/25/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20160702-12 B	MO RIVER	NPW	07/26/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
20160702-12 A	MO RIVER	NPW	07/26/16	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						

CONTAINER INSPECTION

 # Coolers 2 **Custody Seals Broken** N/A **Temperature:** Amb °C **Ice** **Radiation Survey:** <300 cpm

SAMPLE INSPECTION

Sample Seal Broken No **Chain of Custody Record** ☑ **Labels in Tact** ☑ **Radiation Survey Complete** N/A

Anomalies Sample date, samples -03, -10 & -11; Sample label has "7/23" and coc has "7/25". 07/27/16 m

Inspected By: Amber Taylor **DATE** 7/27/16

QA or Designee Review: Raymond Thomas **DATE** 07/27/16

Sample Custodian Review: [signature] **DATE** 7/27/16

Project Notes:

Case Narrative

Lab No: 20161076

This report contains the analytical results for the 12 sample(s) received under chain of custody by ESC Lab Sciences on 11/4/2016 11:11:42 AM. These samples are associated with your GW-Creek Bottom Ash Pond project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted below:

The test results in this report meet all NELAC requirements unless noted below:

This report shall not be reproduced, except in full, without the written approval of ESC Lab Sciences.

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.

Results have been reviewed by the Director of Radiochemistry or their designees and is approved for release.

Observations / Nonconformances

L869025

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20161076-01								
Client ID : MW-2A								
Date Sampled : 10/25/2016 1:50:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		1.23 +/- 0.621	0.720	pCi/l				
Radium-226	SM 7500 Ra B M*	0.255 +/- 0.167	0.185	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.976 +/- 0.454	0.535	pCi/l		11/15/16	11/18/16	JR
Lab ID : 20161076-02								
Client ID : MW-3								
Date Sampled : 10/25/2016 2:50:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.537 +/- 0.695	1.06	pCi/l				
Radium-226	SM 7500 Ra B M*	0.537 +/- 0.207	0.217	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	-0.269 +/- 0.488	0.840	pCi/l		11/15/16	11/18/16	JR
Lab ID : 20161076-03								
Client ID : MW-4								
Date Sampled : 10/25/2016 3:45:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.887 +/- 0.575	0.756	pCi/l				
Radium-226	SM 7500 Ra B M*	0.017 +/- 0.059	0.122	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.870 +/- 0.516	0.634	pCi/l		11/15/16	11/18/16	JR
Lab ID : 20161076-04								
Client ID : MW-8A								
Date Sampled : 10/25/2016 4:35:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.716 +/- 0.670	1.11	pCi/l				
Radium-226	SM 7500 Ra B M*	0.022 +/- 0.072	0.135	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.694 +/- 0.598	0.971	pCi/l		11/15/16	11/18/16	JR

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20161076-05								
Client ID : MW-10								
Date Sampled : 10/26/2016 2:10:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.524 +/- 0.628	0.877	pCi/l				
Radium-226	SM 7500 Ra B M*	0.081 +/- 0.138	0.224	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.443 +/- 0.490	0.653	pCi/l		11/15/16	11/18/16	JR
Lab ID : 20161076-06								
Client ID : MW-1B								
Date Sampled : 10/26/2016 5:05:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.940 +/- 0.711	0.942	pCi/l				
Radium-226	SM 7500 Ra B M*	0.198 +/- 0.163	0.222	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.742 +/- 0.548	0.720	pCi/l		11/15/16	11/18/16	JR
Lab ID : 20161076-07								
Client ID : BA POND								
Date Sampled : 10/27/2016 1:25:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.192 +/- 0.497	0.674	pCi/l				
Radium-226	SM 7500 Ra B M*	0.036 +/- 0.066	0.113	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.156 +/- 0.431	0.561	pCi/l		11/15/16	11/18/16	JR
Lab ID : 20161076-08								
Client ID : DUP-1								
Date Sampled : 10/26/2016								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		1.13 +/- 0.535	0.603	pCi/l				
Radium-226	SM 7500 Ra B M*	0.280 +/- 0.121	0.076	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.854 +/- 0.414	0.527	pCi/l		11/15/16	11/18/16	JR

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20161076-09**								
Client ID : **DUP-2**								
Date Sampled : **10/27/2016**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.087 +/- 0.606	0.809	pCi/l				
Radium-226	SM 7500 Ra B M*	0.087 +/- 0.089	0.125	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	-0.334 +/- 0.517	0.684	pCi/l		11/15/16	11/18/16	JR
Lab ID : **20161076-10**								
Client ID : **MW-8A MS**								
Date Sampled : **10/25/2016 4:35:00 PM**								
Matrix : **NPW**								
Radiochemical Analyses								
Radium-226	SM 7500 Ra B M*	107		% REC		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	87.8		% REC		11/15/16	11/18/16	JR
Lab ID : **20161076-11**								
Client ID : **MW-8A MSD**								
Date Sampled : **10/25/2016 4:35:00 PM**								
Matrix : **NPW**								
Radiochemical Analyses								
Radium-226	SM 7500 Ra B M*	7.9		RPD		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	11.6		RPD		11/15/16	11/18/16	JR
Lab ID : **20161076-12**								
Client ID : **MO RIVER**								
Date Sampled : **10/27/2016 12:45:00 PM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.957 +/- 0.539	0.803	pCi/l				
Radium-226	SM 7500 Ra B M*	0.152 +/- 0.096	0.085	pCi/l		11/14/16	11/16/16	AK
Radium-228	EPA 904*/9320*	0.805 +/- 0.443	0.718	pCi/l		11/15/16	11/18/16	JR

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QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	RER, NAD or DER	MS %REC	MSD %REC	MSD RPD	Batch ID
Radium-226	-0.005	109.0			8.9	0.991	107.0	116.0	7.9	R1160
Radium-228	0.236	98.9			NC	0.992	87.8	98.7	11.6	R3883

Lab Approval:

Ron Eidson
Director of Radiochemistry

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information & Quote Number:

300 N 65th St
Kansas City, KS 66102

Report to: Ingrid Setzler

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

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: Kansas City, KS

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

Client Project # KCBPU Nearman

Lab Project # KCKAN02-MW NEARMAN2

Collected by (print): J. Heermann

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Heermann

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABS SCIENCES

YOUR LAB OF CHOICE

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

L# 1869025

C142

Acctnum: KCBPUKS

Template: T111575

Prelogin: P573313

TSR: 650 - Linda Cashman

PB: 10-19-16

Shipped Via: FedEX Ground

	Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3										Rem./Contaminant	Sample # (lab only)
1	MW-2A	Comp	GW	—	10-25-16	1350	2	X											-01
2	MW-3	Comp	GW	—	10-25-16	1450	2	X											02
3	MW-4	Comp	GW	—	10-25-16	1545	2	X											03
4	MW-8A	Comp	GW	—	10-25-16	1635	2	X											04
5	MW-10	Comp	GW	—	10-26-16	1410	2	X											05
6	MW-1B	Comp	GW	—	10-26-16	1705	2	X											06
7	BA POND	Grab	GW	—	10-27-16	1125	2	X											07
8	DUP-1	Comp	GW	—	10-26-16	—	2	X											08
9	DUP-2	Grab	GW	—	10-27-16	—	2	X											09
10	MATRIX SPIKE	Comp	GW	—	10-25-16	1635	2	X										-04	+0

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC

pH ___ Temp ___

Flow ___ Other ___

20161076

Hold #

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☒ Courier ☐ ___
Jonathan Heermann	10-27-16	1600	Alan Nelson 1600 10/27/16	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.2 °C Bottles Received: 24 ER
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) Joseph R	Date: 10-28-16 Time: 9W

Condition: C (lab use only)

COC Seal Intact: ___ Y ___ N 1 NA

pH Checked: <2 NCF:

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information & Quote Number:

300 N 65th St
Kansas City, KS 66102

Report to: Ingrid Setzler

Email To: lsetzler@bpu.com;bhoye@burnsmcd.com;kbrown

Project Description: GW-Creek Bottom Ash Pond

City/State Collected: Kansas City KS

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

Client Project # KCBPU Nearman

Lab Project # KCKAN02-MW NEARMAN2

Collected by (print): J. Heermans

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Hermans

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 75%
___ Three Day 25%

Date Results Needed

Email? ___No X Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3										Rem./Contaminant	Sample # (lab only)
MATRIX SPIKE DUPLICATE	Comp	GW	—	10-25-16	1635	2	X										-04	
MO RIVER	Grab	GW	—	10-27-16	1245	2	X										10	

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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

L# L869025

Table #

Acctnum: KCKAN02

Template: T111575

Prelogin: P573313

TSR: 650 - Linda Cashman

PB: AH 10-19-16

Shipped Via: FedEX Ground

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC

pH ___ Temp ___

Flow ___ Other ___

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☒ Courier ☐ ___	Condition: (lab use only)
Jonathan Hermans	10/27/16	1600	Alex Lebron 10-27-16 1600		G
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.2 °C Bottles Received: 24 ER	COC Seal Intact: ___Y ___N ✓NA
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/28/16 Time: 900	pH Checked: NCF:

SAMPLE LOGIN

Date Received: 11/4/2016 11:11:4 Lab Number: 20161076 Due: 12/2/2016

Sample Number	Client Sample ID	Matrix	Date Sampled	Container Type	Container Size	Preservation	Preserved Upon Receipt	Custody Seal	Seal Intact
20161076-01 B	MW-2A	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
20161076-01 A	MW-2A	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20161076-02 A	MW-3	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
20161076-02 B	MW-3	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20161076-03 A	MW-4	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
20161076-03 B	MW-4	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20161076-04 A	MW-8A	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
20161076-04 B	MW-8A	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2		No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20161076-05 A	MW-10	NPW	10/26/16	Plastic	1 L	HNO3, pH < 2		No	No
20161076-05 B	MW-10	NPW	10/26/16	Plastic	1 L	HNO3, pH < 2		No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20161076-06 B	MW-1B	NPW	10/26/16	Plastic	1 L	HNO3, pH < 2		No	No
20161076-06 A	MW-1B	NPW	10/26/16	Plastic	1 L	HNO3, pH < 2		No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20161076-07 B	BA POND	NPW	10/27/16	Plastic	1 L	HNO3, pH < 2		No	No
20161076-07 A	BA POND	NPW	10/27/16	Plastic	1 L	HNO3, pH < 2		No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						

20161076-08 A	DUP-1	NPW	10/26/16	Plastic	1 L	HNO3, pH < 2	No	No
20161076-08 B	DUP-1	NPW	10/26/16	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
20161076-09 A	DUP-2	NPW	10/27/16	Plastic	1 L	HNO3, pH < 2	No	No
20161076-09 B	DUP-2	NPW	10/27/16	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
	MW-8A							
20161076-10 A	MATRIX SPIKE	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2	No	No
20161076-10 B	MATRIX SPIKE	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
	MW 8A							
20161076-11 A	MATRIX SPIKE DUPLICAT	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2	No	No
20161076-11 B	MATRIX SPIKE DUPLICAT	NPW	10/25/16	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
20161076-12 B	MO RIVER	NPW	10/27/16	Plastic	1 L	HNO3, pH < 2	No	No
20161076-12 A	MO RIVER	NPW	10/27/16	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					

CONTAINER INSPECTION

Coolers 2 Boxes Custody Seals Broken Ø Temperature: 4.0 C Ice Radiation Survey: <300 cpm

SAMPLE INSPECTION

Sample Seal Broken Ø Chain of Custody Record ✓ Labels in Tact ✓ Radiation Survey Complete N/A

Anomalies sample -05, sample date descrimpancy between subsample containers. Kansas City Board of Public Utilities labels have two separate dates of 10/26/16 and 10/25/16. NJ Also the Kansas City Board of P.U. has the sample date as 10/26/16 and ESC's COC has sample date as 10/25/16. NJ

Inspected By: _____ DATE 11/4/16

QA or Designee Review: Raymond Thomas DATE 11/04/16

Sample Custodian Review: Donna Nunes DATE N/4/16

Project Notes:

Sub-Contract Chain of Custody

Environmental Science Corp
12065 Lebanon Road
Mt. Juliet, TN 37122
(615) 773-9756 (615) 758-5859 fax

Sub-Contract Lab : ORLBAOK
City / State : Broken Arrow, OK
Results Needed by : 11/28/16
ESC Purchase Order # : S24607
Send Reports To : Janice Cozby jcozby@esclabsciences.com

WORKGROUP	WG922417
Date Created :	10/31/2016

SAMPLENO / Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
L869025-01	GW	10/25/2016 13:5(	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426620 S21426621						
L869025-01	GW	10/25/2016 13:5(	Radium-228	ORL-RA-228	9320	
S21426621 S21426620						
L869025-02	GW	10/25/2016 14:5(	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426625 S21426624						
L869025-02	GW	10/25/2016 14:5(	Radium-228	ORL-RA-228	9320	
S21426624 S21426625						
L869025-03	GW	10/25/2016 15:4{	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426613 S21426612						
L869025-03	GW	10/25/2016 15:4{	Radium-228	ORL-RA-228	9320	
S21426612 S21426613						
L869025-04	GW	10/25/2016 16:3{	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426614 S21426615						
L869025-04	GW	10/25/2016 16:3{	Radium-228	ORL-RA-228	9320	
S21426614 S21426615						
L869025-05	GW	10/25/2016 14:1(	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426616 S21426617						
L869025-05	GW	10/25/2016 14:1(	Radium-228	ORL-RA-228	9320	

Relinquished by _____ Date: 110316
Received by : _____ Date: 11/4/16 1111 20161076
Relinquished by _____ Date: _____
Received by : Date:

Sub-Contract Lab : __ORLBAOK____
City / State : _____Broken Arrow, OK_____
Results Needed by : ___11/28/16_____
ESC Purchase Order # : __S24607_____
Send Reports To : ____Janice Cozby jcozby@esclabsciences.com____

WORKGROUP	WG922417
Date Created :	10/31/2016

SAMPLENO / Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
L869025-06	GW	10/25/2016 17:0	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426616						
S21426617						
L869025-06	GW	10/25/2016 17:0	Radium-228	ORL-RA-228	9320	
S21426618						
S21426619						
L869025-07	GW	10/25/2016 13:2	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426611						
S21426610						
L869025-07	GW	10/25/2016 13:2	Radium-228	ORL-RA-228	9320	
S21426610						
S21426611						
L869025-08	GW	10/25/2016 0:00	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426603						
S21426602						
L869025-08	GW	10/25/2016 0:00	Radium-228	ORL-RA-228	9320	
S21426603						
S21426602						
L869025-09	GW	10/25/2016 0:00	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426605						
S21426604						
L869025-09	GW	10/25/2016 0:00	Radium-228	ORL-RA-228	9320	
S21426604						
S21426605						
L869025-10	GW	10/25/2016 12:4	Radium-226	ORL-RA-226	SM7500Ra B M	
S21426623						
S21426622						
L869025-10	GW	10/25/2016 12:4	Radium-228	ORL-RA-228	9320	
S21426623						
S21426622						

Relinquished by _____ Date: _____
Received by : _____ Date: _____
Relinquished by _____ Date: _____
Received by : Date:

Sub-Contract Lab : __ORLBAOK____
City / State : _____Broken Arrow, OK_____
Results Needed by : ___11/28/16_____
ESC Purchase Order # : __S24607_____
Send Reports To : ____Janice Cozby jcozby@esclabsciences.com____

WORKGROUP	WG922417
Date Created :	10/31/2016

SAMPLENO Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
L869025-11	GW	10/25/2016 16:3	Radium-226	ORL-RA-226	SM7500Ra B M	
L869025-11	GW	10/25/2016 16:3	Radium-228	ORL-RA-228	9320	
L869025-12	GW	10/25/2016 16:3	Radium-226	ORL-RA-226	SM7500Ra B M	
L869025-12	GW	10/25/2016 16:3	Radium-228	ORL-RA-228	9320	

Relinquished by _____ Date: _____
Received by : _____ Date: _____
Relinquished by _____ Date: _____
Received by : Date:

ANALYTICAL REPORT

November 15, 2016

Kansas City Board of Public Utilities

Sample Delivery Group:	L868992
Samples Received:	10/28/2016
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:

Linda Cashman
Technical Service Representative

MW-2A L868992-01 GW

Collected by: JH | Collected date/time: 10/25/16 13:50 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG921876	1	10/29/16 03:32	10/30/16 01:03	JM
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 15:51	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:17	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:16	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922731	1	11/02/16 18:07	11/02/16 18:07	CM
Wet Chemistry by Method 9056A	WG924098	5	11/05/16 20:40	11/05/16 20:40	CM

MW-3 L868992-02 GW

Collected by: JH | Collected date/time: 10/25/16 14:50 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG921876	1	10/29/16 03:32	10/30/16 01:03	JM
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 15:54	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:20	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:19	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 11:47	11/02/16 11:47	CM
Wet Chemistry by Method 9056A	WG924098	5	11/05/16 21:52	11/05/16 21:52	CM

MW-4 L868992-03 GW

Collected by: JH | Collected date/time: 10/25/16 15:45 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG921876	1	10/29/16 03:32	10/30/16 01:03	JM
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 15:56	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:23	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/14/16 13:13	JDG
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 12:17	11/02/16 12:17	CM

MW-8A L868992-04 GW

Collected by: JH | Collected date/time: 10/25/16 16:35 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG921876	1	10/29/16 03:32	10/30/16 01:03	JM
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 15:44	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	10/31/16 23:51	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:04	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 12:48	11/02/16 12:48	CM
Wet Chemistry by Method 9056A	WG922732	10	11/02/16 20:46	11/02/16 20:46	CM

MW-10 L868992-05 GW

Collected by: JH | Collected date/time: 10/26/16 14:10 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG922498	1	11/02/16 02:49	11/02/16 04:30	JM
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 15:59	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:25	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:38	LAT

MW-10 L868992-05 GW

Collected by: JH | Collected date/time: 10/26/16 14:10 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/04/16 13:44	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 14:05	11/02/16 14:05	CM
Wet Chemistry by Method 9056A	WG922732	5	11/02/16 21:01	11/02/16 21:01	CM

MW-1B L868992-06 GW

Collected by: JH | Collected date/time: 10/26/16 17:05 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG922498	1	11/02/16 02:49	11/02/16 04:30	JM
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 16:01	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:28	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:41	LAT
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/04/16 13:47	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 14:20	11/02/16 14:20	CM

BA POND L868992-07 GW

Collected by: JH | Collected date/time: 10/27/16 13:25 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG922790	1	11/02/16 14:55	11/02/16 15:30	MMF
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 16:04	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:31	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:44	LAT
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/04/16 13:50	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 14:36	11/02/16 14:36	CM
Wet Chemistry by Method 9056A	WG922732	10	11/02/16 14:51	11/02/16 14:51	CM

DUP-1 L868992-08 GW

Collected by: JH | Collected date/time: 10/26/16 00:00 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG922498	1	11/02/16 02:49	11/02/16 04:30	JM
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 16:12	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:34	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:47	LAT
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/04/16 13:53	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 15:07	11/02/16 15:07	CM
Wet Chemistry by Method 9056A	WG922732	5	11/02/16 21:16	11/02/16 21:16	CM

DUP-2 L868992-09 GW

Collected by: JH | Collected date/time: 10/27/16 00:00 | Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG922790	1	11/02/16 14:55	11/02/16 15:30	MMF
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 16:14	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:36	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:50	LAT

DUP-2 L868992-09 GW

Collected by: JH
Collected date/time: 10/27/16 00:00
Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/04/16 13:56	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 15:37	11/02/16 15:37	CM
Wet Chemistry by Method 9056A	WG922732	10	11/02/16 15:22	11/02/16 15:22	CM

MO RIVER L868992-10 GW

Collected by: JH
Collected date/time: 10/27/16 12:45
Received date/time: 10/28/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG922790	1	11/02/16 14:55	11/02/16 15:30	MMF
Mercury by Method 7470A	WG922404	1	11/02/16 11:14	11/02/16 16:17	NJB
Metals (ICP) by Method 6010B	WG921953	1	10/31/16 13:35	11/01/16 00:39	LTB
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/03/16 16:53	LAT
Metals (ICPMS) by Method 6020	WG922947	1	11/02/16 11:09	11/04/16 13:59	LAT
Wet Chemistry by Method 9040C	WG921915	1	11/03/16 10:55	11/03/16 10:55	MHM
Wet Chemistry by Method 9056A	WG922732	1	11/02/16 16:24	11/02/16 16:24	CM
Wet Chemistry by Method 9056A	WG924098	5	11/05/16 20:55	11/05/16 20:55	CM

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.

Linda Cashman
Technical Service Representative

Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
L868992-01	MW-2A	9040C
L868992-02	MW-3	9040C
L868992-03	MW-4	9040C
L868992-04	MW-8A	9040C
L868992-05	MW-10	9040C
L868992-06	MW-1B	9040C
L868992-07	BA POND	9040C
L868992-08	DUP-1	9040C
L868992-09	DUP-2	9040C
L868992-10	MO RIVER	9040C

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	616		10.0	1	10/30/2016 01:03	WG921876

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.00		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-01 WG921915: 7.00 at 8.3c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	9.70		1.00	1	11/02/2016 18:07	WG922731
Fluoride	0.130		0.100	1	11/02/2016 18:07	WG922731
Sulfate	127		25.0	5	11/05/2016 20:40	WG924098

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 15:51	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.102		0.00500	1	11/01/2016 00:17	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:17	WG921953
Boron	ND		0.200	1	11/01/2016 00:17	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:17	WG921953
Calcium	163		1.00	1	11/01/2016 00:17	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:17	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:17	WG921953
Lithium	0.0351		0.0150	1	11/01/2016 00:17	WG921953
Molybdenum	ND		0.00500	1	11/01/2016 00:17	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/03/2016 16:16	WG922947
Arsenic	0.00499		0.00200	1	11/03/2016 16:16	WG922947
Lead	ND		0.00200	1	11/03/2016 16:16	WG922947
Selenium	ND		0.00200	1	11/03/2016 16:16	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:16	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	697		10.0	1	10/30/2016 01:03	WG921876

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.29		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-02 WG921915: 8.29 at 19.4c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	5.23		1.00	1	11/02/2016 11:47	WG922732
Fluoride	0.138		0.100	1	11/02/2016 11:47	WG922732
Sulfate	121		25.0	5	11/05/2016 21:52	WG924098

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 15:54	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.173		0.00500	1	11/01/2016 00:20	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:20	WG921953
Boron	0.240		0.200	1	11/01/2016 00:20	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:20	WG921953
Calcium	218		1.00	1	11/01/2016 00:20	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:20	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:20	WG921953
Lithium	0.0551		0.0150	1	11/01/2016 00:20	WG921953
Molybdenum	ND		0.00500	1	11/01/2016 00:20	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/03/2016 16:19	WG922947
Arsenic	ND		0.00200	1	11/03/2016 16:19	WG922947
Lead	ND		0.00200	1	11/03/2016 16:19	WG922947
Selenium	0.00685		0.00200	1	11/03/2016 16:19	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:19	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	837		10.0	1	10/30/2016 01:03	WG921876

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.30		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-03 WG921915: 7.30 at 19.0c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	6.27		1.00	1	11/02/2016 12:17	WG922732
Fluoride	0.131		0.100	1	11/02/2016 12:17	WG922732
Sulfate	96.2		5.00	1	11/02/2016 12:17	WG922732

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 15:56	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.149		0.00500	1	11/01/2016 00:23	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:23	WG921953
Boron	ND		0.200	1	11/01/2016 00:23	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:23	WG921953
Calcium	186		1.00	1	11/01/2016 00:23	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:23	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:23	WG921953
Lithium	0.0464		0.0150	1	11/01/2016 00:23	WG921953
Molybdenum	ND		0.00500	1	11/01/2016 00:23	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/14/2016 13:13	WG922947
Arsenic	ND		0.00200	1	11/14/2016 13:13	WG922947
Lead	ND		0.00200	1	11/14/2016 13:13	WG922947
Selenium	0.0383		0.00200	1	11/14/2016 13:13	WG922947
Thallium	ND		0.00200	1	11/14/2016 13:13	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1040		10.0	1	10/30/2016 01:03	WG921876

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.97		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-04 WG921915: 7.97 at 19.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	30.3		1.00	1	11/02/2016 12:48	WG922732
Fluoride	0.355		0.100	1	11/02/2016 12:48	WG922732
Sulfate	412		50.0	10	11/02/2016 20:46	WG922732

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 15:44	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0473		0.00500	1	10/31/2016 23:51	WG921953
Beryllium	ND		0.00200	1	10/31/2016 23:51	WG921953
Boron	2.29		0.200	1	10/31/2016 23:51	WG921953
Cadmium	ND		0.00200	1	10/31/2016 23:51	WG921953
Calcium	156		1.00	1	10/31/2016 23:51	WG921953
Chromium	ND		0.0100	1	10/31/2016 23:51	WG921953
Cobalt	ND		0.0100	1	10/31/2016 23:51	WG921953
Lithium	0.0316		0.0150	1	10/31/2016 23:51	WG921953
Molybdenum	ND		0.00500	1	10/31/2016 23:51	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/03/2016 16:04	WG922947
Arsenic	0.0134		0.00200	1	11/03/2016 16:04	WG922947
Lead	ND		0.00200	1	11/03/2016 16:04	WG922947
Selenium	ND		0.00200	1	11/03/2016 16:04	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:04	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	911		10.0	1	11/02/2016 04:30	WG922498

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.02		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-05 WG921915: 7.02 at 10.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	18.0		1.00	1	11/02/2016 14:05	WG922732
Fluoride	0.111		0.100	1	11/02/2016 14:05	WG922732
Sulfate	228		25.0	5	11/02/2016 21:01	WG922732

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 15:59	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0825		0.00500	1	11/01/2016 00:25	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:25	WG921953
Boron	1.04		0.200	1	11/01/2016 00:25	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:25	WG921953
Calcium	217		1.00	1	11/01/2016 00:25	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:25	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:25	WG921953
Lithium	0.0578		0.0150	1	11/01/2016 00:25	WG921953
Molybdenum	ND		0.00500	1	11/01/2016 00:25	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/04/2016 13:44	WG922947
Arsenic	0.00351		0.00200	1	11/03/2016 16:38	WG922947
Lead	ND		0.00200	1	11/03/2016 16:38	WG922947
Selenium	ND		0.00200	1	11/03/2016 16:38	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:38	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	739		10.0	1	11/02/2016 04:30	WG922498

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.46		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-06 WG921915: 7.46 at 10.9c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	46.3		1.00	1	11/02/2016 14:20	WG922732
Fluoride	0.101		0.100	1	11/02/2016 14:20	WG922732
Sulfate	75.0		5.00	1	11/02/2016 14:20	WG922732

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 16:01	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.295		0.00500	1	11/01/2016 00:28	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:28	WG921953
Boron	ND		0.200	1	11/01/2016 00:28	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:28	WG921953
Calcium	221		1.00	1	11/01/2016 00:28	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:28	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:28	WG921953
Lithium	0.0254		0.0150	1	11/01/2016 00:28	WG921953
Molybdenum	ND		0.00500	1	11/01/2016 00:28	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/04/2016 13:47	WG922947
Arsenic	ND		0.00200	1	11/03/2016 16:41	WG922947
Lead	ND		0.00200	1	11/03/2016 16:41	WG922947
Selenium	ND		0.00200	1	11/03/2016 16:41	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:41	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	510		10.0	1	11/02/2016 15:30	WG922790

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.67		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-07 WG921915: 8.67 at 10.2c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	24.4		1.00	1	11/02/2016 14:36	WG922732
Fluoride	0.503		0.100	1	11/02/2016 14:36	WG922732
Sulfate	281		50.0	10	11/02/2016 14:51	WG922732

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 16:04	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.150		0.00500	1	11/01/2016 00:31	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:31	WG921953
Boron	1.65		0.200	1	11/01/2016 00:31	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:31	WG921953
Calcium	78.0		1.00	1	11/01/2016 00:31	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:31	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:31	WG921953
Lithium	0.0197		0.0150	1	11/01/2016 00:31	WG921953
Molybdenum	0.0337		0.00500	1	11/01/2016 00:31	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/04/2016 13:50	WG922947
Arsenic	0.00205		0.00200	1	11/03/2016 16:44	WG922947
Lead	ND		0.00200	1	11/03/2016 16:44	WG922947
Selenium	ND		0.00200	1	11/03/2016 16:44	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:44	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	904		10.0	1	11/02/2016 04:30	WG922498

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.38		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-08 WG921915: 7.38 at 11.2c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	18.0		1.00	1	11/02/2016 15:07	WG922732
Fluoride	0.110		0.100	1	11/02/2016 15:07	WG922732
Sulfate	231		25.0	5	11/02/2016 21:16	WG922732

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 16:12	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0820		0.00500	1	11/01/2016 00:34	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:34	WG921953
Boron	1.04		0.200	1	11/01/2016 00:34	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:34	WG921953
Calcium	215		1.00	1	11/01/2016 00:34	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:34	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:34	WG921953
Lithium	0.0571		0.0150	1	11/01/2016 00:34	WG921953
Molybdenum	ND		0.00500	1	11/01/2016 00:34	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/04/2016 13:53	WG922947
Arsenic	0.00365		0.00200	1	11/03/2016 16:47	WG922947
Lead	ND		0.00200	1	11/03/2016 16:47	WG922947
Selenium	ND		0.00200	1	11/03/2016 16:47	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:47	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	507		10.0	1	11/02/2016 15:30	WG922790

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.83		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-09 WG921915: 8.83 at 11.2c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	24.5		1.00	1	11/02/2016 15:37	WG922732
Fluoride	0.519		0.100	1	11/02/2016 15:37	WG922732
Sulfate	277		50.0	10	11/02/2016 15:22	WG922732

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 16:14	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.176		0.00500	1	11/01/2016 00:36	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:36	WG921953
Boron	1.65		0.200	1	11/01/2016 00:36	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:36	WG921953
Calcium	83.9		1.00	1	11/01/2016 00:36	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:36	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:36	WG921953
Lithium	0.0215		0.0150	1	11/01/2016 00:36	WG921953
Molybdenum	0.0314		0.00500	1	11/01/2016 00:36	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/04/2016 13:56	WG922947
Arsenic	0.00213		0.00200	1	11/03/2016 16:50	WG922947
Lead	ND		0.00200	1	11/03/2016 16:50	WG922947
Selenium	ND		0.00200	1	11/03/2016 16:50	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:50	WG922947

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	575		10.0	1	11/02/2016 15:30	WG922790

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.73		1	11/03/2016 10:55	WG921915

Sample Narrative:

9040C L868992-10 WG921915: 8.73 at 9.9c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	22.6		1.00	1	11/02/2016 16:24	WG922732
Fluoride	0.409		0.100	1	11/02/2016 16:24	WG922732
Sulfate	184		25.0	5	11/05/2016 20:55	WG924098

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/02/2016 16:17	WG922404

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.129		0.00500	1	11/01/2016 00:39	WG921953
Beryllium	ND		0.00200	1	11/01/2016 00:39	WG921953
Boron	ND		0.200	1	11/01/2016 00:39	WG921953
Cadmium	ND		0.00200	1	11/01/2016 00:39	WG921953
Calcium	86.2		1.00	1	11/01/2016 00:39	WG921953
Chromium	ND		0.0100	1	11/01/2016 00:39	WG921953
Cobalt	ND		0.0100	1	11/01/2016 00:39	WG921953
Lithium	0.0485		0.0150	1	11/01/2016 00:39	WG921953
Molybdenum	ND		0.00500	1	11/01/2016 00:39	WG921953

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	11/04/2016 13:59	WG922947
Arsenic	0.00361		0.00200	1	11/03/2016 16:53	WG922947
Lead	ND		0.00200	1	11/03/2016 16:53	WG922947
Selenium	0.00241		0.00200	1	11/03/2016 16:53	WG922947
Thallium	ND		0.00200	1	11/03/2016 16:53	WG922947

Method Blank (MB)

(MB) R3174488-1 10/30/16 01:03

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

L868835-03 Original Sample (OS) • Duplicate (DUP)

(OS) L868835-03 10/30/16 01:03 • (DUP) R3174488-4 10/30/16 01:03

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	2060	2120	1	2.87		5

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

(LCS) R3174488-2 10/30/16 01:03 • (LCSD) R3174488-3 10/30/16 01:03

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	%	%	%			%	%
Dissolved Solids	8800	8460	8670	96.1	98.5	85.0-115			2.45	5

Method Blank (MB)

(MB) R3175458-1 11/02/16 04:30

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

L868644-01 Original Sample (OS) • Duplicate (DUP)

(OS) L868644-01 11/02/16 04:30 • (DUP) R3175458-4 11/02/16 04:30

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	68.0	65.0	1	4.51		5

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

(LCS) R3175458-2 11/02/16 04:30 • (LCSD) R3175458-3 11/02/16 04:30

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	%	%	%			%	%
Dissolved Solids	8800	8470	8760	96.3	99.5	85.0-115			3.37	5

Method Blank (MB)

(MB) R3175669-1 11/02/16 15:30

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

L868680-01 Original Sample (OS) • Duplicate (DUP)

(OS) L868680-01 11/02/16 15:30 • (DUP) R3175669-4 11/02/16 15:30

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	459	468	1	1.94		5

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

(LCS) R3175669-2 11/02/16 15:30 • (LCSD) R3175669-3 11/02/16 15:30

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	%	%	%			%	%
Dissolved Solids	8800	8590	8500	97.6	96.6	85.0-115			1.05	5

L868961-01 Original Sample (OS) • Duplicate (DUP)

(OS) L868961-01 11/03/16 10:55 • (DUP) WG921915-3 11/03/16 10:55

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	6.06	6.02	1	0.662		1

L869267-01 Original Sample (OS) • Duplicate (DUP)

(OS) L869267-01 11/03/16 10:55 • (DUP) WG921915-4 11/03/16 10:55

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	7.87	7.90	1	0.380		1

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

(LCS) WG921915-1 11/03/16 10:55 • (LCSD) WG921915-2 11/03/16 10:55

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	su	su	su	%	%	%			%	%
pH	6.11	6.12	6.15	100	101	98.4-102			0.489	1

Method Blank (MB)

(MB) R3175523-1 11/02/16 08:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	0.0864	J	0.0519	1.00
Fluoride	U		0.0099	0.100

L868982-01 Original Sample (OS) • Duplicate (DUP)

(OS) L868982-01 11/02/16 15:05 • (DUP) R3175523-6 11/02/16 15:19

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	46.9	46.3	1	1		15
Fluoride	ND	0.0859	1	2	J	15

L868956-02 Original Sample (OS) • Duplicate (DUP)

(OS) L868956-02 11/02/16 18:36 • (DUP) R3175523-9 11/02/16 18:50

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	400	396	50	1		15
Fluoride	ND	1.81	50	0		15

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

(LCS) R3175523-2 11/02/16 09:04 • (LCSD) R3175523-3 11/02/16 09:19

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 %
Chloride	40.0	38.1	38.5	95	96	80-120			1	15
Fluoride	8.00	7.69	7.75	96	97	80-120			1	15

L868609-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L868609-01 11/02/16 10:17 • (MS) R3175523-4 11/02/16 10:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	14.4	62.3	96	1	80-120	
Fluoride	5.00	ND	4.89	96	1	80-120	

L868982-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L868982-04 11/02/16 15:34 • (MS) R3175523-7 11/02/16 15:48 • (MSD) R3175523-8 11/02/16 16:03

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	5.94	55.0	55.5	98	99	1	80-120			1	15
Fluoride	5.00	0.257	5.07	5.07	96	96	1	80-120			0	15

Method Blank (MB)

(MB) R3175524-1 11/02/16 09:54

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

L868992-02 Original Sample (OS) • Duplicate (DUP)

(OS) L868992-02 11/02/16 11:47 • (DUP) R3175524-4 11/02/16 12:02

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	5.23	5.15	1	1		15
Fluoride	0.138	0.126	1	9		15

L869010-01 Original Sample (OS) • Duplicate (DUP)

(OS) L869010-01 11/02/16 16:39 • (DUP) R3175524-7 11/02/16 16:54

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	36.3	36.3	1	0		15
Fluoride	U	0.000	1	0		15
Sulfate	68.6	68.8	1	0		15

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

(LCS) R3175524-2 11/02/16 10:10 • (LCSD) R3175524-3 11/02/16 10:25

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	%	%	%			%	%
Chloride	40.0	38.7	38.7	97	97	80-120			0	15
Fluoride	8.00	7.89	7.89	99	99	80-120			0	15
Sulfate	40.0	39.0	39.0	98	98	80-120			0	15

L868992-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L868992-04 11/02/16 12:48 • (MS) R3175524-5 11/02/16 13:34 • (MSD) R3175524-6 11/02/16 13:50

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	%	%		%			%	%
Chloride	50.0	30.3	79.3	79.5	98	99	1	80-120			0	15
Fluoride	5.00	0.355	5.41	5.40	101	101	1	80-120			0	15

L869070-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L869070-03 11/02/16 17:41 • (MS) R3175524-8 11/02/16 17:56

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	81.3	128	92	1	80-120	E
Fluoride	5.00	0.446	5.43	100	1	80-120	
Sulfate	50.0	32.4	81.0	97	1	80-120	

Method Blank (MB)

(MB) R3176140-1 11/05/16 06:48

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Sulfate	U		0.0774	5.00

L868913-01 Original Sample (OS) • Duplicate (DUP)

(OS) L868913-01 11/05/16 17:47 • (DUP) R3176140-4 11/05/16 18:02

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	334	335	5	0		15

L868992-02 Original Sample (OS) • Duplicate (DUP)

(OS) L868992-02 11/05/16 21:52 • (DUP) R3176140-6 11/05/16 22:07

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	121	121	5	0		15

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

(LCS) R3176140-2 11/05/16 07:03 • (LCSD) R3176140-3 11/05/16 07:17

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	%	%	%			%	%
Sulfate	40.0	38.3	38.3	96	96	80-120			0	15

L869128-05 Original Sample (OS) • Matrix Spike (MS)

(OS) L869128-05 11/05/16 18:59 • (MS) R3176140-5 11/05/16 19:14

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Sulfate	50.0	51.6	95.6	88	1	80-120	

L869128-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L869128-07 11/05/16 22:50 • (MS) R3176140-7 11/05/16 23:04 • (MSD) R3176140-8 11/05/16 23:19

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	%	%		%			%	%
Sulfate	50.0	50.1	93.5	94.4	87	89	1	80-120			1	15

Method Blank (MB)

(MB) R3175355-1 11/02/16 15:28

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3175355-2 11/02/16 15:31 • (LCSD) R3175355-6 11/02/16 17:11

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	%	%	%			%	%
Mercury	0.00300	0.00278	0.00275	93	92	80-120			1	20

L868992-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L868992-04 11/02/16 15:44 • (MS) R3175355-4 11/02/16 15:46 • (MSD) R3175355-5 11/02/16 15:49

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	%	%		%			%	%
Mercury	0.00300	ND	0.00280	0.00285	93	95	1	75-125			2	20

Method Blank (MB)

(MB) R3174836-1 10/31/16 23:43

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium	U		0.0017	0.00500
Beryllium	U		0.0007	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.0007	0.00200
Calcium	U		0.0463	1.00
Chromium	U		0.0014	0.0100
Cobalt	U		0.0023	0.0100
Lithium	U		0.0053	0.0150
Molybdenum	U		0.0016	0.00500

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

(LCS) R3174836-2 10/31/16 23:45 • (LCSD) R3174836-3 10/31/16 23:48

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 %
Barium	1.00	1.02	1.05	102	105	80-120			2	20
Beryllium	1.00	1.03	1.05	103	105	80-120			1	20
Boron	1.00	1.02	1.02	102	102	80-120			0	20
Cadmium	1.00	1.00	1.03	100	103	80-120			2	20
Calcium	10.0	10.0	10.2	100	102	80-120			2	20
Chromium	1.00	1.00	1.02	100	102	80-120			2	20
Cobalt	1.00	1.02	1.04	102	104	80-120			2	20
Lithium	1.00	1.00	1.02	100	102	80-120			1	20
Molybdenum	1.00	1.02	1.04	102	104	80-120			3	20

L868992-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L868992-04 10/31/16 23:51 • (MS) R3174836-5 10/31/16 23:56 • (MSD) R3174836-6 10/31/16 23:58

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 %
Barium	1.00	0.0473	1.09	1.07	104	102	1	75-125			1	20
Beryllium	1.00	ND	1.05	1.03	105	103	1	75-125			2	20
Boron	1.00	2.29	3.31	3.27	102	98	1	75-125			1	20
Cadmium	1.00	ND	1.07	1.05	107	105	1	75-125			2	20
Calcium	10.0	156	166	165	94	83	1	75-125			1	20
Chromium	1.00	ND	1.02	0.994	102	99	1	75-125			3	20
Cobalt	1.00	ND	1.07	1.05	107	105	1	75-125			2	20
Lithium	1.00	0.0316	1.07	1.06	104	103	1	75-125			1	20
Molybdenum	1.00	ND	1.06	1.04	105	104	1	75-125			1	20

L869003-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L869003-01 11/01/16 00:01 • (MS) R3174836-7 11/01/16 00:04 • (MSD) R3174836-8 11/01/16 00:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	1.00	0.00847	1.02	1.03	101	102	1	75-125			1	20
Beryllium	1.00	ND	1.04	1.04	104	104	1	75-125			1	20
Boron	1.00	0.577	1.58	1.60	101	102	1	75-125			1	20
Cadmium	1.00	ND	1.03	1.04	103	104	1	75-125			1	20
Calcium	10.0	3.71	13.6	13.7	99	100	1	75-125			0	20
Chromium	1.00	ND	1.01	1.01	101	101	1	75-125			0	20
Cobalt	1.00	ND	1.05	1.06	105	106	1	75-125			1	20
Lithium	1.00	0.212	1.20	1.21	99	100	1	75-125			1	20
Molybdenum	1.00	ND	1.02	1.01	102	101	1	75-125			1	20

Method Blank (MB)

(MB) R3175780-1 11/03/16 15:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	0.00103	J	0.000754	0.00200
Arsenic	U		0.00025	0.00200
Lead	U		0.00024	0.00200
Selenium	U		0.00038	0.00200
Thallium	U		0.00019	0.00200

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

(LCS) R3175780-2 11/03/16 15:57 • (LCSD) R3175780-3 11/03/16 16:00

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	0.0579	0.0604	0.0624	104	108	80-120			3	20
Arsenic	0.0500	0.0489	0.0510	98	102	80-120			4	20
Lead	0.0500	0.0530	0.0525	106	105	80-120			1	20
Selenium	0.0500	0.0526	0.0499	105	100	80-120			5	20
Thallium	0.0500	0.0529	0.0511	106	102	80-120			3	20

L868992-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L868992-04 11/03/16 16:04 • (MS) R3175780-5 11/03/16 16:10 • (MSD) R3175780-6 11/03/16 16:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0579	ND	0.0612	0.0615	106	106	1	75-125			1	20
Arsenic	0.0500	0.0134	0.0636	0.0648	100	103	1	75-125			2	20
Lead	0.0500	ND	0.0519	0.0522	104	104	1	75-125			0	20
Selenium	0.0500	ND	0.0505	0.0544	101	109	1	75-125			7	20
Thallium	0.0500	ND	0.0525	0.0527	105	105	1	75-125			0	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
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.
Rec.	Recovery.

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.

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
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Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

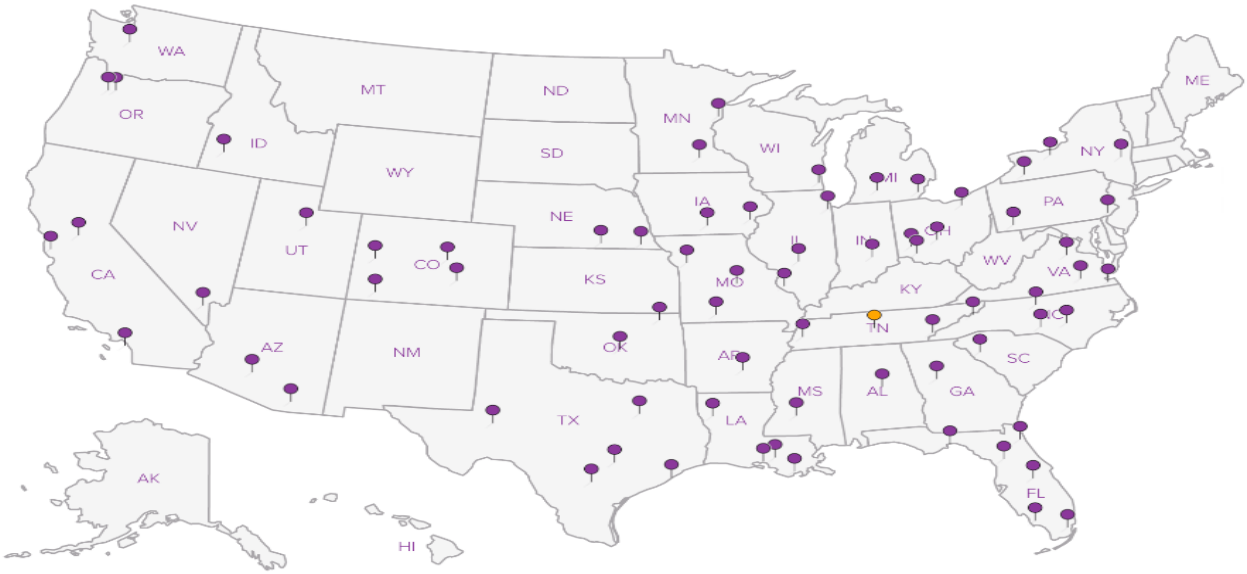
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information & Quote Number:

300 N 65th St
Kansas City, KS 66102

Report to: **Ingrid Setzler**

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

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

City/State Collected: KANSAS CITY, KS

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

Client Project # **KCBPU Nearman**

Lab Project # **KCKAN02-MW NEARMAN2**

Collected by (print): J. HERMANSON

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Hermanson

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Chain of Custody Page ___ of ___

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

L# 863992

C139

Acctnum: KCKAN02
Template: T109043
Prelogin: P573310
TSR: 650 - Linda Cashman
PB: HS 10-19-16
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Rem./Contaminant	Sample # (lab only)
MW-2A	Comp	GW	—	10-25-16	1350	3	X	X	X		01
MW-3	Comp	GW	—	10-25-16	1450	3	X	X	X		02
MW-4	Comp	GW	—	10-25-16	1545	3	X	X	X		03
MW-8A	Comp	GW	—	10-25-16	1635	3	X	X	X		04
MW-10	Comp	GW	—	10-26-16	1410	3	X	X	X		05
MW-1B	Comp	GW	—	10-26-16	1705	3	X	X	X		06
BA POND	Grab	GW	—	10-27-16	1325	3	X	X	X		07
DUP-1	Comp	GW	—	10-26-16	—	3	X	X	X		08
DUP-2	Grab	GW	—	10-27-16	—	3	X	X	X		09
MATRIX SPIKE	Comp	GW	—	10-25-16	1685	3	X	X	X		04

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

pH _____ Temp _____

Flow _____ Other _____

Remarks:

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☑ Courier ☐ _____
Jonathan Hermanson	10-27-16	1600	Allan Nelson 10-27-16 1600	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.2 °C Bottles Received: 36
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Joseph K	Date: 10-28-16 Time: 0900

Condition: (lab use only) OK M²

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

Kansas City Board of Public Utilities 300 N 65th Street Kansas City, KS 66102	Billing Information & Quote Number: 300 N 65th St Kansas City, KS 66102
Report to: Ingrid Setzler	Email To: isetzler@bpu.com;bhoye@burnsmcd.com;kbrown

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC L·A·B S·C·I·E·N·C·E·S YOUR LAB OF CHOICE

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

Project Description: GW-Creek Bottom Ash Pond	City/State Collected: KANSAS CITY, KS
Phone: 913-573-9806 Fax: 913-573-9838	Client Project # KCBPU Nearman
Lab Project # KCKAN02-MW NEARMAN2	
Collected by (print): J. HERMANSON	Site/Facility ID #
P.O. #	
Collected by (signature): [signature]	Rush? (Lab MUST Be Notified) ___ Same Day ......200% ___ Next Day ......100% ___ Two Day ......50% ___ Three Day 25%
Immediately Packed on Ice N____ Y X	Date Results Needed Email? ___No X Yes FAX? ___No ___Yes

L# 868992

Table #

Acctnum: KCKAN02
Template: T109043
Prelogin: P573310
TSR: 650 - Linda Cashman
PB: 10-19-16
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres								Rem./Contaminant	Sample # (lab only)
MATRIX SPIKE DUPLICATE	Comp	GW	—	10-25-16	1635	3	X	X	X									64
MO RIVER	GRAB	GW	—	10-27-16	1245	3	X	X	X									10

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ________

Remarks:

pH ________ Temp ________

Flow ________ Other ________

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via:
[signature]	10/27/16	1600	[signature] 10-27-16 1600	☐ UPS ☐ FedEx ☒ Courier ☐ ____
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.2 °C Bottles Received: 36
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Joseph K.	Date: 10-28-16 Time: 0900

Condition: (lab use only)

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE

Cooler Receipt Form

Client:	KCKANOR	SDG#	368592
Cooler Received/Opened On: 10/28/16		Temperature Upon Receipt:	3.2 °C
Received By: Joseph Roberts			
Signature:	Joseph R		

Receipt Check List	Yes	No	N/A
Were custody seals on outside of cooler and intact?			✓
Were custody papers properly filled out?	✓		
Did all bottles arrive in good condition?	✓		
Were correct bottles used for the analyses requested?	✓		
Was sufficient amount of sample sent in each bottle?	✓		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)	✓		
If applicable, was an observable VOA headspace present?			✓
Non Conformance Generated. (If yes see attached NCF)			

Case Narrative

Lab No: 20170052

This report contains the analytical results for the 12 sample(s) received under chain of custody by ESC Lab Sciences on 1/26/2017 1:08:22 PM. These samples are associated with your KCBPU Nearman project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted below:

The test results in this report meet all NELAC requirements unless noted below:

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.

Results have been reviewed by the Director of Radiochemistry or their designees and is approved for release.

Observations / Nonconformances

L886436

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170052-01**								
Client ID : **MW-2A**								
Date Sampled : **1/23/2017 1:45:00 PM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		1.70 +/- 0.931	0.976	pCi/l				
Radium-226	SM 7500 Ra B M*	0.833 +/- 0.289	0.256	pCi/l		02/07/17	02/14/17	AK
Radium-228	EPA 904*/9320*	0.862 +/- 0.642	0.720	pCi/l		02/08/17	02/20/17	JR
Lab ID : **20170052-02**								
Client ID : **MW-3**								
Date Sampled : **1/24/2017 9:55:00 AM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		4.26 +/- 0.963	1.17	pCi/l				
Radium-226	SM 7500 Ra B M*	0.111 +/- 0.273	0.437	pCi/l		02/07/17	02/14/17	AK
Radium-228	EPA 904*/9320*	4.15 +/- 0.690	0.733	pCi/l		02/08/17	02/20/17	JR
Lab ID : **20170052-03**								
Client ID : **MW-4**								
Date Sampled : **1/24/2017 9:15:00 AM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.180 +/- 0.679	0.818	pCi/l				
Radium-226	SM 7500 Ra B M*	0.180 +/- 0.141	0.174	pCi/l		02/07/17	02/14/17	AK
Radium-228	EPA 904*/9320*	-0.148 +/- 0.538	0.644	pCi/l		02/08/17	02/20/17	JR
Lab ID : **20170052-04**								
Client ID : **MW-8A**								
Date Sampled : **1/23/2017 3:35:00 PM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.536 +/- 0.725	0.923	pCi/l				
Radium-226	SM 7500 Ra B M*	0.132 +/- 0.203	0.319	pCi/l		02/07/17	02/14/17	AK
Radium-228	EPA 904*/9320*	0.404 +/- 0.522	0.604	pCi/l		02/08/17	02/20/17	JR

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170052-05**								
Client ID : **MW-10**								
Date Sampled : **1/23/2017 2:35:00 PM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.253 +/- 0.697	0.822	pCi/l				
Radium-226	SM 7500 Ra B M*	0.253 +/- 0.159	0.186	pCi/l		02/07/17	02/14/17	AK
Radium-228	EPA 904*/9320*	-0.292 +/- 0.538	0.636	pCi/l		02/08/17	02/20/17	JR
Lab ID : **20170052-06**								
Client ID : **MW-1B**								
Date Sampled : **1/24/2017 1:05:00 PM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.439 +/- 0.605	0.729	pCi/l				
Radium-226	SM 7500 Ra B M*	0.209 +/- 0.142	0.147	pCi/l		02/07/17	02/14/17	AK
Radium-228	EPA 904*/9320*	0.230 +/- 0.463	0.582	pCi/l		02/08/17	02/20/17	JR
Lab ID : **20170052-07**								
Client ID : **BA POND**								
Date Sampled : **1/24/2017 10:40:00 AM**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.297 +/- 0.578	0.758	pCi/l				
Radium-226	SM 7500 Ra B M*	0.297 +/- 0.158	0.164	pCi/l		02/07/17	02/14/17	AK
Radium-228	EPA 904*/9320*	-0.169 +/- 0.420	0.594	pCi/l		02/08/17	02/21/17	JR
Lab ID : **20170052-08**								
Client ID : **DUP-1**								
Date Sampled : **1/24/2017**								
Matrix : **NPW**								
Radiochemical Analyses								
Combined Radium		0.443 +/- 0.639	0.691	pCi/l				
Radium-226	SM 7500 Ra B M*	0.443 +/- 0.206	0.216	pCi/l		02/15/17	02/17/17	SD
Radium-228	EPA 904*/9320*	-0.186 +/- 0.433	0.475	pCi/l		02/08/17	02/21/17	JR

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170052-09**								
Client ID : **DUP-2**								
Date Sampled : **1/24/2017**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.364 +/- 0.674	0.741	pCi/l				
Radium-226	SM 7500 Ra B M*	0.364 +/- 0.180	0.167	pCi/l		02/15/17	02/17/17	SD
Radium-228	EPA 904*/9320*	-0.267 +/- 0.494	0.574	pCi/l		02/08/17	02/21/17	JR
Lab ID : **20170052-10**								
Client ID : **MATRIX SPIKE**								
Date Sampled : **1/24/2017 11:30:00 AM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Radium-226	SM 7500 Ra B M*	97.2		% REC		02/15/17	02/17/17	SD
Radium-228	EPA 904*/9320*	81.7		% REC		02/08/17	02/21/17	JR
Lab ID : **20170052-11**								
Client ID : **MATRIX SPIKE DUPLICATE**								
Date Sampled : **1/24/2017 11:30:00 AM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Radium-226	SM 7500 Ra B M*	9.5		RPD		02/15/17	02/17/17	SD
Radium-228	EPA 904*/9320*	11.1		RPD		02/08/17	02/21/17	JR
Lab ID : **20170052-12**								
Client ID : **MO RIVER**								
Date Sampled : **1/24/2017 11:30:00 AM**								
Matrix : **NPW**								
		Radiochemical Analyses						
Combined Radium		0.300 +/- 0.771	1.08	pCi/l				
Radium-226	SM 7500 Ra B M*	0.251 +/- 0.298	0.445	pCi/l		02/15/17	02/17/17	SD
Radium-228	EPA 904*/9320*	0.049 +/- 0.473	0.637	pCi/l		02/08/17	02/21/17	JR

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QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	RER, NAD or DER	MS %REC	MSD %REC	MSD RPD	Batch ID
Radium-226	0.000	102.0			NC	0.520	97.2	107.0	9.5	R1191
Radium-226	-0.004	94.4			NC	1.810	109.0	105.0	3.5	R1189
Radium-228	0.176	91.3			NC	0.883	81.7	73.0	11.1	GS1705

Lab Approval:

Ron Eidson
Director of Radiochemistry

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information & Quote Number:

300 N 65th St
Kansas City, KS 66102

Report to: Ingrid Setzler

Email To: lsetzler@bpu.com;bhoye@burnsmcd.com;kbrown@bpu.com

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 Hermanson

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Hermanson
Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3										Rem./Contaminant	Sample # (lab only)
MW-2A	Comp	GW	—	1-23-17	1345	2	X											
MW-3	Comp	GW	—	1-24-17	0955	2	X											
MW-4	Comp	GW	—	1-24-17	0915	2	X											
MW-8A	Comp	GW	—	1-23-17	1535	2	X											
MW-10	Comp	GW	—	1-23-17	1485	2	X											
MW-1B	Comp	GW	—	1-24-17	1305	2	X											
BA POND	Grab	GW	—	1-24-17	1040	2	X											
DUP-1	—	GW	—	1-24-17	—	2	X											
DUP-2	—	GW	—	1-24-17	—	2	X											
MATRIX SPIKE	Grab	GW	—	1-24-17	1130	2	X											

Analysis / Container / Preservative

COPY

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks:ESC ORL Lab: Report Radium 226/228 combined-LLC

pH ___ Temp ___

Flow ___ Other ___

20170052

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Jonathan Hermanson	1-25-17	1730	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	1/25/17	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___

Temp: Amb °C Bottles Received: 24

Date: 1/26/17 Time: 1308

Condition: good (lab use only)

COC Seal Intact: X Y ___N ___NA

pH Checked: NCF:

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
YOUR LAB OF CHOICE

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

L# 886436

Table #

Acctnum: KCKAN02
Template: T111575
Prelogin: P584874
TSR: 650 - Linda Cashman
PB: 1-16-17 MW

Shipped Via: FedEX Ground

Kansas City Board of Public Utilities
300 N 65th Street
Kansas City, KS 66102

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

Report to: Ingrid Setzler

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

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 Heamawon

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Heamawon

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3
MATRIX SPIKE DUPLICATE	Grab	GW	-	1-24-17	1130	2	X
MO RIVER	Grab	GW	-	1-24-17	1130	2	X

COPY

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC

pH ___ Temp ___

Flow ___ Other ___

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABSCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L#

Table #

Acctnum: KCKAN02
Template: T111575
Prelogin: P584874
TSR: 650 - Linda Cashman
PB: 1-16-17 MW

Shipped Via: FedEx Ground

Rem./Contaminant	Sample # (lab only)

2017005 2

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	1-25-17	1230	
Relinquished by : (Signature)	Date: 1/25/17	Time: 1700	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___

Temp: 4.6 °C Bottles Received: 24

Date: 1/26/17 Time: 1308

Condition: good (lab use only)

COC Seal Intact: X Y ___N ___NA

pH Checked: NCF:

SAMPLE LOGIN

Date Received: *1/26/2017 1:08:22* **Lab Number:** 20170052 **Due:** 2/23/2017

Sample Number	Client Sample ID	Matrix	Date Sampled	Container Type	Container Size	Preservation	Preserved Upon Receipt	Custody Seal	Seal Intact
20170052-01 B	MW-2A	NPW	01/23/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170052-01 A	MW-2A	NPW	01/23/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20170052-02 A	MW-3	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170052-02 B	MW-3	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20170052-03 A	MW-4	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170052-03 B	MW-4	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20170052-04 A	MW-8A	NPW	01/23/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170052-04 B	MW-8A	NPW	01/23/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20170052-05 A	MW-10	NPW	01/23/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170052-05 B	MW-10	NPW	01/23/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20170052-06 B	MW-1B	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170052-06 A	MW-1B	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						
20170052-07 B	BA POND	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170052-07 A	BA POND	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*/9320*						

20170052-08 A	DUP-1	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
20170052-08 B	DUP-1	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
20170052-09 A	DUP-2	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
20170052-09 B	DUP-2	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
20170052-10 A	MATRIX SPIKE	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
20170052-10 B	MATRIX SPIKE	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
20170052-11 A	MATRIX SPIKE DUPLICAT	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
20170052-11 B	MATRIX SPIKE DUPLICAT	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					
20170052-12 B	MO RIVER	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
20170052-12 A	MO RIVER	NPW	01/24/17	Plastic	1 L	HNO3, pH < 2	No	No
Radium-226			SM 7500 Ra B M*					
Radium-228			EPA 904*/9320*					

CONTAINER INSPECTION

 # Coolers 2 **Custody Seals Broken** Ø **Temperature:** 4.6 C **Ice** **Radiation Survey:** <300 cpm

SAMPLE INSPECTION

Sample Seal Broken Ø **Chain of Custody Record** ☑ **Labels in Tact** ☑ **Radiation Survey Complete** N/A

Anomalies No sample time on containers for -05, Time taken from CoC.

Inspected By: _____ **DATE** 1/26/17

QA or Designee Review: Raymond Thomas **DATE** 01/26/17

Sample Custodian Review: Justin Navoda **DATE** 1/26/17

Project Notes:

ANALYTICAL REPORT

February 06, 2017

Kansas City Board of Public Utilities

Sample Delivery Group:	L886084
Samples Received:	01/26/2017
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:

Linda Cashman
Technical Service Representative

MW-2A L886084-01 GW

Collected by: Jonathan H.
Collected date/time: 01/23/17 13:45
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947817	1	01/30/17 20:41	01/30/17 21:11	MMF
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:02	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:28	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 12:35	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 16:57	01/27/17 16:57	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 15:11	01/30/17 15:11	KCF

MW-3 L886084-02 GW

Collected by: Jonathan H.
Collected date/time: 01/24/17 09:55
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947994	1	01/31/17 21:50	01/31/17 23:31	JM
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:04	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:30	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 12:38	JPD
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 15:40	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 17:45	01/27/17 17:45	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 15:42	01/30/17 15:42	KCF

MW-4 L886084-03 GW

Collected by: Jonathan H.
Collected date/time: 01/24/17 09:15
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947994	1	01/31/17 21:50	01/31/17 23:31	JM
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:06	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:33	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 12:42	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 17:13	01/27/17 17:13	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 15:52	01/30/17 15:52	KCF

MW-8A L886084-04 GW

Collected by: Jonathan H.
Collected date/time: 01/23/17 15:35
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947817	1	01/30/17 20:41	01/30/17 21:11	MMF
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:13	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:41	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 12:45	JPD
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 15:44	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 18:33	01/27/17 18:33	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 16:02	01/30/17 16:02	KCF

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

MW-10 L886084-05 GW

Collected by: Jonathan H.
Collected date/time: 01/23/17 14:35
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947817	1	01/30/17 20:41	01/30/17 21:11	MMF
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:15	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:44	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 12:49	JPD
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 15:47	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 18:49	01/27/17 18:49	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 16:12	01/30/17 16:12	KCF

MW-1B L886084-06 GW

Collected by: Jonathan H.
Collected date/time: 01/24/17 13:05
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947994	1	01/31/17 21:50	01/31/17 23:31	JM
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:18	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:47	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 12:52	JPD
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 15:50	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 19:05	01/27/17 19:05	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 16:22	01/30/17 16:22	KCF

BA POND L886084-07 GW

Collected by: Jonathan H.
Collected date/time: 01/24/17 10:40
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947994	1	01/31/17 21:50	01/31/17 23:31	JM
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:20	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:49	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 13:22	JPD
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 15:54	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 19:21	01/27/17 19:21	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 16:32	01/30/17 16:32	KCF

DUP-1 L886084-08 GW

Collected by: Jonathan H.
Collected date/time: 01/24/17 00:00
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947994	1	01/31/17 21:50	01/31/17 23:31	JM
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:22	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:52	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 13:26	JPD
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 15:57	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 19:37	01/27/17 19:37	SAM
Wet Chemistry by Method 9056A	WG947581	1	01/30/17 16:43	01/30/17 16:43	KCF

DUP-2 L886084-09 GW

Collected by: Jonathan H.
Collected date/time: 01/24/17 00:00
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947994	1	01/31/17 21:50	01/31/17 23:31	JM
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 10:38	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:55	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 13:29	JPD
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 16:01	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 20:09	01/27/17 20:09	SAM
Wet Chemistry by Method 9056A	WG947581	5	01/30/17 17:03	01/30/17 17:03	KCF

MO RIVER L886084-10 GW

Collected by: Jonathan H.
Collected date/time: 01/23/17 11:30
Received date/time: 01/26/17 09:05

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG947817	1	01/30/17 20:41	01/30/17 21:11	MMF
Mercury by Method 7470A	WG946916	1	01/26/17 13:56	01/27/17 09:35	NJB
Metals (ICP) by Method 6010B	WG947085	1	01/27/17 10:41	01/27/17 13:17	ST
Metals (ICPMS) by Method 6020	WG946971	1	01/26/17 16:16	02/03/17 11:56	JPD
Wet Chemistry by Method 9040C	WG947292	1	01/30/17 11:00	01/30/17 11:00	KK
Wet Chemistry by Method 9056A	WG947034	1	01/27/17 20:25	01/27/17 20:25	SAM
Wet Chemistry by Method 9056A	WG947581	10	01/30/17 17:33	01/30/17 17:33	KCF

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.

Linda Cashman
Technical Service Representative

Sample Handling and Receiving

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
L886084-01	MW-2A	9040C
L886084-02	MW-3	9040C
L886084-03	MW-4	9040C
L886084-04	MW-8A	9040C
L886084-05	MW-10	9040C
L886084-06	MW-1B	9040C
L886084-07	BA POND	9040C
L886084-08	DUP-1	9040C
L886084-09	DUP-2	9040C
L886084-10	MO RIVER	9040C

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	734		10.0	1	01/30/2017 21:11	WG947817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.84		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-01 WG947292: 6.84 at 20.4c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	14.9		1.00	1	01/27/2017 16:57	WG947034
Fluoride	0.187		0.100	1	01/27/2017 16:57	WG947034
Sulfate	153		25.0	5	01/30/2017 15:11	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:02	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.129		0.00500	1	01/27/2017 13:28	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:28	WG947085
Boron	0.495		0.200	1	01/27/2017 13:28	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:28	WG947085
Calcium	193		1.00	1	01/27/2017 13:28	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:28	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:28	WG947085
Lithium	0.0334		0.0150	1	01/27/2017 13:28	WG947085
Molybdenum	ND		0.00500	1	01/27/2017 13:28	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 12:35	WG946971
Arsenic	0.00541		0.00200	1	02/03/2017 12:35	WG946971
Lead	ND		0.00200	1	02/03/2017 12:35	WG946971
Selenium	ND		0.00200	1	02/03/2017 12:35	WG946971
Thallium	ND		0.00200	1	02/03/2017 12:35	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	831		10.0	1	01/31/2017 23:31	WG947994

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.56		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-02 WG947292: 6.56 at 20.6c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	5.88		1.00	1	01/27/2017 17:45	WG947034
Fluoride	0.176		0.100	1	01/27/2017 17:45	WG947034
Sulfate	130		25.0	5	01/30/2017 15:42	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:04	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.165		0.00500	1	01/27/2017 13:30	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:30	WG947085
Boron	0.208		0.200	1	01/27/2017 13:30	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:30	WG947085
Calcium	212		1.00	1	01/27/2017 13:30	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:30	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:30	WG947085
Lithium	0.0542		0.0150	1	01/27/2017 13:30	WG947085
Molybdenum	ND		0.00500	1	01/27/2017 13:30	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 12:38	WG946971
Arsenic	ND		0.00200	1	02/03/2017 12:38	WG946971
Lead	ND		0.00200	1	02/03/2017 15:40	WG946971
Selenium	ND		0.00200	1	02/03/2017 12:38	WG946971
Thallium	ND		0.00200	1	02/03/2017 15:40	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	774		10.0	1	01/31/2017 23:31	WG947994

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.87		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-03 WG947292: 6.87 at 20.3c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	11.2		1.00	1	01/27/2017 17:13	WG947034
Fluoride	0.172		0.100	1	01/27/2017 17:13	WG947034
Sulfate	148		25.0	5	01/30/2017 15:52	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:06	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.173		0.00500	1	01/27/2017 13:33	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:33	WG947085
Boron	ND		0.200	1	01/27/2017 13:33	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:33	WG947085
Calcium	207		1.00	1	01/27/2017 13:33	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:33	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:33	WG947085
Lithium	0.0411		0.0150	1	01/27/2017 13:33	WG947085
Molybdenum	ND		0.00500	1	01/27/2017 13:33	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 12:42	WG946971
Arsenic	ND		0.00200	1	02/03/2017 12:42	WG946971
Lead	ND		0.00200	1	02/03/2017 12:42	WG946971
Selenium	0.0155		0.00200	1	02/03/2017 12:42	WG946971
Thallium	ND		0.00200	1	02/03/2017 12:42	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	935		10.0	1	01/30/2017 21:11	WG947817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.72		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-04 WG947292: 6.72 at 20.5c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	26.9		1.00	1	01/27/2017 18:33	WG947034
Fluoride	0.413		0.100	1	01/27/2017 18:33	WG947034
Sulfate	386		25.0	5	01/30/2017 16:02	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:13	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0524		0.00500	1	01/27/2017 13:41	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:41	WG947085
Boron	2.38		0.200	1	01/27/2017 13:41	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:41	WG947085
Calcium	146		1.00	1	01/27/2017 13:41	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:41	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:41	WG947085
Lithium	0.0268		0.0150	1	01/27/2017 13:41	WG947085
Molybdenum	0.00623		0.00500	1	01/27/2017 13:41	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 12:45	WG946971
Arsenic	0.0156		0.00200	1	02/03/2017 12:45	WG946971
Lead	ND		0.00200	1	02/03/2017 15:44	WG946971
Selenium	ND		0.00200	1	02/03/2017 12:45	WG946971
Thallium	ND		0.00200	1	02/03/2017 15:44	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	845		10.0	1	01/30/2017 21:11	WG947817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.86		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-05 WG947292: 6.86 at 20.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	23.2		1.00	1	01/27/2017 18:49	WG947034
Fluoride	0.183		0.100	1	01/27/2017 18:49	WG947034
Sulfate	238		25.0	5	01/30/2017 16:12	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:15	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0897		0.00500	1	01/27/2017 13:44	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:44	WG947085
Boron	1.29		0.200	1	01/27/2017 13:44	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:44	WG947085
Calcium	191		1.00	1	01/27/2017 13:44	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:44	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:44	WG947085
Lithium	0.0494		0.0150	1	01/27/2017 13:44	WG947085
Molybdenum	ND		0.00500	1	01/27/2017 13:44	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 12:49	WG946971
Arsenic	0.0107		0.00200	1	02/03/2017 12:49	WG946971
Lead	ND		0.00200	1	02/03/2017 15:47	WG946971
Selenium	ND		0.00200	1	02/03/2017 12:49	WG946971
Thallium	ND		0.00200	1	02/03/2017 15:47	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	568		10.0	1	01/31/2017 23:31	WG947994

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.63		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-06 WG947292: 6.63 at 20.8c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	14.0		1.00	1	01/27/2017 19:05	WG947034
Fluoride	0.193		0.100	1	01/27/2017 19:05	WG947034
Sulfate	34.7		25.0	5	01/30/2017 16:22	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:18	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.232		0.00500	1	01/27/2017 13:47	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:47	WG947085
Boron	ND		0.200	1	01/27/2017 13:47	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:47	WG947085
Calcium	168		1.00	1	01/27/2017 13:47	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:47	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:47	WG947085
Lithium	0.0182		0.0150	1	01/27/2017 13:47	WG947085
Molybdenum	ND		0.00500	1	01/27/2017 13:47	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 12:52	WG946971
Arsenic	ND		0.00200	1	02/03/2017 12:52	WG946971
Lead	ND		0.00200	1	02/03/2017 15:50	WG946971
Selenium	ND		0.00200	1	02/03/2017 12:52	WG946971
Thallium	ND		0.00200	1	02/03/2017 15:50	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	652		10.0	1	01/31/2017 23:31	WG947994

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.96		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-07 WG947292: 7.96 at 19.9c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	26.1		1.00	1	01/27/2017 19:21	WG947034
Fluoride	0.542		0.100	1	01/27/2017 19:21	WG947034
Sulfate	303		25.0	5	01/30/2017 16:32	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:20	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.223		0.00500	1	01/27/2017 13:49	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:49	WG947085
Boron	1.59		0.200	1	01/27/2017 13:49	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:49	WG947085
Calcium	121		1.00	1	01/27/2017 13:49	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:49	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:49	WG947085
Lithium	0.0218		0.0150	1	01/27/2017 13:49	WG947085
Molybdenum	0.0412		0.00500	1	01/27/2017 13:49	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	0.00302		0.00200	1	02/03/2017 13:22	WG946971
Arsenic	0.00497		0.00200	1	02/03/2017 13:22	WG946971
Lead	ND		0.00200	1	02/03/2017 15:54	WG946971
Selenium	ND		0.00200	1	02/03/2017 13:22	WG946971
Thallium	ND		0.00200	1	02/03/2017 15:54	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	581		10.0	1	01/31/2017 23:31	WG947994

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.69		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-08 WG947292: 6.69 at 20.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	13.9		1.00	1	01/27/2017 19:37	WG947034
Fluoride	0.200		0.100	1	01/27/2017 19:37	WG947034
Sulfate	37.9		5.00	1	01/30/2017 16:43	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:22	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.230		0.00500	1	01/27/2017 13:52	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:52	WG947085
Boron	ND		0.200	1	01/27/2017 13:52	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:52	WG947085
Calcium	168		1.00	1	01/27/2017 13:52	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:52	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:52	WG947085
Lithium	0.0175		0.0150	1	01/27/2017 13:52	WG947085
Molybdenum	ND		0.00500	1	01/27/2017 13:52	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 13:26	WG946971
Arsenic	ND		0.00200	1	02/03/2017 13:26	WG946971
Lead	ND		0.00200	1	02/03/2017 15:57	WG946971
Selenium	ND		0.00200	1	02/03/2017 13:26	WG946971
Thallium	ND		0.00200	1	02/03/2017 15:57	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	659		10.0	1	01/31/2017 23:31	WG947994

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.01		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-09 WG947292: 8.01 at 20.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	25.4		1.00	1	01/27/2017 20:09	WG947034
Fluoride	0.603		0.100	1	01/27/2017 20:09	WG947034
Sulfate	304		25.0	5	01/30/2017 17:03	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 10:38	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.225		0.00500	1	01/27/2017 13:55	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:55	WG947085
Boron	1.59		0.200	1	01/27/2017 13:55	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:55	WG947085
Calcium	120		1.00	1	01/27/2017 13:55	WG947085
Chromium	ND		0.0100	1	01/27/2017 13:55	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:55	WG947085
Lithium	0.0221		0.0150	1	01/27/2017 13:55	WG947085
Molybdenum	0.0408		0.00500	1	01/27/2017 13:55	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	0.00210		0.00200	1	02/03/2017 13:29	WG946971
Arsenic	0.00426		0.00200	1	02/03/2017 13:29	WG946971
Lead	ND		0.00200	1	02/03/2017 16:01	WG946971
Selenium	0.00205		0.00200	1	02/03/2017 13:29	WG946971
Thallium	ND		0.00200	1	02/03/2017 16:01	WG946971

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	439		10.0	1	01/30/2017 21:11	WG947817

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.62		1	01/30/2017 11:00	WG947292

Sample Narrative:

9040C L886084-10 WG947292: 7.62 at 20.3c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	23.9		1.00	1	01/27/2017 20:25	WG947034
Fluoride	0.428		0.100	1	01/27/2017 20:25	WG947034
Sulfate	129	J5	50.0	10	01/30/2017 17:33	WG947581

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	01/27/2017 09:35	WG946916

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.224		0.00500	1	01/27/2017 13:17	WG947085
Beryllium	ND		0.00200	1	01/27/2017 13:17	WG947085
Boron	ND		0.200	1	01/27/2017 13:17	WG947085
Cadmium	ND		0.00200	1	01/27/2017 13:17	WG947085
Calcium	74.8		1.00	1	01/27/2017 13:17	WG947085
Chromium	0.0104	B	0.0100	1	01/27/2017 13:17	WG947085
Cobalt	ND		0.0100	1	01/27/2017 13:17	WG947085
Lithium	0.0414		0.0150	1	01/27/2017 13:17	WG947085
Molybdenum	ND		0.00500	1	01/27/2017 13:17	WG947085

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	02/03/2017 11:56	WG946971
Arsenic	0.00711		0.00200	1	02/03/2017 11:56	WG946971
Lead	0.00659		0.00200	1	02/03/2017 11:56	WG946971
Selenium	0.00336		0.00200	1	02/03/2017 11:56	WG946971
Thallium	ND		0.00200	1	02/03/2017 11:56	WG946971

Method Blank (MB)

(MB) R3193845-1 01/30/17 21:11

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

L886084-01 Original Sample (OS) • Duplicate (DUP)

(OS) L886084-01 01/30/17 21:11 • (DUP) R3193845-4 01/30/17 21:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	734	760	1	3.48		5

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

(LCS) R3193845-2 01/30/17 21:11 • (LCSD) R3193845-3 01/30/17 21:11

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	%	%	%			%	%
Dissolved Solids	8800	8650	8520	98.3	96.8	85.0-115			1.51	5

Method Blank (MB)

(MB) R3194237-1 01/31/17 23:31

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

L886033-04 Original Sample (OS) • Duplicate (DUP)

(OS) L886033-04 01/31/17 23:31 • (DUP) R3194237-4 01/31/17 23:31

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	154	155	1	0.647		5

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

(LCS) R3194237-2 01/31/17 23:31 • (LCSD) R3194237-3 01/31/17 23:31

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	%	%	%			%	%
Dissolved Solids	8800	8550	8770	97.1	99.7	85.0-115			2.60	5

L885870-01 Original Sample (OS) • Duplicate (DUP)

(OS) L885870-01 01/30/17 11:00 • (DUP) WG947292-3 01/30/17 11:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.02	7.02	1	0.000		1

L886349-02 Original Sample (OS) • Duplicate (DUP)

(OS) L886349-02 01/30/17 11:00 • (DUP) WG947292-4 01/30/17 11:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.89	7.90	1	0.127		1

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

(LCS) WG947292-1 01/30/17 11:00 • (LCSD) WG947292-2 01/30/17 11:00

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.07	6.07	6.08	100	100	98.4-102			0.165	1

Method Blank (MB)

(MB) R3193387-1 01/27/17 07:20

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100

L885748-02 Original Sample (OS) • Duplicate (DUP)

(OS) L885748-02 01/27/17 15:54 • (DUP) R3193387-4 01/27/17 16:10

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	65.2	64.9	1	0		15
Fluoride	1.15	1.15	1	0		15

L886084-08 Original Sample (OS) • Duplicate (DUP)

(OS) L886084-08 01/27/17 19:37 • (DUP) R3193387-6 01/27/17 19:53

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	13.9	13.7	1	1		15
Fluoride	0.200	0.186	1	8		15

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

(LCS) R3193387-2 01/27/17 07:36 • (LCSD) R3193387-3 01/27/17 07:52

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	%	%	%			%	%
Chloride	40.0	39.7	39.4	99	99	80-120			1	15
Fluoride	8.00	8.23	8.21	103	103	80-120			0	15

L886084-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L886084-03 01/27/17 17:13 • (MS) R3193387-5 01/27/17 17:29

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	11.2	62.2	102	1	80-120	
Fluoride	5.00	0.172	5.12	99	1	80-120	

L886084-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L886084-10 01/27/17 20:25 • (MS) R3193387-7 01/27/17 20:40 • (MSD) R3193387-8 01/27/17 21:28

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	23.9	73.5	73.0	99	98	1	80-120			1	15
Fluoride	5.00	0.428	4.99	4.90	91	89	1	80-120			2	15

Method Blank (MB)

(MB) R3193803-1 01/30/17 12:04

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Sulfate	U		0.0774	5.00

L886045-01 Original Sample (OS) • Duplicate (DUP)

(OS) L886045-01 01/30/17 14:31 • (DUP) R3193803-4 01/30/17 14:41

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	ND	1.11	1	0	J	15

L886084-08 Original Sample (OS) • Duplicate (DUP)

(OS) L886084-08 01/30/17 16:43 • (DUP) R3193803-6 01/30/17 16:53

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	37.9	37.9	1	0		15

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

(LCS) R3193803-2 01/30/17 12:14 • (LCSD) R3193803-3 01/30/17 12:24

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	%	%	%			%	%
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

L886051-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L886051-01 01/30/17 14:51 • (MS) R3193803-5 01/30/17 15:01

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Sulfate	50.0	16.6	69.5	106	1	80-120	

L886084-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L886084-10 01/30/17 17:33 • (MS) R3193803-7 01/30/17 17:44 • (MSD) R3193803-8 01/30/17 17:54

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	%	%		%			%	%
Sulfate	50.0	129	193	179	128	99	10	80-120	J5		8	15

Method Blank (MB)

(MB) R3193197-1 01/27/17 09:28

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3193197-2 01/27/17 09:30 • (LCSD) R3193197-3 01/27/17 09:32

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	%	%	%			%	%
Mercury	0.00300	0.00320	0.00335	107	112	80-120			5	20

L886084-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L886084-10 01/27/17 09:35 • (MS) R3193197-4 01/27/17 09:42 • (MSD) R3193197-5 01/27/17 09:44

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	%	%		%			%	%
Mercury	0.00300	ND	0.00325	0.00333	108	111	1	75-125			3	20

Method Blank (MB)

(MB) R3193352-1 01/27/17 13:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium	U		0.0017	0.00500
Beryllium	U		0.0007	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.0007	0.00200
Calcium	U		0.0463	1.00
Chromium	0.00154	J	0.0014	0.0100
Cobalt	U		0.0023	0.0100
Lithium	U		0.0053	0.0150
Molybdenum	U		0.0016	0.00500

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

(LCS) R3193352-2 01/27/17 13:12 • (LCSD) R3193352-3 01/27/17 13:15

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 %
Barium	1.00	1.02	1.03	102	103	80-120			1	20
Beryllium	1.00	0.998	1.00	100	100	80-120			1	20
Boron	1.00	0.984	1.00	98	100	80-120			2	20
Cadmium	1.00	0.993	1.00	99	100	80-120			1	20
Calcium	10.0	9.72	9.76	97	98	80-120			0	20
Chromium	1.00	1.00	1.01	100	101	80-120			1	20
Cobalt	1.00	1.02	1.03	102	103	80-120			1	20
Lithium	1.00	1.01	1.01	101	101	80-120			1	20
Molybdenum	1.00	0.980	0.988	98	99	80-120			1	20

L886084-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L886084-10 01/27/17 13:17 • (MS) R3193352-5 01/27/17 13:23 • (MSD) R3193352-6 01/27/17 13:25

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 %
Barium	1.00	0.224	1.21	1.22	99	99	1	75-125			0	20
Beryllium	1.00	ND	1.01	1.01	101	101	1	75-125			0	20
Boron	1.00	ND	1.13	1.13	100	100	1	75-125			0	20
Cadmium	1.00	ND	0.998	1.00	100	100	1	75-125			0	20
Calcium	10.0	74.8	83.8	83.6	90	87	1	75-125			0	20
Chromium	1.00	0.0104	0.997	1.00	99	99	1	75-125			0	20
Cobalt	1.00	ND	1.05	1.04	104	104	1	75-125			0	20
Lithium	1.00	0.0414	1.05	1.05	100	101	1	75-125			1	20
Molybdenum	1.00	ND	0.963	0.964	96	96	1	75-125			0	20

Method Blank (MB)

(MB) R3194738-1 02/03/17 11:45

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.00025	0.00200
Lead	U		0.00024	0.00200
Selenium	U		0.00038	0.00200
Thallium	U		0.00019	0.00200

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

(LCS) R3194738-2 02/03/17 11:49 • (LCSD) R3194738-3 02/03/17 11:52

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	%	%	%			%	%
Antimony	0.0579	0.0549	0.0548	95	95	80-120			0	20
Arsenic	0.0500	0.0526	0.0528	105	106	80-120			0	20
Lead	0.0500	0.0553	0.0553	111	111	80-120			0	20
Selenium	0.0500	0.0540	0.0540	108	108	80-120			0	20
Thallium	0.0500	0.0536	0.0539	107	108	80-120			1	20

L886084-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L886084-10 02/03/17 11:56 • (MS) R3194738-5 02/03/17 12:03 • (MSD) R3194738-6 02/03/17 12:06

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	%	%		%			%	%
Antimony	0.0579	ND	0.0480	0.0491	83	85	1	75-125			2	20
Arsenic	0.0500	0.00711	0.0604	0.0608	107	107	1	75-125			1	20
Lead	0.0500	0.00659	0.0641	0.0660	115	119	1	75-125			3	20
Selenium	0.0500	0.00336	0.0592	0.0615	112	116	1	75-125			4	20
Thallium	0.0500	ND	0.0559	0.0575	111	114	1	75-125			3	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
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.
Rec.	Recovery.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

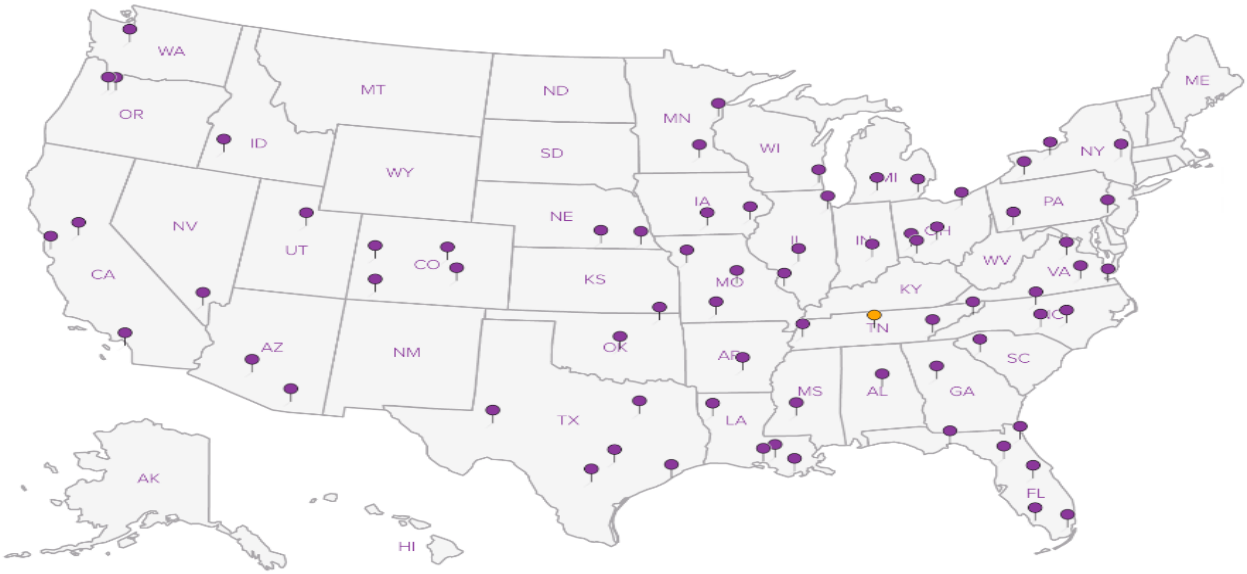
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information & Quote Number:

300 N 65th St
Kansas City, KS 66102

Report to: **Ingrid Setzler**

Email To: **isetzler@bpu.com;bhoye@burnsmcd.com;kbrown**

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 Herrmann

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Brown

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L886084

G113

Acctnum: KCKAN02
Template: T109043
Prelogin: P584873
TSR: 650 - Linda Cashman
PB: 1-16-17 GM
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3 pH<2	TDS, pH 250mlHDPE-NoPres							Rem./Contaminant	Sample # (lab only)
MW-2A	Comp	GW	—	1-23-17	1345	3	X	X	X								-01
MW-3	Comp	GW	—	1-24-17	0455	3	X	X	X								02
MW-4	Comp	GW	—	1-24-17	0915	3	X	X	X								03
MW-8A	Comp	GW	—	1-23-17	1535	3	X	X	X								04
MW-10	Comp	GW	—	1-23-17	1435	3	X	X	X								05
MW-1B	Comp	GW	—	1-24-17	1305	3	X	X	X								06
BA POND	Grab	GW	—	1-24-17	1040	3	X	X	X								07
DUP-1	"	GW	"	1-24-17	"	3	X	X	X								08
DUP-2	"	GW	"	1-24-17	"	3	X	X	X								09
MATRIX SPIKE	Grab	GW	—	1-24-17	1130	3	X	X	X								10

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Jonathan Brown	1-25-17	1230	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	1/25/17	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 2.4 °C Bottles Received: 36

Date: 1-26-17 Time: 915

Condition: (lab use only) a

COC Seal Intact: ___Y ___N ___NA

pH Checked: C2 NCF:

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

Billing Information & Quote Number:

300 N 65th St
Kansas City, KS 66102

Report to: **Ingrid Setzler**

Email To: **isetzler@bpu.com;bhoye@burnsmcd.com;kbrown**

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 Hemanson

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Hemanson

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl, Fl, Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3 (2)	TDS, pH 250mlHDPE-NoPres	Rem./Contaminant	Sample # (lab only)
MATRIX SPIKE DUPLICATE	Grab	GW	—	1-24-17	1130	3	X	X	X		10
MO RIVER	Grab	GW	—	1-24-17	1130	3	X	X	X		10

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Jonathan Hemanson	1-25-17	1230	
Relinquished by : (Signature)	Date: 1/25/17	Time: 1700	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 2.0 °C Bottles Received: 36

Date: 1/26/17 Time: 915

Hold #

Condition: (lab use only) a

COC Seal Intact: ___Y ___N ___NA

pH Checked: C2 NCF:

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES

YOUR LAB OF CHOICE

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

L # L886084

Table #

Acctnum: **KCKAN02**

Template: **T109043**

Prelogin: **P584873**

TSR: **650 - Linda Cashman**

PB: 1-16-17 Jm

Shipped Via: **FedEX Ground**

ESC LAB SCIENCES
Cooler Receipt Form

Client: KCLAND2	SDG#	L886084	
Cooler Received/Opened On: 1/26/17	Temperature:	2.4	
Received By: Rickey Mosley			
Signature:			

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?			✓
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?		✓	

ANALYTICAL REPORT

May 09, 2017

Kansas City Board of Public Utilities

Sample Delivery Group:	L905439
Samples Received:	04/27/2017
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:

Linda Cashman
Technical Service Representative

TABLE OF CONTENTS

MW-2A/GW02 L905439-01 GW

Collected by: JH | Collected date/time: 04/24/17 15:00 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974886	1	04/29/17 11:24	04/29/17 12:00	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 05:22	05/01/17 05:22	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:33	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 03:52	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 02:56	LAT

MW-3/GW02 L905439-02 GW

Collected by: JH | Collected date/time: 04/24/17 16:00 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974886	1	04/29/17 11:24	04/29/17 12:00	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 05:40	05/01/17 05:40	KCF
Wet Chemistry by Method 9056A	WG975159	5	05/01/17 09:42	05/01/17 09:42	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:35	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 03:55	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:00	LAT

MW-4/GW02 L905439-03 GW

Collected by: JH | Collected date/time: 04/24/17 16:55 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974886	1	04/29/17 11:24	04/29/17 12:00	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 11:44	05/01/17 11:44	KCF
Wet Chemistry by Method 9056A	WG975159	5	05/01/17 14:19	05/01/17 14:19	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:05	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 03:41	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 02:35	LAT

MW-8A/GW02 L905439-04 GW

Collected by: JH | Collected date/time: 04/24/17 13:00 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974886	1	04/29/17 11:24	04/29/17 12:00	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 05:57	05/01/17 05:57	KCF
Wet Chemistry by Method 9056A	WG975159	5	05/01/17 06:14	05/01/17 06:14	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:37	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 03:58	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:03	LAT

MW-10/GW02 L905439-05 GW

Collected by: JH | Collected date/time: 04/24/17 13:50 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974887	1	04/30/17 11:11	04/30/17 11:49	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 06:32	05/01/17 06:32	KCF
Wet Chemistry by Method 9056A	WG975159	5	05/01/17 09:59	05/01/17 09:59	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:40	NJB

MW-10/GW02 L905439-05 GW

Collected by: JH | Collected date/time: 04/24/17 13:50 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 04:06	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:07	LAT

MW-12/GW02 L905439-06 GW

Collected by: JH | Collected date/time: 04/24/17 18:10 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 04:09	CCE

MW-1B/GW02 L905439-07 GW

Collected by: JH | Collected date/time: 04/25/17 09:30 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974901	1	04/29/17 11:59	04/29/17 12:39	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 07:24	05/01/17 07:24	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:42	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 04:12	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:10	LAT

BA POND/GW02 L905439-08 GW

Collected by: JH | Collected date/time: 04/25/17 16:15 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974901	1	04/29/17 11:59	04/29/17 12:39	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 07:59	05/01/17 07:59	KCF
Wet Chemistry by Method 9056A	WG975159	5	05/01/17 10:16	05/01/17 10:16	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:44	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 04:15	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:14	LAT

DUP-1/GW02 L905439-09 GW

Collected by: JH | Collected date/time: 04/25/17 00:00 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974901	1	04/29/17 11:59	04/29/17 12:39	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 08:16	05/01/17 08:16	KCF
Wet Chemistry by Method 9056A	WG975159	5	05/01/17 11:09	05/01/17 11:09	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:46	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 04:18	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:17	LAT

DUP-2/GW02 L905439-10 GW

Collected by: JH | Collected date/time: 04/25/17 00:00 | Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974901	1	04/29/17 11:59	04/29/17 12:39	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 08:34	05/01/17 08:34	KCF

DUP-2/GW02 L905439-10 GW

Collected by	Collected date/time	Received date/time
JH	04/25/17 00:00	04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:49	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 04:21	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:21	LAT

MO RIVER/GW02 L905439-11 GW

Collected by	Collected date/time	Received date/time
JH	04/25/17 15:50	04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG974902	1	04/29/17 12:27	04/30/17 11:17	MMF
Wet Chemistry by Method 9040C	WG974677	1	04/28/17 09:05	04/28/17 09:05	MA
Wet Chemistry by Method 9056A	WG975159	1	05/01/17 08:51	05/01/17 08:51	KCF
Wet Chemistry by Method 9056A	WG975159	5	05/01/17 11:26	05/01/17 11:26	KCF
Mercury by Method 7470A	WG974841	1	04/29/17 07:01	05/01/17 12:51	NJB
Metals (ICP) by Method 6010B	WG974753	1	04/28/17 16:55	05/01/17 04:24	CCE
Metals (ICPMS) by Method 6020	WG974750	1	04/28/17 18:30	05/01/17 03:24	LAT

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. 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.

Linda Cashman
Technical Service Representative

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	508		10.0	1	04/29/2017 12:00	WG974886

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.00	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-01 WG974677: 7.00 at 10.0c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	9.83		1.00	1	05/01/2017 05:22	WG975159
Fluoride	0.181		0.100	1	05/01/2017 05:22	WG975159
Sulfate	81.6		5.00	1	05/01/2017 05:22	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:33	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0796		0.00500	1	05/01/2017 03:52	WG974753
Beryllium	ND		0.00200	1	05/01/2017 03:52	WG974753
Boron	ND		0.200	1	05/01/2017 03:52	WG974753
Cadmium	ND		0.00200	1	05/01/2017 03:52	WG974753
Calcium	128		1.00	1	05/01/2017 03:52	WG974753
Chromium	ND		0.0100	1	05/01/2017 03:52	WG974753
Cobalt	ND		0.0100	1	05/01/2017 03:52	WG974753
Lithium	0.0305		0.0150	1	05/01/2017 03:52	WG974753
Molybdenum	ND		0.00500	1	05/01/2017 03:52	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 02:56	WG974750
Arsenic	0.00381		0.00200	1	05/01/2017 02:56	WG974750
Lead	ND		0.00200	1	05/01/2017 02:56	WG974750
Selenium	ND		0.00200	1	05/01/2017 02:56	WG974750
Thallium	ND		0.00200	1	05/01/2017 02:56	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	715		10.0	1	04/29/2017 12:00	WG974886

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.85	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-02 WG974677: 6.85 at 10.8c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	7.83		1.00	1	05/01/2017 05:40	WG975159
Fluoride	0.136		0.100	1	05/01/2017 05:40	WG975159
Sulfate	115		25.0	5	05/01/2017 09:42	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:35	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.145		0.00500	1	05/01/2017 03:55	WG974753
Beryllium	ND		0.00200	1	05/01/2017 03:55	WG974753
Boron	ND		0.200	1	05/01/2017 03:55	WG974753
Cadmium	ND		0.00200	1	05/01/2017 03:55	WG974753
Calcium	191		1.00	1	05/01/2017 03:55	WG974753
Chromium	ND		0.0100	1	05/01/2017 03:55	WG974753
Cobalt	ND		0.0100	1	05/01/2017 03:55	WG974753
Lithium	0.0548		0.0150	1	05/01/2017 03:55	WG974753
Molybdenum	ND		0.00500	1	05/01/2017 03:55	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:00	WG974750
Arsenic	ND		0.00200	1	05/01/2017 03:00	WG974750
Lead	ND		0.00200	1	05/01/2017 03:00	WG974750
Selenium	ND		0.00200	1	05/01/2017 03:00	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:00	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	840		10.0	1	04/29/2017 12:00	WG974886

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.86	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-03 WG974677: 6.86 at 10.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	12.4		1.00	1	05/01/2017 11:44	WG975159
Fluoride	0.119		0.100	1	05/01/2017 11:44	WG975159
Sulfate	148		25.0	5	05/01/2017 14:19	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:05	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.151		0.00500	1	05/01/2017 03:41	WG974753
Beryllium	ND		0.00200	1	05/01/2017 03:41	WG974753
Boron	ND		0.200	1	05/01/2017 03:41	WG974753
Cadmium	ND		0.00200	1	05/01/2017 03:41	WG974753
Calcium	224	V	1.00	1	05/01/2017 03:41	WG974753
Chromium	ND		0.0100	1	05/01/2017 03:41	WG974753
Cobalt	ND		0.0100	1	05/01/2017 03:41	WG974753
Lithium	0.0442		0.0150	1	05/01/2017 03:41	WG974753
Molybdenum	ND		0.00500	1	05/01/2017 03:41	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 02:35	WG974750
Arsenic	ND		0.00200	1	05/01/2017 02:35	WG974750
Lead	ND		0.00200	1	05/01/2017 02:35	WG974750
Selenium	ND		0.00200	1	05/01/2017 02:35	WG974750
Thallium	ND		0.00200	1	05/01/2017 02:35	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	880		10.0	1	04/29/2017 12:00	WG974886

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.91	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-04 WG974677: 6.91 at 11.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	29.6		1.00	1	05/01/2017 05:57	WG975159
Fluoride	0.370		0.100	1	05/01/2017 05:57	WG975159
Sulfate	383		25.0	5	05/01/2017 06:14	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:37	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0565		0.00500	1	05/01/2017 03:58	WG974753
Beryllium	ND		0.00200	1	05/01/2017 03:58	WG974753
Boron	2.26		0.200	1	05/01/2017 03:58	WG974753
Cadmium	ND		0.00200	1	05/01/2017 03:58	WG974753
Calcium	126		1.00	1	05/01/2017 03:58	WG974753
Chromium	ND		0.0100	1	05/01/2017 03:58	WG974753
Cobalt	ND		0.0100	1	05/01/2017 03:58	WG974753
Lithium	0.0275		0.0150	1	05/01/2017 03:58	WG974753
Molybdenum	0.00685		0.00500	1	05/01/2017 03:58	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:03	WG974750
Arsenic	0.0232		0.00200	1	05/01/2017 03:03	WG974750
Lead	ND		0.00200	1	05/01/2017 03:03	WG974750
Selenium	ND		0.00200	1	05/01/2017 03:03	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:03	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	709		10.0	1	04/30/2017 11:49	WG974887

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.01	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-05 WG974677: 7.01 at 10.5c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	21.6		1.00	1	05/01/2017 06:32	WG975159
Fluoride	0.161		0.100	1	05/01/2017 06:32	WG975159
Sulfate	193		25.0	5	05/01/2017 09:59	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:40	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0880		0.00500	1	05/01/2017 04:06	WG974753
Beryllium	ND		0.00200	1	05/01/2017 04:06	WG974753
Boron	1.24		0.200	1	05/01/2017 04:06	WG974753
Cadmium	ND		0.00200	1	05/01/2017 04:06	WG974753
Calcium	157		1.00	1	05/01/2017 04:06	WG974753
Chromium	ND		0.0100	1	05/01/2017 04:06	WG974753
Cobalt	ND		0.0100	1	05/01/2017 04:06	WG974753
Lithium	0.0399		0.0150	1	05/01/2017 04:06	WG974753
Molybdenum	ND		0.00500	1	05/01/2017 04:06	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:07	WG974750
Arsenic	0.0143		0.00200	1	05/01/2017 03:07	WG974750
Lead	ND		0.00200	1	05/01/2017 03:07	WG974750
Selenium	ND		0.00200	1	05/01/2017 03:07	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:07	WG974750

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	05/01/2017 04:09	WG974753

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	467		10.0	1	04/29/2017 12:39	WG974901

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.43	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-07 WG974677: 6.43 at 11.3c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	16.6		1.00	1	05/01/2017 07:24	WG975159
Fluoride	0.129		0.100	1	05/01/2017 07:24	WG975159
Sulfate	16.7		5.00	1	05/01/2017 07:24	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:42	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.214		0.00500	1	05/01/2017 04:12	WG974753
Beryllium	ND		0.00200	1	05/01/2017 04:12	WG974753
Boron	ND		0.200	1	05/01/2017 04:12	WG974753
Cadmium	ND		0.00200	1	05/01/2017 04:12	WG974753
Calcium	129		1.00	1	05/01/2017 04:12	WG974753
Chromium	ND		0.0100	1	05/01/2017 04:12	WG974753
Cobalt	ND		0.0100	1	05/01/2017 04:12	WG974753
Lithium	0.0214		0.0150	1	05/01/2017 04:12	WG974753
Molybdenum	ND		0.00500	1	05/01/2017 04:12	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:10	WG974750
Arsenic	ND		0.00200	1	05/01/2017 03:10	WG974750
Lead	ND		0.00200	1	05/01/2017 03:10	WG974750
Selenium	ND		0.00200	1	05/01/2017 03:10	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:10	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	702		10.0	1	04/29/2017 12:39	WG974901

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.55	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-08 WG974677: 8.55 at 12.4c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	29.5		1.00	1	05/01/2017 07:59	WG975159
Fluoride	0.588		0.100	1	05/01/2017 07:59	WG975159
Sulfate	388		25.0	5	05/01/2017 10:16	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:44	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.146		0.00500	1	05/01/2017 04:15	WG974753
Beryllium	ND		0.00200	1	05/01/2017 04:15	WG974753
Boron	1.81		0.200	1	05/01/2017 04:15	WG974753
Cadmium	ND		0.00200	1	05/01/2017 04:15	WG974753
Calcium	126		1.00	1	05/01/2017 04:15	WG974753
Chromium	ND		0.0100	1	05/01/2017 04:15	WG974753
Cobalt	ND		0.0100	1	05/01/2017 04:15	WG974753
Lithium	0.0314		0.0150	1	05/01/2017 04:15	WG974753
Molybdenum	0.0529		0.00500	1	05/01/2017 04:15	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:14	WG974750
Arsenic	ND		0.00200	1	05/01/2017 03:14	WG974750
Lead	ND		0.00200	1	05/01/2017 03:14	WG974750
Selenium	ND		0.00200	1	05/01/2017 03:14	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:14	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	7150		10.0	1	04/29/2017 12:39	WG974901

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.57	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-09 WG974677: 8.57 at 12.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	29.7		1.00	1	05/01/2017 08:16	WG975159
Fluoride	0.611		0.100	1	05/01/2017 08:16	WG975159
Sulfate	380		25.0	5	05/01/2017 11:09	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:46	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.145		0.00500	1	05/01/2017 04:18	WG974753
Beryllium	ND		0.00200	1	05/01/2017 04:18	WG974753
Boron	1.82		0.200	1	05/01/2017 04:18	WG974753
Cadmium	ND		0.00200	1	05/01/2017 04:18	WG974753
Calcium	125		1.00	1	05/01/2017 04:18	WG974753
Chromium	ND		0.0100	1	05/01/2017 04:18	WG974753
Cobalt	ND		0.0100	1	05/01/2017 04:18	WG974753
Lithium	0.0291		0.0150	1	05/01/2017 04:18	WG974753
Molybdenum	0.0523		0.00500	1	05/01/2017 04:18	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:17	WG974750
Arsenic	ND		0.00200	1	05/01/2017 03:17	WG974750
Lead	ND		0.00200	1	05/01/2017 03:17	WG974750
Selenium	ND		0.00200	1	05/01/2017 03:17	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:17	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	478		10.0	1	04/29/2017 12:39	WG974901

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.02	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-10 WG974677: 7.02 at 11.9c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	9.88		1.00	1	05/01/2017 08:34	WG975159
Fluoride	0.191		0.100	1	05/01/2017 08:34	WG975159
Sulfate	82.5		5.00	1	05/01/2017 08:34	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:49	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0796		0.00500	1	05/01/2017 04:21	WG974753
Beryllium	ND		0.00200	1	05/01/2017 04:21	WG974753
Boron	ND		0.200	1	05/01/2017 04:21	WG974753
Cadmium	ND		0.00200	1	05/01/2017 04:21	WG974753
Calcium	130		1.00	1	05/01/2017 04:21	WG974753
Chromium	ND		0.0100	1	05/01/2017 04:21	WG974753
Cobalt	ND		0.0100	1	05/01/2017 04:21	WG974753
Lithium	0.0305		0.0150	1	05/01/2017 04:21	WG974753
Molybdenum	ND		0.00500	1	05/01/2017 04:21	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:21	WG974750
Arsenic	0.00326		0.00200	1	05/01/2017 03:21	WG974750
Lead	ND		0.00200	1	05/01/2017 03:21	WG974750
Selenium	ND		0.00200	1	05/01/2017 03:21	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:21	WG974750

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	533		10.0	1	04/30/2017 11:17	WG974902

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.28	T8	1	04/28/2017 09:05	WG974677

Sample Narrative:

9040C L905439-11 WG974677: 8.28 at 13.2c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	19.8		1.00	1	05/01/2017 08:51	WG975159
Fluoride	0.382		0.100	1	05/01/2017 08:51	WG975159
Sulfate	197		25.0	5	05/01/2017 11:26	WG975159

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	05/01/2017 12:51	WG974841

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.152		0.00500	1	05/01/2017 04:24	WG974753
Beryllium	ND		0.00200	1	05/01/2017 04:24	WG974753
Boron	ND		0.200	1	05/01/2017 04:24	WG974753
Cadmium	ND		0.00200	1	05/01/2017 04:24	WG974753
Calcium	80.8		1.00	1	05/01/2017 04:24	WG974753
Chromium	ND		0.0100	1	05/01/2017 04:24	WG974753
Cobalt	ND		0.0100	1	05/01/2017 04:24	WG974753
Lithium	0.0468		0.0150	1	05/01/2017 04:24	WG974753
Molybdenum	ND		0.00500	1	05/01/2017 04:24	WG974753

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	05/01/2017 03:24	WG974750
Arsenic	0.00437		0.00200	1	05/01/2017 03:24	WG974750
Lead	0.00310	B	0.00200	1	05/01/2017 03:24	WG974750
Selenium	0.00286		0.00200	1	05/01/2017 03:24	WG974750
Thallium	ND		0.00200	1	05/01/2017 03:24	WG974750

Method Blank (MB)

(MB) R3214683-1 04/29/17 12:00

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

L905511-01 Original Sample (OS) • Duplicate (DUP)

(OS) L905511-01 04/29/17 12:00 • (DUP) R3214683-4 04/29/17 12:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	1860	1860	1	0.269		5

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

(LCS) R3214683-2 04/29/17 12:00 • (LCSD) R3214683-3 04/29/17 12:00

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	%	%	%			%	%
Dissolved Solids	8800	8560	8630	97.3	98.1	85.0-115			0.814	5

Method Blank (MB)

(MB) R3215013-1 04/30/17 11:49

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

L905226-01 Original Sample (OS) • Duplicate (DUP)

(OS) L905226-01 04/30/17 11:49 • (DUP) R3215013-4 04/30/17 11:49

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	1770	1760	1	0.567		5

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

(LCS) R3215013-2 04/30/17 11:49 • (LCSD) R3215013-3 04/30/17 11:49

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	%	%	%			%	%
Dissolved Solids	8800	8610	8590	97.8	97.6	85.0-115			0.233	5

Method Blank (MB)

(MB) R3214732-1 04/29/17 12:39

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

L905439-10 Original Sample (OS) • Duplicate (DUP)

(OS) L905439-10 04/29/17 12:39 • (DUP) R3214732-4 04/29/17 12:39

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	478	479	1	0.209		5

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

(LCS) R3214732-2 04/29/17 12:39 • (LCSD) R3214732-3 04/29/17 12:39

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 %
Dissolved Solids	8800	8660	8640	98.4	98.2	85.0-115			0.231	5

Method Blank (MB)

(MB) R3215024-1 04/30/17 11:17

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

L905562-03 Original Sample (OS) • Duplicate (DUP)

(OS) L905562-03 04/30/17 11:17 • (DUP) R3215024-4 04/30/17 11:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	4290	4470	1	4.23		5

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

(LCS) R3215024-2 04/30/17 11:17 • (LCSD) R3215024-3 04/30/17 11:17

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	%	%	%			%	%
Dissolved Solids	8800	8610	8630	97.8	98.1	85.0-115			0.232	5

L905205-01 Original Sample (OS) • Duplicate (DUP)

(OS) L905205-01 04/28/17 09:05 • (DUP) WG974677-3 04/28/17 09:05

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.97	7.00	1	0.429	T8	1

L905480-01 Original Sample (OS) • Duplicate (DUP)

(OS) L905480-01 04/28/17 09:05 • (DUP) WG974677-4 04/28/17 09:05

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.99	7.98	1	0.125	T8	1

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

(LCS) WG974677-1 04/28/17 09:05 • (LCSD) WG974677-2 04/28/17 09:05

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	7.50	7.49	7.49	99.9	99.9	98.7-101			0.000	1

Method Blank (MB)

(MB) R3214767-1 05/01/17 00:43

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	0.0778	J	0.0774	5.00

L905409-01 Original Sample (OS) • Duplicate (DUP)

(OS) L905409-01 05/01/17 02:10 • (DUP) R3214767-4 05/01/17 02:28

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	12.7	12.1	1	5		15
Fluoride	ND	0.000	1	0		15
Sulfate	ND	3.61	1	0		15

L905439-07 Original Sample (OS) • Duplicate (DUP)

(OS) L905439-07 05/01/17 07:24 • (DUP) R3214767-6 05/01/17 07:41

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	16.6	16.6	1	0		15
Fluoride	0.129	0.126	1	2		15
Sulfate	16.7	16.7	1	0		15

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

(LCS) R3214767-2 05/01/17 01:01 • (LCSD) R3214767-3 05/01/17 01:18

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 %
Chloride	40.0	39.8	39.8	99	99	80-120			0	15
Fluoride	8.00	8.03	8.03	100	100	80-120			0	15
Sulfate	40.0	40.1	40.1	100	100	80-120			0	15

L905409-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L905409-02 05/01/17 02:45 • (MS) R3214767-5 05/01/17 03:03

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	ND	52.1	102	1	80-120	
Fluoride	5.00	ND	5.16	103	1	80-120	
Sulfate	50.0	ND	51.2	102	1	80-120	

L905439-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905439-03 05/01/17 11:44 • (MS) R3214767-7 05/01/17 12:01 • (MSD) R3214767-8 05/01/17 12:18

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	12.4	63.6	63.4	102	102	1	80-120			0	15
Fluoride	5.00	0.119	5.24	5.22	102	102	1	80-120			1	15

Method Blank (MB)

(MB) R3214678-1 05/01/17 11:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3214678-6 05/01/17 12:17 • (LCSD) R3214678-7 05/01/17 12:19

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	0.00290	0.00288	97	96	80-120			1	20

L905439-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905439-03 05/01/17 12:05 • (MS) R3214678-4 05/01/17 12:08 • (MSD) R3214678-5 05/01/17 12:10

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	0.00270	0.00249	90	83	1	75-125			8	20

Method Blank (MB)

(MB) R3214572-1 05/01/17 03:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium	U		0.0017	0.00500
Beryllium	U		0.0007	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.0007	0.00200
Calcium	U		0.0463	1.00
Chromium	U		0.0014	0.0100
Cobalt	U		0.0023	0.0100
Lithium	U		0.0053	0.0150
Molybdenum	U		0.0016	0.00500

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

(LCS) R3214572-2 05/01/17 03:35 • (LCSD) R3214572-3 05/01/17 03:38

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 %
Barium	1.00	1.00	1.00	100	100	80-120			0	20
Beryllium	1.00	1.01	1.01	101	101	80-120			1	20
Boron	1.00	0.938	0.955	94	96	80-120			2	20
Cadmium	1.00	0.998	0.999	100	100	80-120			0	20
Calcium	10.0	9.62	9.69	96	97	80-120			1	20
Chromium	1.00	0.970	0.973	97	97	80-120			0	20
Cobalt	1.00	1.00	1.00	100	100	80-120			0	20
Lithium	1.00	0.984	0.995	98	100	80-120			1	20
Molybdenum	1.00	0.991	0.997	99	100	80-120			1	20

L905439-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905439-03 05/01/17 03:41 • (MS) R3214572-5 05/01/17 03:46 • (MSD) R3214572-6 05/01/17 03:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	1.00	0.151	1.11	1.15	96	100	1	75-125			3	20
Beryllium	1.00	ND	0.982	1.02	98	102	1	75-125			4	20
Boron	1.00	ND	1.06	1.09	93	96	1	75-125			3	20
Cadmium	1.00	ND	1.00	1.04	100	104	1	75-125			4	20
Calcium	10.0	224	231	231	65	66	1	75-125	V	V	0	20
Chromium	1.00	ND	0.938	0.982	94	98	1	75-125			5	20
Cobalt	1.00	ND	0.991	1.03	99	103	1	75-125			3	20
Lithium	1.00	0.0442	1.03	1.08	99	104	1	75-125			5	20
Molybdenum	1.00	ND	0.968	1.01	97	101	1	75-125			4	20

Method Blank (MB)

(MB) R3214583-1 05/01/17 02:24

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.00025	0.00200
Lead	0.000314	J	0.00024	0.00200
Selenium	U		0.00038	0.00200
Thallium	U		0.00019	0.00200

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

(LCS) R3214583-2 05/01/17 02:28 • (LCSD) R3214583-3 05/01/17 02:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	0.0484	0.0489	97	98	80-120			1	20
Arsenic	0.0500	0.0470	0.0461	94	92	80-120			2	20
Lead	0.0500	0.0476	0.0472	95	94	80-120			1	20
Selenium	0.0500	0.0464	0.0470	93	94	80-120			1	20
Thallium	0.0500	0.0462	0.0459	92	92	80-120			1	20

L905439-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905439-03 05/01/17 02:35 • (MS) R3214583-5 05/01/17 02:42 • (MSD) R3214583-6 05/01/17 02:46

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 %
Antimony	0.0500	ND	0.0502	0.0497	100	99	1	75-125			1	20
Arsenic	0.0500	ND	0.0467	0.0465	92	92	1	75-125			0	20
Lead	0.0500	ND	0.0468	0.0469	94	94	1	75-125			0	20
Selenium	0.0500	ND	0.0495	0.0477	96	93	1	75-125			4	20
Thallium	0.0500	ND	0.0462	0.0461	92	92	1	75-125			0	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
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.
Rec.	Recovery.

Qualifier	Description
B	The same analyte is found in the associated blank.
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.

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

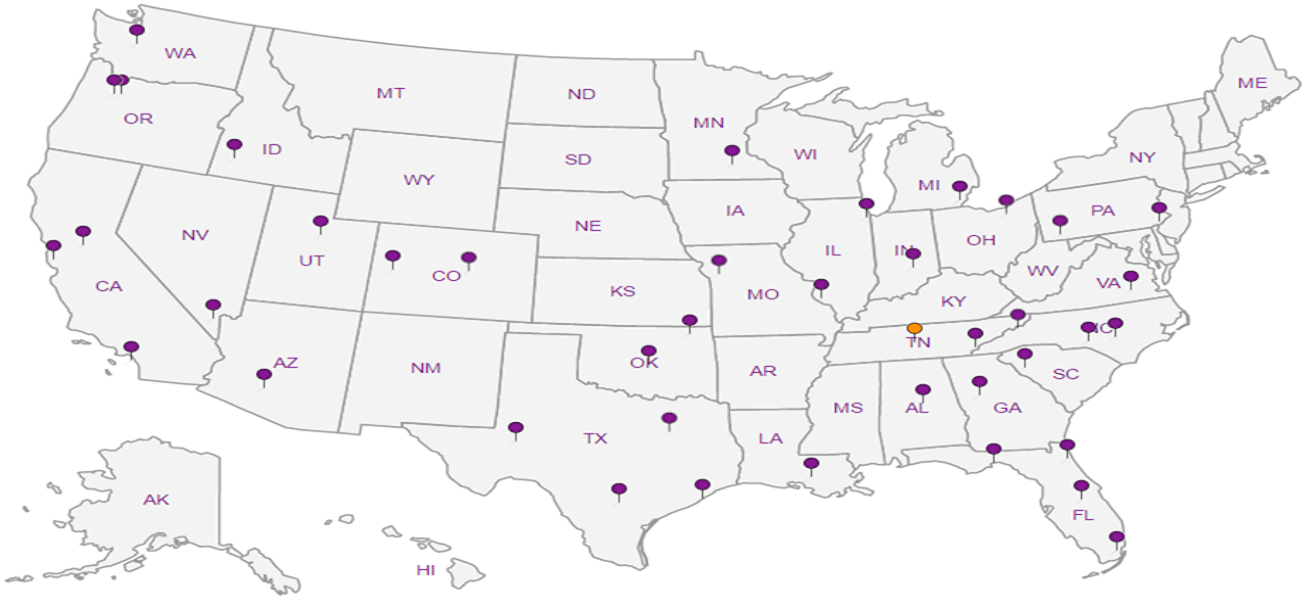
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



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;bhoye@burnsmcd.com;kbrown

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 Hermansen

Site/Facility ID #

P.O. #

Collected by (signature): [signature]
Immediately Packed on Ice N ___ Y X

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

Date Results Needed

Quote #

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,Fl,Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	Metals-Boron 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-2A / 6W02	GRAB	GW	—	4-24-17	1500	3	X	X		X		01
MW-3 / 6W02	GRAB	GW	—	4-24-17	1600	3	X	X		X		02
MW-4 / 6W02	GRAB	GW	—	4-24-17	1655	3	X	X		X	MS/MSD	03
MW-8A / 6W02	GRAB	GW	—	4-24-17	1300	3	X	X		X		04
MW-10 / 6W02	GRAB	GW	—	4-24-17	1350	3	X	X		X		05
MW-12 / 6W02	GRAB	GW	—	4-24-17	1810	1			X			06
MW-1B / 6W02	GRAB	GW	—	4-25-17	0930	3	X	X		X		07
BA POND / 6W02	GRAB	GW	—	4-25-17	1615	3	X	X		X		08
DUP-1 / 6W02	GRAB	GW	—	4-25-17	—	3	X	X		X		09
DUP-2 / 6W02	GRAB	GW	—	4-24-17	—	3	X	X		X		10

* 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 #

Relinquished by : (Signature) [signature] Date: 4-26-17 Time: 1020 Received by: (Signature) [signature]

Relinquished by : (Signature) [signature] Date: 4/26/17 Time: 1700 Received by: (Signature) [signature]

Relinquished by : (Signature) Date: Time: Received for lab by: (Signature) [signature] Date: 4-27-17 Time: 845

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: 2.2 °C Bottles Received: 37

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

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

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 905439

C245

Acctnum: KCKAN02
Template: T122810
Prelogin: P597717
TSR: 650 - Linda Cashman
PB:

Shipped Via: FedEX Ground

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;bhoye@burnsmcd.com;kbrown

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 Hermann

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,Fl,Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	Metals-Boron 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MATRIX SPIKE	GRAB	GW	—	4-24-17	1655	3	X	X		X	MW-4	03
MATRIX SPIKE DUP	GRAB	GW	—	4-24-17	1655	3	X	X		X	MW-4	03
MO RIVER 1402	GRAB	GW	—	4-25-17	1550	3	X	X		X		11
		GW				3	X	X		X		

Jonathan Hermann 4-26-17

* 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 #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Jonathan Hermann	4-26-17	1070	
Relinquished by : (Signature)	Date: 4/26/17	Time: 1700	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: 2.2 °C Bottles Received: 37

Date: 4-27-17 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

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

Chain of Custody Page ___ of ___

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Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 605439

Table #

Acctnum: **KCKAN02**
Template: **T122810**
Prelogin: **P597717**
TSR: **650 - Linda Cashman**
PB:

Shipped Via: **FedEx Ground**

Case Narrative

Lab No: 20170354

This report contains the analytical results for the 12 sample(s) received under chain of custody by ESC Lab Sciences on 4/27/2017 1:52:24 PM. These samples are associated with your KCBPU Nearman project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted below:

The test results in this report meet all NELAC requirements unless noted below:

This report shall not be reproduced, except in full, without the written approval of ESC Lab Sciences.

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.

Results have been reviewed by the Director of Radiochemistry or their designees and is approved for release.

DL for Radiochemistry = MDA DL for Metals and Wet Chemistry = MDL DL for Drinking Water = SDWA

Observations / Nonconformances

L905547

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20170354-01								
Client ID : MW-2A								
Date Sampled : 4/24/2017 3:00:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.214 +/- 0.880	0.625	pCi/l				
Radium-226	SM 7500 Ra B M*	0.214 +/- 0.169	0.227	pCi/l		05/15/17	05/17/17	SD
Radium-228	EPA 904*	-0.018 +/- 0.711	0.398	pCi/l		05/17/17	05/22/17	JR
Lab ID : 20170354-02								
Client ID : MW-3								
Date Sampled : 4/24/2017 4:00:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		1.27 +/- 0.856	0.622	pCi/l				
Radium-226	SM 7500 Ra B M*	0.192 +/- 0.170	0.233	pCi/l		05/15/17	05/17/17	SD
Radium-228	EPA 904*	1.08 +/- 0.686	0.389	pCi/l		05/17/17	05/22/17	JR
Lab ID : 20170354-03								
Client ID : MW-4								
Date Sampled : 4/24/2017 4:55:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.191 +/- 1.00	0.677	pCi/l				
Radium-226	SM 7500 Ra B M*	0.191 +/- 0.148	0.167	pCi/l		05/17/17	05/18/17	SD
Radium-228	EPA 904*	-0.549 +/- 0.854	0.510	pCi/l		05/17/17	05/22/17	JR
Lab ID : 20170354-04								
Client ID : MW-8A								
Date Sampled : 4/24/2017 1:00:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		1.07 +/- 0.759	0.516	pCi/l				
Radium-226	SM 7500 Ra B M*	0.240 +/- 0.173	0.187	pCi/l		05/15/17	05/19/17	SD
Radium-228	EPA 904*	0.832 +/- 0.586	0.329	pCi/l		05/17/17	05/22/17	JR

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20170354-05								
Client ID : MW-10								
Date Sampled : 4/24/2017 1:50:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.848 +/- 0.712	0.864	pCi/l				
Radium-226	SM 7500 Ra B M*	0.233 +/- 0.210	0.294	pCi/l		05/17/17	05/19/17	SD
Radium-228	EPA 904*	0.615 +/- 0.502	0.570	pCi/l		05/17/17	05/22/17	JR
Lab ID : 20170354-06								
Client ID : MW-1B								
Date Sampled : 4/25/2017 6:10:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		1.12 +/- 0.600	0.739	pCi/l				
Radium-226	SM 7500 Ra B M*	0.186 +/- 0.157	0.214	pCi/l		05/17/17	05/19/17	SD
Radium-228	EPA 904*	0.932 +/- 0.443	0.525	pCi/l		05/17/17	05/22/17	JR
Lab ID : 20170354-07								
Client ID : BA POND								
Date Sampled : 4/25/2017 9:30:00 AM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.023 +/- 0.704	1.01	pCi/l				
Radium-226	SM 7500 Ra B M*	0.023 +/- 0.206	0.340	pCi/l		05/17/17	05/19/17	SD
Radium-228	EPA 904*	-0.393 +/- 0.498	0.665	pCi/l		05/17/17	05/22/17	JR
Lab ID : 20170354-08								
Client ID : DUP-1								
Date Sampled : 4/25/2017								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.165 +/- 0.675	1.04	pCi/l				
Radium-226	SM 7500 Ra B M*	-0.445 +/- 0.20	0.418	pCi/l		05/17/17	05/19/17	SD
Radium-228	EPA 904*	0.165 +/- 0.475	0.623	pCi/l		05/17/17	05/22/17	JR

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Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20170354-09								
Client ID : DUP-2								
Date Sampled : 4/24/2017								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.597 +/- 0.589	0.813	pCi/l				
Radium-226	SM 7500 Ra B M*	-0.019 +/- 0.15	0.277	pCi/l		05/17/17	05/19/17	SD
Radium-228	EPA 904*	0.597 +/- 0.439	0.536	pCi/l		05/17/17	05/22/17	JR
Lab ID : 20170354-10								
Client ID : MATRIX SPIKE								
Date Sampled : 4/24/2017 4:55:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Radium-226	SM 7500 Ra B M*	105		% REC		05/17/17	05/19/17	SD
Radium-228	EPA 904*	104		% REC		05/17/17	05/22/17	JR
Lab ID : 20170354-11								
Client ID : MATRIX SPIKE DUPLICATE								
Date Sampled : 4/24/2017 4:55:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Radium-226	SM 7500 Ra B M*	15.6		RPD		05/17/17	05/19/17	SD
Radium-228	EPA 904*	4.05		RPD		05/17/17	05/22/17	JR
Lab ID : 20170354-12								
Client ID : MO RIVER								
Date Sampled : 4/25/2017 3:50:00 PM								
Matrix : NPW								
Radiochemical Analyses								
Combined Radium		0.205 +/- 0.618	0.793	pCi/l				
Radium-226	SM 7500 Ra B M*	0.205 +/- 0.165	0.222	pCi/l		05/17/17	05/19/17	SD
Radium-228	EPA 904*	-0.214 +/- 0.453	0.571	pCi/l		05/17/17	05/22/17	JR

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QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	RER, NAD or DER	MS %REC	MSD %REC	MSD RPD	Batch ID
Radium-226	0.038	94.9			NC	0.132	105.0	123.0	15.6	R1226
Radium-226	-0.006	120.0			NC	2.570	117.0	122.0	3.9	R1225
Radium-228	0.851	104.0			NC	0.829	104.0	109.0	4.1	R3960

Lab Approval:

Ron Eidson
Director of Radiochemistry

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

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;bhoye@burnsmcd.com;kbrown

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 HERMANSEN

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 1 of 2

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

L# 905547

Table #

Acctnum: KCKAN02

Template: T111575

Prelogin: P597714

TSR: 650 - Linda Cashman

PB:

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
MW-2A / GW02	GRAB	GW	—	4-24-17	1500	2	X		
MW-3 / GW02	GRAB	GW	—	4-24-17	1600	2	X		
MW-4 / GW02	GRAB	GW	—	4-24-17	1655	2	X	MS/MSD	
MW-8A / GW02	GRAB	GW	—	4-24-17	1300	2	X		
MW-10 / GW02	GRAB	GW	—	4-24-17	1350	2	X		
MW-1B / GW02	GRAB	GW	—	4-25-17	1810	2	X		
BA POND / GW02	GRAB	GW	—	4-25-17	0930	2	X		
DUP-1 / GW02	GRAB	GW	—	4-25-17	—	2	X		
DUP-2 / GW02	GRAB	GW	—	4-24-17	—	2	X		
MATRIX SPIKE	GRAB	GW	—	4-24-17	1655	2	X	MW-4	

COC 1

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

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Jonathan Hermansen	4-26-17	1620			
Relinquished by : (Signature)	Date: 4/26/17	Time: 1700	Received by: (Signature)	Temp: Amb °C	Bottles Received: 24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 4/27/17	Time: 1352

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

20170354

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

Analysis / Container / Preservative

Chain of Custody

ESC LABS
YOUR LAB OF CHOICE
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;bhoye@burnsmcd.com;kbrown

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

L# 905547

Table #

Acctnum: KCKAN02
Template: T111575
Prelogin: P597714
TSR: 650 - Linda Cashman
PB:

Collected by (print): JONATHAN HERRMANN

Site/Facility ID #

P.O. #

Shipped Via: FedEx Ground

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
MATRIX SPIKE DUPLICATE	GRAB	GW	—	4-24-17	1655	2	X	MW-4	
MO RIVER	GRAB	GW	—	4-25-17	1550	2	X		

Jonathan Herrmann 4-26-17

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

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Jonathan Herrmann	4-26-17	1020			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C	Bottles Received:
	4/26/17	1700		Amb	24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date:	Time:
				4/27/17	1352

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

20170354

SAMPLE LOGIN

Date Received: *4/27/2017 1:52:24* **Lab Number:** 20170354 **Due:** 5/25/2017

Sample Number	Client Sample ID	Matrix	Date Sampled	Container Type	Container Size	Preservation	Preserved Upon Receipt	Custody Seal	Seal Intact
20170354-01 B	MW-2A	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-01 A	MW-2A	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-02 A	MW-3	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-02 B	MW-3	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-03 A	MW-4	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-03 B	MW-4	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-04 A	MW-8A	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-04 B	MW-8A	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-05 A	MW-10	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-05 B	MW-10	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-06 B	MW-1B	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-06 A	MW-1B	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-07 B	BA POND	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-07 A	BA POND	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						

20170354-08 A	DUP-1	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-08 B	DUP-1	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-09 A	DUP-2	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-09 B	DUP-2	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-10 A	MATRIX SPIKE	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-10 B	MATRIX SPIKE	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-11 A	MATRIX SPIKE DUPLICAT	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-11 B	MATRIX SPIKE DUPLICAT	NPW	04/24/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170354-12 B	MO RIVER	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
20170354-12 A	MO RIVER	NPW	04/25/17	Plastic	1 L	HNO3, pH < 2	✓	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						

CONTAINER INSPECTION

Coolers 2 Custody Seals Broken Ø Temperature: 4.0 C Ice Radiation Survey: <300 cpm

SAMPLE INSPECTION

Sample Seal Broken Ø Chain of Custody Record ✓ Labels in Tact ✓ Radiation Survey Complete N/A

Anomalies Sample time discrepancy for - 06 and 07. 06 has a time of 1810 on COC but 930 on label. 07 says 930 on COC but 1615 on label, times from CoC used.

Inspected By: _____ DATE 4/27/17

QA or Designee Review: _____ DATE 4/27/17

Sample Custodian Review: _____ DATE 4/27/17

Project Notes:

ANALYTICAL REPORT

August 04, 2017

Kansas City Board of Public Utilities

Sample Delivery Group:	L925244
Samples Received:	07/27/2017
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:

Linda Cashman
Technical Service Representative

TABLE OF CONTENTS

MW-2A L925244-01 GW

Collected by: Lewis Turner
Collected date/time: 07/25/17 15:15
Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1003885	1	07/31/17 13:31	07/31/17 14:09	MMF
Wet Chemistry by Method 9040C	WG1003455	1	07/28/17 15:13	07/28/17 15:13	GB
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 15:56	07/29/17 15:56	DR
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 12:53	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 12:37	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 21:55	LAT

MW-3 L925244-02 GW

Collected by: Lewis Turner
Collected date/time: 07/25/17 16:20
Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1003885	1	07/31/17 13:31	07/31/17 14:09	MMF
Wet Chemistry by Method 9040C	WG1003455	1	07/28/17 15:13	07/28/17 15:13	GB
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 16:10	07/29/17 16:10	DR
Wet Chemistry by Method 9056A	WG1004340	5	07/31/17 17:32	07/31/17 17:32	SAM
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 12:55	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 12:40	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 21:58	LAT

MW-4 L925244-03 GW

Collected by: Lewis Turner
Collected date/time: 07/26/17 09:35
Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1004275	1	08/02/17 14:09	08/02/17 15:33	MMF
Wet Chemistry by Method 9040C	WG1003760	1	07/31/17 09:43	07/31/17 09:43	TH
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 16:25	07/29/17 16:25	DR
Wet Chemistry by Method 9056A	WG1004340	5	07/31/17 17:58	07/31/17 17:58	SAM
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 12:46	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 11:58	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 21:40	LAT

MW-8A L925244-04 GW

Collected by: Lewis Turner
Collected date/time: 07/25/17 12:20
Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1003885	1	07/31/17 13:31	07/31/17 14:09	MMF
Wet Chemistry by Method 9040C	WG1003760	1	07/31/17 09:43	07/31/17 09:43	TH
Wet Chemistry by Method 9056A	WG1004340	1	07/31/17 18:10	07/31/17 18:10	SAM
Wet Chemistry by Method 9056A	WG1004340	5	07/31/17 18:23	07/31/17 18:23	SAM
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 12:57	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 12:42	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 22:02	LAT

MW-10 L925244-05 GW

Collected by: Lewis Turner
Collected date/time: 07/25/17 14:10
Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1003885	1	07/31/17 13:31	07/31/17 14:09	MMF
Wet Chemistry by Method 9040C	WG1003455	1	07/28/17 15:13	07/28/17 15:13	GB
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 17:10	07/29/17 17:10	DR
Wet Chemistry by Method 9056A	WG1004340	5	07/31/17 18:36	07/31/17 18:36	SAM

MW-10 L925244-05 GW

Collected by: Lewis Turner | Collected date/time: 07/25/17 14:10 | Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 13:00	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 12:45	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 22:13	LAT
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/04/17 13:31	LAT

MW-12 L925244-06 GW

Collected by: Lewis Turner | Collected date/time: 07/26/17 08:50 | Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 12:52	CCE

MW-1B L925244-07 GW

Collected by: Lewis Turner | Collected date/time: 07/24/17 15:50 | Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1003491	1	07/28/17 20:31	07/28/17 20:53	EG
Wet Chemistry by Method 9040C	WG1003758	1	08/01/17 08:21	08/01/17 08:21	TH
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 17:25	07/29/17 17:25	DR
Wet Chemistry by Method 9056A	WG1004340	5	07/31/17 19:15	07/31/17 19:15	SAM
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 13:07	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 12:55	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 22:16	LAT
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/04/17 14:51	LAT

BA POND L925244-08 GW

Collected by: Lewis Turner | Collected date/time: 07/26/17 09:56 | Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1004276	1	08/02/17 16:25	08/02/17 17:21	MMF
Wet Chemistry by Method 9040C	WG1003455	1	07/28/17 15:13	07/28/17 15:13	GB
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 18:10	07/29/17 18:10	DR
Wet Chemistry by Method 9056A	WG1004340	10	07/31/17 19:28	07/31/17 19:28	SAM
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 13:09	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 12:57	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 22:20	LAT
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/04/17 14:55	LAT

DUP-1 L925244-09 GW

Collected by: Lewis Turner | Collected date/time: 07/25/17 00:00 | Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1003885	1	07/31/17 13:31	07/31/17 14:09	MMF
Wet Chemistry by Method 9040C	WG1003455	1	07/28/17 15:13	07/28/17 15:13	GB
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 18:25	07/29/17 18:25	DR
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 13:11	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 13:00	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 22:23	LAT
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/04/17 14:58	LAT

DUP-2 L925244-10 GW

Collected by: Lewis Turner
Collected date/time: 07/26/17 00:00
Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1004276	1	08/02/17 16:25	08/02/17 17:21	MMF
Wet Chemistry by Method 9040C	WG1003455	1	07/28/17 15:13	07/28/17 15:13	GB
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 18:40	07/29/17 18:40	DR
Wet Chemistry by Method 9056A	WG1004340	10	07/31/17 19:41	07/31/17 19:41	SAM
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 13:13	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 13:03	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 22:27	LAT
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/04/17 15:02	LAT

MO RIVER L925244-11 GW

Collected by: Lewis Turner
Collected date/time: 07/25/17 10:15
Received date/time: 07/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1003885	1	07/31/17 13:31	07/31/17 14:09	MMF
Wet Chemistry by Method 9040C	WG1003455	1	07/28/17 15:13	07/28/17 15:13	GB
Wet Chemistry by Method 9056A	WG1003767	1	07/29/17 18:55	07/29/17 18:55	DR
Wet Chemistry by Method 9056A	WG1004340	5	07/31/17 19:54	07/31/17 19:54	SAM
Mercury by Method 7470A	WG1003471	1	07/27/17 22:41	07/28/17 13:16	TRB
Metals (ICP) by Method 6010B	WG1005113	1	08/02/17 23:42	08/03/17 13:05	CCE
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/03/17 22:31	LAT
Metals (ICPMS) by Method 6020	WG1005122	1	08/02/17 22:28	08/04/17 15:06	LAT

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. 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.

Linda Cashman
Technical Service Representative

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	512		10.0	1	07/31/2017 14:09	WG1003885

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.94	T8	1	07/28/2017 15:13	WG1003455

Sample Narrative:

L925244-01 WG1003455: 6.94 at 18.4c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	9.67		1.00	1	07/29/2017 15:56	WG1003767
Fluoride	0.189		0.100	1	07/29/2017 15:56	WG1003767
Sulfate	74.6		5.00	1	07/29/2017 15:56	WG1003767

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 12:53	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.111		0.00500	1	08/03/2017 12:37	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 12:37	WG1005113
Boron	ND		0.200	1	08/03/2017 12:37	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 12:37	WG1005113
Calcium	138		1.00	1	08/03/2017 12:37	WG1005113
Chromium	ND		0.0100	1	08/03/2017 12:37	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 12:37	WG1005113
Lithium	0.0206		0.0150	1	08/03/2017 12:37	WG1005113
Molybdenum	ND		0.00500	1	08/03/2017 12:37	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 21:55	WG1005122
Arsenic	0.00578		0.00200	1	08/03/2017 21:55	WG1005122
Lead	ND		0.00200	1	08/03/2017 21:55	WG1005122
Selenium	ND		0.00200	1	08/03/2017 21:55	WG1005122
Thallium	ND		0.00200	1	08/03/2017 21:55	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	827		10.0	1	07/31/2017 14:09	WG1003885

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.78	T8	1	07/28/2017 15:13	WG1003455

Sample Narrative:

L925244-02 WG1003455: 6.78 at 18.4c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	6.69		1.00	1	07/29/2017 16:10	WG1003767
Fluoride	0.141		0.100	1	07/29/2017 16:10	WG1003767
Sulfate	143		25.0	5	07/31/2017 17:32	WG1004340

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 12:55	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.159		0.00500	1	08/03/2017 12:40	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 12:40	WG1005113
Boron	0.218		0.200	1	08/03/2017 12:40	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 12:40	WG1005113
Calcium	218		1.00	1	08/03/2017 12:40	WG1005113
Chromium	ND		0.0100	1	08/03/2017 12:40	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 12:40	WG1005113
Lithium	0.0461		0.0150	1	08/03/2017 12:40	WG1005113
Molybdenum	ND		0.00500	1	08/03/2017 12:40	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 21:58	WG1005122
Arsenic	ND		0.00200	1	08/03/2017 21:58	WG1005122
Lead	ND		0.00200	1	08/03/2017 21:58	WG1005122
Selenium	0.00411		0.00200	1	08/03/2017 21:58	WG1005122
Thallium	ND		0.00200	1	08/03/2017 21:58	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	736		10.0	1	08/02/2017 15:33	WG1004275

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.71	T8	1	07/31/2017 09:43	WG1003760

Sample Narrative:

L925244-03 WG1003760: 6.71 at 19.0c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	6.60		1.00	1	07/29/2017 16:25	WG1003767
Fluoride	0.135		0.100	1	07/29/2017 16:25	WG1003767
Sulfate	117		25.0	5	07/31/2017 17:58	WG1004340

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 12:46	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.140		0.00500	1	08/03/2017 11:58	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 11:58	WG1005113
Boron	ND		0.200	1	08/03/2017 11:58	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 11:58	WG1005113
Calcium	193	V	1.00	1	08/03/2017 11:58	WG1005113
Chromium	ND		0.0100	1	08/03/2017 11:58	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 11:58	WG1005113
Lithium	0.0353		0.0150	1	08/03/2017 11:58	WG1005113
Molybdenum	ND		0.00500	1	08/03/2017 11:58	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 21:40	WG1005122
Arsenic	ND		0.00200	1	08/03/2017 21:40	WG1005122
Lead	ND		0.00200	1	08/03/2017 21:40	WG1005122
Selenium	0.0220		0.00200	1	08/03/2017 21:40	WG1005122
Thallium	ND		0.00200	1	08/03/2017 21:40	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1020		10.0	1	07/31/2017 14:09	WG1003885

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.88	T8	1	07/31/2017 09:43	WG1003760

Sample Narrative:

L925244-04 WG1003760: 6.88 at 19.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	28.9		1.00	1	07/31/2017 18:10	WG1004340
Fluoride	0.325		0.100	1	07/31/2017 18:10	WG1004340
Sulfate	477		25.0	5	07/31/2017 18:23	WG1004340

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 12:57	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0539		0.00500	1	08/03/2017 12:42	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 12:42	WG1005113
Boron	2.40		0.200	1	08/03/2017 12:42	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 12:42	WG1005113
Calcium	161		1.00	1	08/03/2017 12:42	WG1005113
Chromium	ND		0.0100	1	08/03/2017 12:42	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 12:42	WG1005113
Lithium	0.0201		0.0150	1	08/03/2017 12:42	WG1005113
Molybdenum	0.00569		0.00500	1	08/03/2017 12:42	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 22:02	WG1005122
Arsenic	0.0145		0.00200	1	08/03/2017 22:02	WG1005122
Lead	ND		0.00200	1	08/03/2017 22:02	WG1005122
Selenium	ND		0.00200	1	08/03/2017 22:02	WG1005122
Thallium	ND		0.00200	1	08/03/2017 22:02	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	852		10.0	1	07/31/2017 14:09	WG1003885

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.88	T8	1	07/28/2017 15:13	WG1003455

Sample Narrative:

L925244-05 WG1003455: 6.88 at 18.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	26.0		1.00	1	07/29/2017 17:10	WG1003767
Fluoride	0.143		0.100	1	07/29/2017 17:10	WG1003767
Sulfate	280		25.0	5	07/31/2017 18:36	WG1004340

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 13:00	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0748		0.00500	1	08/03/2017 12:45	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 12:45	WG1005113
Boron	1.29		0.200	1	08/03/2017 12:45	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 12:45	WG1005113
Calcium	193		1.00	1	08/03/2017 12:45	WG1005113
Chromium	ND		0.0100	1	08/03/2017 12:45	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 12:45	WG1005113
Lithium	0.0376		0.0150	1	08/03/2017 12:45	WG1005113
Molybdenum	ND		0.00500	1	08/03/2017 12:45	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 22:13	WG1005122
Arsenic	0.00612		0.00200	1	08/03/2017 22:13	WG1005122
Lead	ND		0.00200	1	08/04/2017 13:31	WG1005122
Selenium	ND		0.00200	1	08/03/2017 22:13	WG1005122
Thallium	ND		0.00200	1	08/04/2017 13:31	WG1005122

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	08/03/2017 12:52	WG1005113

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	785		10.0	1	07/28/2017 20:53	WG1003491

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.88	T8	1	08/01/2017 08:21	WG1003758

Sample Narrative:

L925244-07 WG1003758: 6.88 at 19.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	124		5.00	5	07/31/2017 19:15	WG1004340
Fluoride	0.119		0.100	1	07/29/2017 17:25	WG1003767
Sulfate	36.7		5.00	1	07/29/2017 17:25	WG1003767

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 13:07	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.343		0.00500	1	08/03/2017 12:55	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 12:55	WG1005113
Boron	ND		0.200	1	08/03/2017 12:55	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 12:55	WG1005113
Calcium	199		1.00	1	08/03/2017 12:55	WG1005113
Chromium	ND		0.0100	1	08/03/2017 12:55	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 12:55	WG1005113
Lithium	ND		0.0150	1	08/03/2017 12:55	WG1005113
Molybdenum	ND		0.00500	1	08/03/2017 12:55	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 22:16	WG1005122
Arsenic	ND		0.00200	1	08/03/2017 22:16	WG1005122
Lead	ND		0.00200	1	08/04/2017 14:51	WG1005122
Selenium	ND		0.00200	1	08/03/2017 22:16	WG1005122
Thallium	ND		0.00200	1	08/04/2017 14:51	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	660		10.0	1	08/02/2017 17:21	WG1004276

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.82	T8	1	07/28/2017 15:13	WG1003455

Sample Narrative:

L925244-08 WG1003455: 8.82 at 17.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	31.4		1.00	1	07/29/2017 18:10	WG1003767
Fluoride	0.628		0.100	1	07/29/2017 18:10	WG1003767
Sulfate	422		50.0	10	07/31/2017 19:28	WG1004340

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 13:09	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.269		0.00500	1	08/03/2017 12:57	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 12:57	WG1005113
Boron	2.03		0.200	1	08/03/2017 12:57	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 12:57	WG1005113
Calcium	103		1.00	1	08/03/2017 12:57	WG1005113
Chromium	ND		0.0100	1	08/03/2017 12:57	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 12:57	WG1005113
Lithium	0.0202		0.0150	1	08/03/2017 12:57	WG1005113
Molybdenum	0.0402		0.00500	1	08/03/2017 12:57	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 22:20	WG1005122
Arsenic	0.00300		0.00200	1	08/03/2017 22:20	WG1005122
Lead	ND		0.00200	1	08/04/2017 14:55	WG1005122
Selenium	ND		0.00200	1	08/03/2017 22:20	WG1005122
Thallium	ND		0.00200	1	08/04/2017 14:55	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	506		10.0	1	07/31/2017 14:09	WG1003885

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.01	T8	1	07/28/2017 15:13	WG1003455

Sample Narrative:

L925244-09 WG1003455: 7.01 at 19.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	9.67		1.00	1	07/29/2017 18:25	WG1003767
Fluoride	0.192		0.100	1	07/29/2017 18:25	WG1003767
Sulfate	74.7		5.00	1	07/29/2017 18:25	WG1003767

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 13:11	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.111		0.00500	1	08/03/2017 13:00	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 13:00	WG1005113
Boron	ND		0.200	1	08/03/2017 13:00	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 13:00	WG1005113
Calcium	140		1.00	1	08/03/2017 13:00	WG1005113
Chromium	ND		0.0100	1	08/03/2017 13:00	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 13:00	WG1005113
Lithium	0.0221		0.0150	1	08/03/2017 13:00	WG1005113
Molybdenum	ND		0.00500	1	08/03/2017 13:00	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 22:23	WG1005122
Arsenic	0.00553		0.00200	1	08/03/2017 22:23	WG1005122
Lead	ND		0.00200	1	08/04/2017 14:58	WG1005122
Selenium	ND		0.00200	1	08/03/2017 22:23	WG1005122
Thallium	ND		0.00200	1	08/04/2017 14:58	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	699		10.0	1	08/02/2017 17:21	WG1004276

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.76	T8	1	07/28/2017 15:13	WG1003455

Sample Narrative:

L925244-10 WG1003455: 8.76 at 19.3c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	31.4		1.00	1	07/29/2017 18:40	WG1003767
Fluoride	0.624		0.100	1	07/29/2017 18:40	WG1003767
Sulfate	425		50.0	10	07/31/2017 19:41	WG1004340

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 13:13	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.269		0.00500	1	08/03/2017 13:03	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 13:03	WG1005113
Boron	2.01		0.200	1	08/03/2017 13:03	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 13:03	WG1005113
Calcium	104		1.00	1	08/03/2017 13:03	WG1005113
Chromium	ND		0.0100	1	08/03/2017 13:03	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 13:03	WG1005113
Lithium	0.0187		0.0150	1	08/03/2017 13:03	WG1005113
Molybdenum	0.0405		0.00500	1	08/03/2017 13:03	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 22:27	WG1005122
Arsenic	0.00303		0.00200	1	08/03/2017 22:27	WG1005122
Lead	ND		0.00200	1	08/04/2017 15:02	WG1005122
Selenium	ND		0.00200	1	08/03/2017 22:27	WG1005122
Thallium	ND		0.00200	1	08/04/2017 15:02	WG1005122

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	567		10.0	1	07/31/2017 14:09	WG1003885

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.42	T8	1	07/28/2017 15:13	WG1003455

Sample Narrative:

L925244-11 WG1003455: 8.42 at 19.5c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	21.5		1.00	1	07/29/2017 18:55	WG1003767
Fluoride	0.402		0.100	1	07/29/2017 18:55	WG1003767
Sulfate	248		25.0	5	07/31/2017 19:54	WG1004340

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	07/28/2017 13:16	WG1003471

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.117		0.00500	1	08/03/2017 13:05	WG1005113
Beryllium	ND		0.00200	1	08/03/2017 13:05	WG1005113
Boron	ND		0.200	1	08/03/2017 13:05	WG1005113
Cadmium	ND		0.00200	1	08/03/2017 13:05	WG1005113
Calcium	72.0		1.00	1	08/03/2017 13:05	WG1005113
Chromium	ND		0.0100	1	08/03/2017 13:05	WG1005113
Cobalt	ND		0.0100	1	08/03/2017 13:05	WG1005113
Lithium	0.0491		0.0150	1	08/03/2017 13:05	WG1005113
Molybdenum	ND		0.00500	1	08/03/2017 13:05	WG1005113

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/03/2017 22:31	WG1005122
Arsenic	0.00408		0.00200	1	08/03/2017 22:31	WG1005122
Lead	ND		0.00200	1	08/04/2017 15:06	WG1005122
Selenium	0.00261		0.00200	1	08/03/2017 22:31	WG1005122
Thallium	ND		0.00200	1	08/04/2017 15:06	WG1005122

Method Blank (MB)

(MB) R3237155-1 07/28/17 20:53

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

L924775-02 Original Sample (OS) • Duplicate (DUP)

(OS) L924775-02 07/28/17 20:53 • (DUP) R3237155-4 07/28/17 20:53

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	8500	8460	1	0.472		5

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

(LCS) R3237155-2 07/28/17 20:53 • (LCSD) R3237155-3 07/28/17 20:53

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	%	%	%			%	%
Dissolved Solids	8800	8430	8700	95.8	98.9	85.0-115			3.15	5

Method Blank (MB)

(MB) R3238346-1 07/31/17 14:09

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

L925025-06 Original Sample (OS) • Duplicate (DUP)

(OS) L925025-06 07/31/17 14:09 • (DUP) R3238346-4 07/31/17 14:09

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	393	401	1	2.02		5

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

(LCS) R3238346-2 07/31/17 14:09 • (LCSD) R3238346-3 07/31/17 14:09

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	%	%	%			%	%
Dissolved Solids	8800	8580	8550	97.5	97.2	85.0-115			0.350	5

Method Blank (MB)

(MB) R3238409-1 08/02/17 15:33

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

L925060-02 Original Sample (OS) • Duplicate (DUP)

(OS) L925060-02 08/02/17 15:33 • (DUP) R3238409-4 08/02/17 15:33

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	336	323	1	3.95		5

L925060-13 Original Sample (OS) • Duplicate (DUP)

(OS) L925060-13 08/02/17 15:33 • (DUP) R3238409-5 08/02/17 15:33

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	682	677	1	0.736		5

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

(LCS) R3238409-2 08/02/17 15:33 • (LCSD) R3238409-3 08/02/17 15:33

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	%	%	%			%	%
Dissolved Solids	8800	8360	8520	95.0	96.8	85.0-115			1.90	5

Method Blank (MB)

(MB) R3238421-1 08/02/17 17:21

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

L925244-08 Original Sample (OS) • Duplicate (DUP)

(OS) L925244-08 08/02/17 17:21 • (DUP) R3238421-4 08/02/17 17:21

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	660	661	1	0.151		5

L925601-01 Original Sample (OS) • Duplicate (DUP)

(OS) L925601-01 08/02/17 17:21 • (DUP) R3238421-5 08/02/17 17:21

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	422	418	1	0.952		5

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

(LCS) R3238421-2 08/02/17 17:21 • (LCSD) R3238421-3 08/02/17 17:21

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	%	%	%			%	%
Dissolved Solids	8800	8510	8530	96.7	96.9	85.0-115			0.235	5

L925117-01 Original Sample (OS) • Duplicate (DUP)

(OS) L925117-01 07/28/17 15:13 • (DUP) WG1003455-3 07/28/17 15:13

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.96	6.99	1	0.430	T8	1

Sample Narrative:

OS: 6.96 at 19.1c

DUP: 6.99 at 19.2c

L925427-03 Original Sample (OS) • Duplicate (DUP)

(OS) L925427-03 07/28/17 15:13 • (DUP) WG1003455-4 07/28/17 15:13

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.07	7.07	1	0.000	T8	1

Sample Narrative:

OS: 7.07 at 19.3c

DUP: 7.07 at 19.3c

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

(LCS) WG1003455-1 07/28/17 15:13 • (LCSD) WG1003455-2 07/28/17 15:13

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.38	6.37	6.37	99.8	99.8	98.4-102			0.000	1

Sample Narrative:

LCS: 6.37 at 20.3c

LCSD: 6.37 at 20.3c

L925244-07 Original Sample (OS) • Duplicate (DUP)

(OS) L925244-07 08/01/17 08:21 • (DUP) WG1003758-3 08/01/17 08:21

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.88	6.87	1	0.145	T8	1

Sample Narrative:

OS: 6.88 at 19.1c

DUP: 6.87 at 19.0c

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

(LCS) WG1003758-1 08/01/17 08:21 • (LCSD) WG1003758-2 08/01/17 08:21

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.38	6.39	6.38	100	100	98.4-102			0.157	1

Sample Narrative:

LCS: 6.39 at 19.4c

LCSD: 6.38 at 19.5c

L925244-03 Original Sample (OS) • Duplicate (DUP)

(OS) L925244-03 07/31/17 09:43 • (DUP) WG1003760-3 07/31/17 09:43

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.71	6.72	1	0.149	T8	1

Sample Narrative:

OS: 6.71 at 19.0c

DUP: 6.72 at 19.0c

L925719-01 Original Sample (OS) • Duplicate (DUP)

(OS) L925719-01 07/31/17 09:43 • (DUP) WG1003760-4 07/31/17 09:43

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.76	7.74	1	0.258	T8	1

Sample Narrative:

OS: 7.76 at 10.8c

DUP: 7.74 at 10.7c

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

(LCS) WG1003760-1 07/31/17 09:43 • (LCSD) WG1003760-2 07/31/17 09:43

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.38	6.36	6.35	99.7	99.5	98.4-102			0.157	1

Sample Narrative:

LCS: 6.36 at 18.3c

LCSD: 6.35 at 18.3c

Method Blank (MB)

(MB) R3237420-1 07/29/17 12:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	0.0966	J	0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	0.118	J	0.0774	5.00

L925238-04 Original Sample (OS) • Duplicate (DUP)

(OS) L925238-04 07/29/17 13:27 • (DUP) R3237420-4 07/29/17 13:41

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	9.62	9.64	1	0		15
Fluoride	0.318	0.316	1	1		15

L925238-09 Original Sample (OS) • Duplicate (DUP)

(OS) L925238-09 07/29/17 15:26 • (DUP) R3237420-6 07/29/17 15:41

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	3.43	3.50	1	2		15
Fluoride	0.0857	0.0995	1	15	J	15
Sulfate	3.38	3.41	1	1	J	15

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

(LCS) R3237420-2 07/29/17 12:17 • (LCSD) R3237420-3 07/29/17 12:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	40.1	39.9	100	100	80-120			1	15
Fluoride	8.00	8.02	8.04	100	100	80-120			0	15
Sulfate	40.0	39.7	39.7	99	99	80-120			0	15

L925238-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L925238-04 07/29/17 13:27 • (MS) R3237420-5 07/29/17 13:56

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	9.62	53.3	87	1	80-120	
Fluoride	5.00	0.318	4.86	91	1	80-120	

L925244-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L925244-03 07/29/17 16:25 • (MS) R3237420-7 07/29/17 16:40 • (MSD) R3237420-8 07/29/17 16:55

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	6.60	55.4	52.3	98	91	1	80-120			6	15
Fluoride	5.00	0.135	4.88	4.74	95	92	1	80-120			3	15

Method Blank (MB)

(MB) R3237387-1 07/31/17 11:35

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

L925844-01 Original Sample (OS) • Duplicate (DUP)

(OS) L925844-01 07/31/17 13:02 • (DUP) R3237387-4 07/31/17 13:14

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	7.45	7.48	1	0		15
Fluoride	0.180	0.180	1	0		15
Sulfate	ND	2.57	1	0		15

L925244-02 Original Sample (OS) • Duplicate (DUP)

(OS) L925244-02 07/31/17 17:32 • (DUP) R3237387-5 07/31/17 17:45

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	7.08	7.01	5	1		15
Fluoride	ND	0.000	5	0		15
Sulfate	143	142	5	0		15

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

(LCS) R3237387-2 07/31/17 11:48 • (LCSD) R3237387-3 07/31/17 12:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	40.5	40.4	101	101	80-120			0	15
Fluoride	8.00	8.65	8.63	108	108	80-120			0	15
Sulfate	40.0	40.9	40.7	102	102	80-120			1	15

L925387-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L925387-01 07/31/17 20:33 • (MS) R3237387-6 07/31/17 20:45

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	18.8	65.7	94	1	80-120	
Fluoride	5.00	0.268	4.96	94	1	80-120	

L925387-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L925387-01 07/31/17 20:33 • (MS) R3237387-6 07/31/17 20:45

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	42.5	83.1	81	1	80-120	

L925634-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L925634-01 07/31/17 22:03 • (MS) R3237387-7 07/31/17 22:16 • (MSD) R3237387-8 07/31/17 22:29

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	42.3	90.2	90.5	96	96	1	80-120			0	15
Fluoride	5.00	0.104	5.17	5.25	101	103	1	80-120			2	15
Sulfate	50.0	ND	49.7	49.6	97	97	1	80-120			0	15

Method Blank (MB)

(MB) R3237011-1 07/28/17 12:39

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3237011-2 07/28/17 12:41 • (LCSD) R3237011-3 07/28/17 12:44

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	%	%	%			%	%
Mercury	0.00300	0.00266	0.00266	89	89	80-120			0	20

L925244-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L925244-03 07/28/17 12:46 • (MS) R3237011-4 07/28/17 12:48 • (MSD) R3237011-5 07/28/17 12:51

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	%	%		%			%	%
Mercury	0.00300	ND	0.00265	0.00268	88	89	1	75-125			1	20

Method Blank (MB)

(MB) R3238305-1 08/03/17 11:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium	U		0.0017	0.00500
Beryllium	U		0.0007	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.0007	0.00200
Calcium	U		0.0463	1.00
Chromium	U		0.0014	0.0100
Cobalt	U		0.0023	0.0100
Lithium	U		0.0053	0.0150
Molybdenum	U		0.0016	0.00500

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

(LCS) R3238305-2 08/03/17 11:54 • (LCSD) R3238305-3 08/03/17 11:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Barium	1.00	1.03	1.05	103	105	80-120			2	20
Beryllium	1.00	1.02	1.04	102	104	80-120			2	20
Boron	1.00	0.960	0.990	96	99	80-120			3	20
Cadmium	1.00	0.995	1.02	100	102	80-120			2	20
Calcium	10.0	9.81	10.0	98	100	80-120			2	20
Chromium	1.00	0.997	1.02	100	102	80-120			3	20
Cobalt	1.00	1.03	1.05	103	105	80-120			2	20
Lithium	1.00	0.993	1.01	99	101	80-120			2	20
Molybdenum	1.00	1.01	1.03	101	103	80-120			2	20

L925244-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L925244-03 08/03/17 11:58 • (MS) R3238305-5 08/03/17 12:03 • (MSD) R3238305-6 08/03/17 12:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	1.00	0.140	1.15	1.16	101	102	1	75-125			1	20
Beryllium	1.00	ND	1.02	1.03	102	103	1	75-125			1	20
Boron	1.00	ND	1.11	1.13	97	98	1	75-125			1	20
Cadmium	1.00	ND	1.03	1.03	103	103	1	75-125			1	20
Calcium	10.0	193	196	195	30	24	1	75-125	V	V	0	20
Chromium	1.00	ND	1.00	1.01	100	101	1	75-125			1	20
Cobalt	1.00	ND	1.06	1.07	106	107	1	75-125			1	20
Lithium	1.00	0.0353	1.04	1.05	100	101	1	75-125			1	20
Molybdenum	1.00	ND	1.02	1.03	102	103	1	75-125			1	20

Method Blank (MB)

(MB) R3238490-1 08/03/17 21:30

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.00025	0.00200
Lead	U		0.00024	0.00200
Selenium	U		0.00038	0.00200
Thallium	U		0.00019	0.00200

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

(LCS) R3238490-2 08/03/17 21:33 • (LCSD) R3238490-3 08/03/17 21:37

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	%	%	%			%	%
Antimony	0.0500	0.0494	0.0488	99	98	80-120			1	20
Arsenic	0.0500	0.0499	0.0506	100	101	80-120			1	20
Lead	0.0500	0.0481	0.0486	96	97	80-120			1	20
Selenium	0.0500	0.0503	0.0498	101	100	80-120			1	20
Thallium	0.0500	0.0475	0.0475	95	95	80-120			0	20

L925244-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L925244-03 08/03/17 21:40 • (MS) R3238490-5 08/03/17 21:47 • (MSD) R3238490-6 08/03/17 21:51

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	%	%		%			%	%
Antimony	0.0500	ND	0.0502	0.0493	100	99	1	75-125			2	20
Arsenic	0.0500	ND	0.0487	0.0487	96	96	1	75-125			0	20
Lead	0.0500	ND	0.0487	0.0490	97	98	1	75-125			0	20
Selenium	0.0500	0.0220	0.0732	0.0724	102	101	1	75-125			1	20
Thallium	0.0500	ND	0.0481	0.0487	96	97	1	75-125			1	20

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
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.
Rec.	Recovery.

Qualifier	Description
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.

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

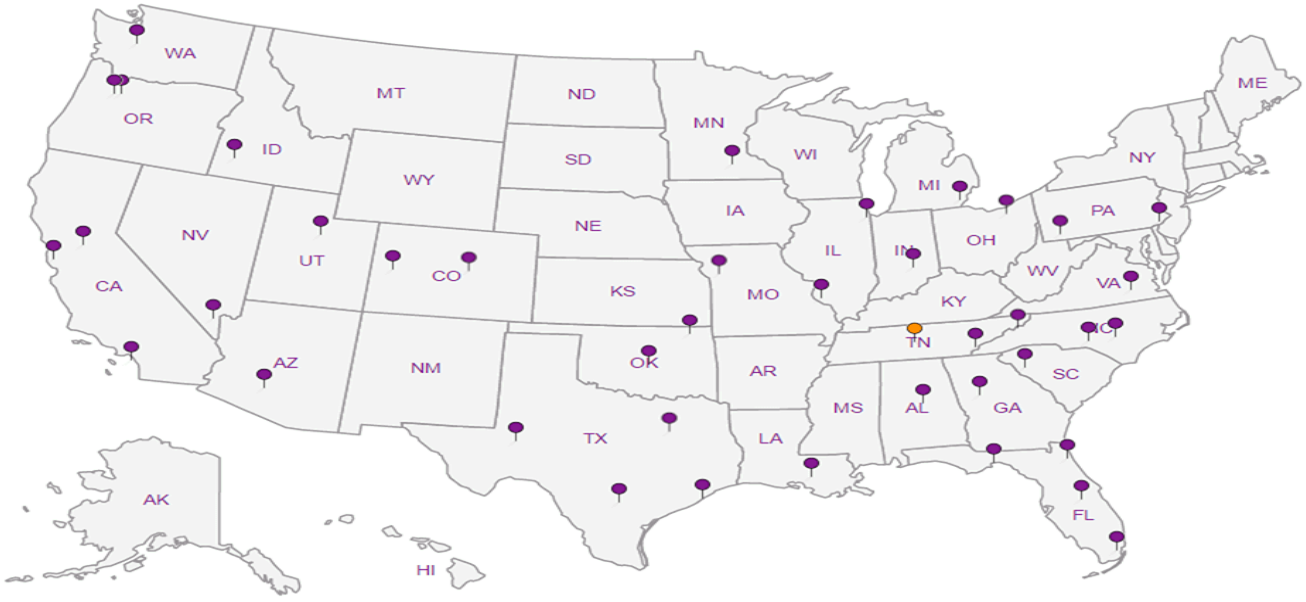
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



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;bhoye@burnsmcd.com;kbrown

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): Lewis Turner

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,Fl,Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	Metals-Boron 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-2A	G	GW	—	7/25/17	1515	3	X	X		X		-01
MW-3	G	GW	—	7/25/17	1620	3	X	X		X		02
MW-4	G	GW	—	7/26/17	0935	3	X	X		X		03
MW-8A	G	GW	—	7/25/17	1220	3	X	X		X		04
MW-10	G	GW	—	7/25/17	1410	3	X	X		X		05
MW-12	G	GW	—	7/26/17	0850	1			X			06
MW-1B	G	GW	—	7/24/17	1550	3	X	X		X		07
BA POND	G	GW	—	7/26/17	0956	3	X	X		X		08
DUP-1	G	GW	—	7/25/17	—	3	X	X		X		09
DUP-2	G	GW	—	7/26/17	—	3	X	X		X		10

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

Remarks: ESCKC

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Relinquished by : (Signature) — Date: 7/26/17 — Time: 1214 — Received by: (Signature)

Relinquished by : (Signature) — Date: 7/26/17 — Time: 1700 — Received by: (Signature)

Relinquished by : (Signature) — Date: — Time: — Received for lab by: (Signature) — Date: 7-27-17 — Time: 895

Trip Blank Received: Yes / (No) HCL / MeoH TBR

Temp: 2.1, +0.1 °C Bottles Received: 37

If preservation required by Login: Date/Time

Hold:

Condition: NCF (OK)

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

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
a subsidiary of

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

L# L925244
F042

Acctnum: KCKAN02
Template: T122810
Prelogin: P610383
TSR: 650 - Linda Cashman
PB: 7-19-17
Shipped Via: FedEx Ground

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;bhoye@burnsmcd.com;kbrown

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): Lewis Turner

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,Fl,Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	Metals-Boron 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres								Remarks	Sample # (lab only)
MATRIX SPIKE MW-4	G	GW	-	7/26/17	0935	3	X	X		X									-03
MATRIX SPIKE DUP MW-4	G	GW	-	7/26/17	0935	3	X	X		X									03
MO RIVER	G	GW	-	7/26/17	1015	3	X	X		X									01
		~~GW~~				~~3~~	~~X~~	~~X~~		~~X~~									

Analysis / Container / Preservative

Pres Chk

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
a subsidiary of Pace Analytical

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

L# L925244

Table #

Acctnum: KCKAN02

Template: T122810

Prelogin: P610383

TSR: 650 - Linda Cashman

PB: LS 7-18-17

Shipped Via: FedEX Ground

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

Remarks: ESCKC

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	7/26/17	1214	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	7/26/17	1700	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes (No) HCL / MeoH TBR

Temp: 7.1° °C Bottles Received: 1011 37

Date: 7-27-17 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / (OK)

Case Narrative

Lab No: 20170864

This report contains the analytical results for the 11 sample(s) received under chain of custody by ESC Lab Sciences on 9/15/2017 2:26:31 PM. These samples are associated with your KCBPU Nearman project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted below:

The test results in this report meet all NELAC requirements unless noted below:

This report shall not be reproduced, except in full, without the written approval of ESC Lab Sciences.

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.

Results have been reviewed by the Director of Radiochemistry or their designees and is approved for release.

DL for Radiochemistry = MDA DL for Metals and Wet Chemistry = MDL DL for Drinking Water = SDWA

Observations / Nonconformances

L936696

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20170864-01								
Client ID : MW-2A								
Date Sampled : 9/14/2017 2:15:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		1.31 +/- 0.706	0.868	pCi/l				
Radium-226	SM 7500 Ra B M*	0.419 +/- 0.263	0.233	pCi/l		09/21/17	09/27/17	RE
Radium-228	EPA 904*	0.890 +/- 0.443	0.635	pCi/l		10/02/17	10/05/17	JR
Lab ID : 20170864-02								
Client ID : MW-3								
Date Sampled : 9/14/2017 3:00:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.914 +/- 0.813	1.07	pCi/l				
Radium-226	SM 7500 Ra B M*	0.419 +/- 0.287	0.321	pCi/l		09/21/17	09/27/17	RE
Radium-228	EPA 904*	0.495 +/- 0.526	0.745	pCi/l		10/02/17	10/05/17	JR
Lab ID : 20170864-03								
Client ID : MW-4								
Date Sampled : 9/14/2017 3:35:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.375 +/- 0.611	0.740	pCi/l				
Radium-226	SM 7500 Ra B M*	0.375 +/- 0.235	0.208	pCi/l		09/21/17	09/27/17	RE
Radium-228	EPA 904*	-0.152 +/- 0.376	0.532	pCi/l		10/02/17	10/05/17	JR
Lab ID : 20170864-04								
Client ID : MATRIX SPIKE								
Date Sampled : 9/14/2017 3:35:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Radium-226	SM 7500 Ra B M*	104		% REC		09/21/17	09/27/17	RE
Radium-228	EPA 904*	90.5		% REC		10/02/17	10/05/17	JR

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20170864-05								
Client ID : MATRIX SPIKE DUPLICATE								
Date Sampled : 9/14/2017 3:35:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Radium-226	SM 7500 Ra B M*	1.7		RPD		09/21/17	09/27/17	RE
Radium-228	EPA 904*	1.6		RPD		10/02/17	10/05/17	JR
Lab ID : 20170864-06								
Client ID : MW-8A								
Date Sampled : 9/14/2017 12:55:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.980 +/- 0.791	0.963	pCi/l				
Radium-226	SM 7500 Ra B M*	0.446 +/- 0.266	0.228	pCi/l		09/21/17	09/27/17	RE
Radium-228	EPA 904*	0.534 +/- 0.525	0.735	pCi/l		10/02/17	10/05/17	JR
Lab ID : 20170864-07								
Client ID : MW-10								
Date Sampled : 9/14/2017 1:35:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		1.10 +/- 0.744	1.07	pCi/l				
Radium-226	SM 7500 Ra B M*	0.184 +/- 0.228	0.320	pCi/l		09/21/17	09/27/17	RE
Radium-228	EPA 904*	0.912 +/- 0.516	0.753	pCi/l		10/02/17	10/05/17	JR
Lab ID : 20170864-08								
Client ID : MW-1B								
Date Sampled : 9/14/2017 11:16:00 AM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		1.51 +/- 0.841	0.997	pCi/l				
Radium-226	SM 7500 Ra B M*	0.693 +/- 0.367	0.399	pCi/l		09/21/17	09/27/17	RE
Radium-228	EPA 904*	0.814 +/- 0.474	0.598	pCi/l		10/02/17	10/05/17	JR

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Address: 311 North Aspen Avenue, Broken Arrow, OK, 74012 - EMail: outreach@esclabsciences.com - Tel: (918) 251-2515

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : 20170864-09								
Client ID : BA POND								
Date Sampled : 9/14/2017 12:00:00 PM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.041 +/- 0.485	0.810	pCi/l				
Radium-226	SM 7500 Ra B M*	0.041 +/- 0.111	0.211	pCi/l		09/25/17	09/28/17	RE
Radium-228	EPA 904*	-0.075 +/- 0.374	0.599	pCi/l		10/02/17	10/05/17	JR
Lab ID : 20170864-10								
Client ID : DUP-1								
Date Sampled : 9/14/2017								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		1.10 +/- 0.725	1.05	pCi/l				
Radium-226	SM 7500 Ra B M*	0.224 +/- 0.242	0.322	pCi/l		09/25/17	09/28/17	RE
Radium-228	EPA 904*	0.880 +/- 0.483	0.728	pCi/l		10/02/17	10/05/17	JR
Lab ID : 20170864-11								
Client ID : MO RIVER								
Date Sampled : 9/14/2017 11:40:00 AM								
Matrix : NPW								
		Radiochemical Analyses						
Combined Radium		0.000 +/- 0.754	1.31	pCi/l				
Radium-226	SM 7500 Ra B M*	0.000 +/- 0.238	0.396	pCi/l		09/25/17	09/28/17	RE
Radium-228	EPA 904*	-0.369 +/- 0.516	0.917	pCi/l		10/02/17	10/05/17	JR

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QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	RER, NAD or DER	MS %REC	MSD %REC	MSD RPD	Batch ID
Radium-226	0.114	117.0			NC	0.858	104.0	102.0	1.7	R1283
Radium-226	0.006	114.0			NC	0.173	120.0	119.0	1.2	R1285
Radium-228	0.080	83.0			NC	0.750	90.5	91.9	1.6	R4009

Lab Approval:

Ron Eidson
Director of Radiochemistry

OUTREACH LABORATORY, A Divsion of ESC Lab Sciences
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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

Analysis / Container / Preservative

Chain of Custody Page 2 of 2

ESC LABORATORY SCIENCES
a subsidiary of Pace Analytical
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;bhoye@burnsmcd.com;kbrown

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

L# 936696

Table #

Collected by (print): Jonathan Heinman

Site/Facility ID #

P.O. #

Acctnum: KCKAN02

Template: T111575

Prelogin: P614341

TSR: 650 - Linda Cashman

PB: 8/17/17 mg

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3									Remarks	Sample # (lab only)
MW-2A	Grab	GW	—	9/14/17	1415	2	X										
MW-3	Grab	GW	—	9/14/17	1500	2	X										
MW-4	Grab	GW	—	9/14/17	1535	2	X										
MW-8A	Grab	GW	—	9/14/17	1255	2	X										
MW-10	Grab	GW	—	9/14/17	1335	2	X										
MW-1B	Grab	GW	—	9/14/17	1116	2	X										
BA POND	Grab	GW	—	9/14/17	1200	2	X										
DUP-1	Grab	GW	—	9/14/17	—	2	X										
DUP-2	—	GW	—	—	—	2	X									Not collected	
MATRIX SPIKE	Grab	GW	—	9/14/17	1535	2	X										

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

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC
Dup-2 Not collected

pH _____ Temp _____
Flow _____ Other _____

ESCKC

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	9/14/17	1645			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
	9/14/17	1700		4.6 22	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK
				9/15/17 1426	

20170824-1

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

Analysis / Container / Preservative

Chain of Custody Page 2 of 2

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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;bhoye@burnsmcd.com;kbrown

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

L# 936696

Table #

Collected by (print): Jonathon Thomason

Site/Facility ID #

P.O. #

Acctnum: KCKAN02

Template: T111575

Prelogin: P614341

TSR: 650 - Linda Cashman

PB: 8/17/17 NG

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Radium 226/228 1L-HDPE-Add HNO3										Remarks	Sample # (lab only)
MATRIX SPIKE DUPLICATE	Grab	GW	—	9/14/17	1535	2	X											
MO RIVER	Grab	GW	—	9/14/17	1140	2	X											

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

Remarks: ESC ORL Lab: Report Radium 226/228 combined-LLC
ESCKC

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 Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Samples returned via:
__UPS __FedEx __Courier _____

Tracking #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	9/14/17	1645			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
	9/14/17	1800		Ambient 22	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: / Condition: NCF / OK
				9/15/17 1426	

20170864-2

SAMPLE LOGIN

Date Received: *9/15/2017 2:26:31* **Lab Number:** 20170864 **Due:** 10/16/2017

Sample Number	Client Sample ID	Matrix	Date Sampled	Container Type	Container Size	Preservation	Preserved Upon Receipt	Custody Seal	Seal Intact
20170864-01 B	MW-2A	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-01 A	MW-2A	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-02 A	MW-3	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-02 B	MW-3	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-03 A	MW-4	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-03 B	MW-4	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-04 A	MATRIX SPIKE	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-04 B	MATRIX SPIKE	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-05 B	MATRIX SPIKE DUPLICAT	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-05 A	MATRIX SPIKE DUPLICAT	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-06 B	MW-8A	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-06 A	MW-8A	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-07 A	MW-10	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-07 B	MW-10	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						

20170864-08 A	MW-1B	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-08 B	MW-1B	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-09 A	BA POND	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-09 B	BA POND	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-10 A	DUP-1	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-10 B	DUP-1	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						
20170864-11 B	MO RIVER	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
20170864-11 A	MO RIVER	NPW	09/14/17	Plastic	1 L	HNO3, pH < 2	☑	No	No
Radium-226			SM 7500 Ra B M*						
Radium-228			EPA 904*						

CONTAINER INSPECTION

 # Coolers 2 **Custody Seals Broken** Ø **Temperature:** 4.5 C **Ice** **Radiation Survey:** <300 cpm

SAMPLE INSPECTION

Sample Seal Broken Ø **Chain of Custody Record** ✓ **Labels in Tact** ✓ **Radiation Survey Complete** N/A

Anomalies

Inspected By: _____ **DATE** 9/15/17

QA or Designee Review: Raymond Thomas **DATE** 09/15/17

Sample Custodian Review: _____ **DATE** 9/15/17

Project Notes:

ANALYTICAL REPORT

October 17, 2017

Kansas City Board of Public Utilities

Sample Delivery Group:	L936894
Samples Received:	09/15/2017
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:

Linda Cashman
Technical Service Representative

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 ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

MW-2A L936894-01 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	09/14/17 14:15	09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 08:16	09/21/17 08:16	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 11:45	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 01:43	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 00:56	JPD

MW-3 L936894-02 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	09/14/17 15:00	09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022243	5	09/21/17 17:16	09/21/17 17:16	DR
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 08:26	09/21/17 08:26	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 11:47	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 01:46	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 01:00	JPD

MW-4 L936894-03 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	09/14/17 15:35	09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022243	5	09/21/17 17:26	09/21/17 17:26	DR
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 08:36	09/21/17 08:36	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 11:20	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 00:59	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 00:38	JPD

MW-8A L936894-04 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	09/14/17 12:55	09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022243	10	09/21/17 17:36	09/21/17 17:36	DR
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 09:17	09/21/17 09:17	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 11:49	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 01:50	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 01:11	JPD

MW-10 L936894-05 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	09/14/17 13:35	09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022243	5	09/21/17 17:46	09/21/17 17:46	DR
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 09:47	09/21/17 09:47	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 11:56	ABL

MW-10 L936894-05 GW

Collected by: Jonathan H. | Collected date/time: 09/14/17 13:35 | Received date/time: 09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 01:53	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 01:14	JPD

MW-1B L936894-06 GW

Collected by: Jonathan H. | Collected date/time: 09/14/17 11:10 | Received date/time: 09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 09:57	09/21/17 09:57	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 11:58	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 01:56	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 01:18	JPD

BA POND L936894-07 GW

Collected by: Jonathan H. | Collected date/time: 09/14/17 12:00 | Received date/time: 09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022243	5	09/21/17 17:56	09/21/17 17:56	DR
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 10:08	09/21/17 10:08	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 12:01	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 01:59	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 01:21	JPD

DUP-1 L936894-08 GW

Collected by: Jonathan H. | Collected date/time: 09/14/17 00:00 | Received date/time: 09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 10:18	09/21/17 10:18	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 12:03	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 02:09	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 01:25	JPD

MO RIVER L936894-09 GW

Collected by: Jonathan H. | Collected date/time: 09/14/17 11:40 | Received date/time: 09/15/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1021143	1	09/18/17 14:38	09/18/17 15:51	BS
Wet Chemistry by Method 9040C	WG1021164	1	09/16/17 13:04	09/16/17 13:04	GB
Wet Chemistry by Method 9056A	WG1022243	5	09/21/17 18:06	09/21/17 18:06	DR
Wet Chemistry by Method 9056A	WG1022244	1	09/21/17 10:28	09/21/17 10:28	DR
Mercury by Method 7470A	WG1021833	1	09/19/17 11:11	09/20/17 12:05	ABL
Metals (ICP) by Method 6010B	WG1022463	1	09/21/17 17:32	09/22/17 02:13	ST
Metals (ICPMS) by Method 6020	WG1022928	1	09/22/17 10:09	09/23/17 01:28	JPD

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. 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
Technical Service Representative

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	571		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.91	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-01 WG1021164: 6.91 at 17.1c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	6.26		1.00	1	09/21/2017 08:16	WG1022244
Fluoride	0.186		0.100	1	09/21/2017 08:16	WG1022244
Sulfate	89.0		5.00	1	09/21/2017 08:16	WG1022244

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 11:45	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.116		0.00500	1	09/22/2017 01:43	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 01:43	WG1022463
Boron	ND		0.200	1	09/22/2017 01:43	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 01:43	WG1022463
Calcium	155		1.00	1	09/22/2017 01:43	WG1022463
Chromium	ND		0.0100	1	09/22/2017 01:43	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 01:43	WG1022463
Lithium	0.0294		0.0150	1	09/22/2017 01:43	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 01:43	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 00:56	WG1022928
Arsenic	0.00487		0.00200	1	09/23/2017 00:56	WG1022928
Lead	ND		0.00200	1	09/23/2017 00:56	WG1022928
Selenium	ND		0.00200	1	09/23/2017 00:56	WG1022928
Thallium	ND		0.00200	1	09/23/2017 00:56	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	733		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.79	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-02 WG1021164: 6.79 at 17.3c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	5.63		1.00	1	09/21/2017 08:26	WG1022244
Fluoride	0.157		0.100	1	09/21/2017 08:26	WG1022244
Sulfate	106		25.0	5	09/21/2017 17:16	WG1022243

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 11:47	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.177		0.00500	1	09/22/2017 01:46	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 01:46	WG1022463
Boron	0.226		0.200	1	09/22/2017 01:46	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 01:46	WG1022463
Calcium	195		1.00	1	09/22/2017 01:46	WG1022463
Chromium	ND		0.0100	1	09/22/2017 01:46	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 01:46	WG1022463
Lithium	0.0486		0.0150	1	09/22/2017 01:46	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 01:46	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 01:00	WG1022928
Arsenic	ND		0.00200	1	09/23/2017 01:00	WG1022928
Lead	ND		0.00200	1	09/23/2017 01:00	WG1022928
Selenium	0.00568		0.00200	1	09/23/2017 01:00	WG1022928
Thallium	ND		0.00200	1	09/23/2017 01:00	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	732		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.88	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-03 WG1021164: 6.88 at 17.2c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	4.92		1.00	1	09/21/2017 08:36	WG1022244
Fluoride	0.148	J6 P1	0.100	1	09/21/2017 08:36	WG1022244
Sulfate	100		25.0	5	09/21/2017 17:26	WG1022243

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 11:20	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.146		0.00500	1	09/22/2017 00:59	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 00:59	WG1022463
Boron	ND		0.200	1	09/22/2017 00:59	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 00:59	WG1022463
Calcium	186	V	1.00	1	09/22/2017 00:59	WG1022463
Chromium	ND		0.0100	1	09/22/2017 00:59	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 00:59	WG1022463
Lithium	0.0428		0.0150	1	09/22/2017 00:59	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 00:59	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 00:38	WG1022928
Arsenic	ND		0.00200	1	09/23/2017 00:38	WG1022928
Lead	ND		0.00200	1	09/23/2017 00:38	WG1022928
Selenium	0.0186		0.00200	1	09/23/2017 00:38	WG1022928
Thallium	ND		0.00200	1	09/23/2017 00:38	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1000		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.89	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-04 WG1021164: 6.89 at 17.2c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	28.4		1.00	1	09/21/2017 09:17	WG1022244
Fluoride	0.268		0.100	1	09/21/2017 09:17	WG1022244
Sulfate	380		50.0	10	09/21/2017 17:36	WG1022243

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 11:49	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0541		0.00500	1	09/22/2017 01:50	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 01:50	WG1022463
Boron	2.27		0.200	1	09/22/2017 01:50	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 01:50	WG1022463
Calcium	153		1.00	1	09/22/2017 01:50	WG1022463
Chromium	ND		0.0100	1	09/22/2017 01:50	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 01:50	WG1022463
Lithium	0.0269		0.0150	1	09/22/2017 01:50	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 01:50	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 01:11	WG1022928
Arsenic	0.0144		0.00200	1	09/23/2017 01:11	WG1022928
Lead	ND		0.00200	1	09/23/2017 01:11	WG1022928
Selenium	ND		0.00200	1	09/23/2017 01:11	WG1022928
Thallium	ND		0.00200	1	09/23/2017 01:11	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	880		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.82	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-05 WG1021164: 6.82 at 17.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	22.6		1.00	1	09/21/2017 09:47	WG1022244
Fluoride	0.144		0.100	1	09/21/2017 09:47	WG1022244
Sulfate	258		25.0	5	09/21/2017 17:46	WG1022243

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 11:56	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0705		0.00500	1	09/22/2017 01:53	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 01:53	WG1022463
Boron	1.19		0.200	1	09/22/2017 01:53	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 01:53	WG1022463
Calcium	195		1.00	1	09/22/2017 01:53	WG1022463
Chromium	ND		0.0100	1	09/22/2017 01:53	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 01:53	WG1022463
Lithium	0.0495		0.0150	1	09/22/2017 01:53	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 01:53	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 01:14	WG1022928
Arsenic	0.00635		0.00200	1	09/23/2017 01:14	WG1022928
Lead	ND		0.00200	1	09/23/2017 01:14	WG1022928
Selenium	ND		0.00200	1	09/23/2017 01:14	WG1022928
Thallium	ND		0.00200	1	09/23/2017 01:14	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	700		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.56	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-06 WG1021164: 6.56 at 17.9c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	92.4		1.00	1	09/21/2017 09:57	WG1022244
Fluoride	ND		0.100	1	09/21/2017 09:57	WG1022244
Sulfate	31.8		5.00	1	09/21/2017 09:57	WG1022244

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 11:58	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.312		0.00500	1	09/22/2017 01:56	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 01:56	WG1022463
Boron	ND		0.200	1	09/22/2017 01:56	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 01:56	WG1022463
Calcium	190		1.00	1	09/22/2017 01:56	WG1022463
Chromium	ND		0.0100	1	09/22/2017 01:56	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 01:56	WG1022463
Lithium	0.0204		0.0150	1	09/22/2017 01:56	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 01:56	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 01:18	WG1022928
Arsenic	ND		0.00200	1	09/23/2017 01:18	WG1022928
Lead	ND		0.00200	1	09/23/2017 01:18	WG1022928
Selenium	ND		0.00200	1	09/23/2017 01:18	WG1022928
Thallium	ND		0.00200	1	09/23/2017 01:18	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	578		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.67	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-07 WG1021164: 8.67 at 18.0c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	24.3		1.00	1	09/21/2017 10:08	WG1022244
Fluoride	0.431		0.100	1	09/21/2017 10:08	WG1022244
Sulfate	326		25.0	5	09/21/2017 17:56	WG1022243

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 12:01	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.222		0.00500	1	09/22/2017 01:59	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 01:59	WG1022463
Boron	1.61		0.200	1	09/22/2017 01:59	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 01:59	WG1022463
Calcium	94.1		1.00	1	09/22/2017 01:59	WG1022463
Chromium	ND		0.0100	1	09/22/2017 01:59	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 01:59	WG1022463
Lithium	0.0210		0.0150	1	09/22/2017 01:59	WG1022463
Molybdenum	0.0309		0.00500	1	09/22/2017 01:59	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 01:21	WG1022928
Arsenic	0.00341		0.00200	1	09/23/2017 01:21	WG1022928
Lead	ND		0.00200	1	09/23/2017 01:21	WG1022928
Selenium	ND		0.00200	1	09/23/2017 01:21	WG1022928
Thallium	ND		0.00200	1	09/23/2017 01:21	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	568		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	6.99	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-08 WG1021164: 6.99 at 17.6c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	6.33		1.00	1	09/21/2017 10:18	WG1022244
Fluoride	0.181		0.100	1	09/21/2017 10:18	WG1022244
Sulfate	89.6		5.00	1	09/21/2017 10:18	WG1022244

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 12:03	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.115		0.00500	1	09/22/2017 02:09	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 02:09	WG1022463
Boron	ND		0.200	1	09/22/2017 02:09	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 02:09	WG1022463
Calcium	155		1.00	1	09/22/2017 02:09	WG1022463
Chromium	ND		0.0100	1	09/22/2017 02:09	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 02:09	WG1022463
Lithium	0.0298		0.0150	1	09/22/2017 02:09	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 02:09	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 01:25	WG1022928
Arsenic	0.00487		0.00200	1	09/23/2017 01:25	WG1022928
Lead	ND		0.00200	1	09/23/2017 01:25	WG1022928
Selenium	ND		0.00200	1	09/23/2017 01:25	WG1022928
Thallium	ND		0.00200	1	09/23/2017 01:25	WG1022928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	543		10.0	1	09/18/2017 15:51	WG1021143

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.44	T8	1	09/16/2017 13:04	WG1021164

Sample Narrative:

L936894-09 WG1021164: 8.44 at 17.7c

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	21.3		1.00	1	09/21/2017 10:28	WG1022244
Fluoride	0.344		0.100	1	09/21/2017 10:28	WG1022244
Sulfate	216		25.0	5	09/21/2017 18:06	WG1022243

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/20/2017 12:05	WG1021833

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.102		0.00500	1	09/22/2017 02:13	WG1022463
Beryllium	ND		0.00200	1	09/22/2017 02:13	WG1022463
Boron	ND		0.200	1	09/22/2017 02:13	WG1022463
Cadmium	ND		0.00200	1	09/22/2017 02:13	WG1022463
Calcium	67.9		1.00	1	09/22/2017 02:13	WG1022463
Chromium	ND		0.0100	1	09/22/2017 02:13	WG1022463
Cobalt	ND		0.0100	1	09/22/2017 02:13	WG1022463
Lithium	0.0535		0.0150	1	09/22/2017 02:13	WG1022463
Molybdenum	ND		0.00500	1	09/22/2017 02:13	WG1022463

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	09/23/2017 01:28	WG1022928
Arsenic	0.00367		0.00200	1	09/23/2017 01:28	WG1022928
Lead	ND		0.00200	1	09/23/2017 01:28	WG1022928
Selenium	ND		0.00200	1	09/23/2017 01:28	WG1022928
Thallium	ND		0.00200	1	09/23/2017 01:28	WG1022928

Method Blank (MB)

(MB) R3250525-1 09/18/17 15:51

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

L936764-02 Original Sample (OS) • Duplicate (DUP)

(OS) L936764-02 09/18/17 15:51 • (DUP) R3250525-4 09/18/17 15:51

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	1210	1200	1	0.498		5

L936894-04 Original Sample (OS) • Duplicate (DUP)

(OS) L936894-04 09/18/17 15:51 • (DUP) R3250525-5 09/18/17 15:51

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	1000	1040	1	3.52		5

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

(LCS) R3250525-2 09/18/17 15:51 • (LCSD) R3250525-3 09/18/17 15:51

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	%	%	%			%	%
Dissolved Solids	8800	8710	8740	99.0	99.3	85.0-115			0.344	5

L935492-01 Original Sample (OS) • Duplicate (DUP)

(OS) L935492-01 09/16/17 13:04 • (DUP) WG1021164-7 09/16/17 13:04

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.88	7.88	1	0.000	T8	1

Sample Narrative:

OS: 7.88 at 19.4c

DUP: 7.88 at 21.0c

L936925-01 Original Sample (OS) • Duplicate (DUP)

(OS) L936925-01 09/16/17 13:04 • (DUP) WG1021164-8 09/16/17 13:04

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.61	6.61	1	0.000	T8	1

Sample Narrative:

OS: 6.61 at 18.5c

DUP: 6.61 at 19.0c

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

(LCS) WG1021164-5 09/16/17 13:04 • (LCSD) WG1021164-6 09/16/17 13:04

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	10.0	9.94	9.94	99.4	99.4	98.4-102			0.000	1

Sample Narrative:

LCS: 9.94 at 19.4c

LCSD: 9.94 at 19.5c

Method Blank (MB)

(MB) R3251289-1 09/21/17 11:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.0774	5.00

L936608-01 Original Sample (OS) • Duplicate (DUP)

(OS) L936608-01 09/21/17 12:50 • (DUP) R3251289-4 09/21/17 13:00

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	0.635	1	12	J	15

L936740-03 Original Sample (OS) • Duplicate (DUP)

(OS) L936740-03 09/21/17 14:32 • (DUP) R3251289-7 09/21/17 14:42

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	0.684	1	0		15

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

(LCS) R3251289-2 09/21/17 12:09 • (LCSD) R3251289-3 09/21/17 12:20

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 %
Sulfate	40.0	40.7	40.7	102	102	80-120			0	15

L936608-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L936608-01 09/21/17 12:50 • (MS) R3251289-5 09/21/17 13:10 • (MSD) R3251289-6 09/21/17 13:21

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 %
Sulfate	50.0	ND	44.3	44.5	87	88	1	80-120			0	15

L936740-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L936740-03 09/21/17 14:32 • (MS) R3251289-8 09/21/17 14:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	ND	51.3	101	1	80-120	

Method Blank (MB)

(MB) R3251239-1 09/21/17 05:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

L936469-13 Original Sample (OS) • Duplicate (DUP)

(OS) L936469-13 09/21/17 06:44 • (DUP) R3251239-4 09/21/17 06:54

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Fluoride	0.374	0.343	1	9		15
Sulfate	33.5	33.7	1	1		15

L936894-03 Original Sample (OS) • Duplicate (DUP)

(OS) L936894-03 09/21/17 08:36 • (DUP) R3251239-6 09/21/17 08:46

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	4.92	5.36	1	8		15
Fluoride	0.148	0.000	1	200	P1	15

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

(LCS) R3251239-2 09/21/17 05:33 • (LCSD) R3251239-3 09/21/17 05:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	39.6	39.7	99	99	80-120			0	15
Fluoride	8.00	8.20	8.22	102	103	80-120			0	15
Sulfate	40.0	40.8	40.9	102	102	80-120			0	15

L936469-13 Original Sample (OS) • Matrix Spike (MS)

(OS) L936469-13 09/21/17 06:44 • (MS) R3251239-5 09/21/17 07:05

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Fluoride	5.00	0.374	4.06	74	1	80-120	J6
Sulfate	50.0	33.5	75.6	84	1	80-120	

L936894-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L936894-03 09/21/17 08:36 • (MS) R3251239-7 09/21/17 08:56 • (MSD) R3251239-8 09/21/17 09:07

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	4.92	47.8	48.3	86	87	1	80-120			1	15
Fluoride	5.00	0.148	4.40	3.91	85	75	1	80-120		J6	12	15

Method Blank (MB)

(MB) R3250745-1 09/20/17 11:13

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3250745-2 09/20/17 11:15 • (LCSD) R3250745-3 09/20/17 11:17

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	0.00301	0.00289	100	96	80-120			4	20

L936894-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L936894-03 09/20/17 11:20 • (MS) R3250745-4 09/20/17 11:22 • (MSD) R3250745-5 09/20/17 11:29

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 %
Mercury	0.00300	ND	0.00299	0.00305	100	102	1	75-125			2	20

Method Blank (MB)

(MB) R3251329-1 09/22/17 00:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium	U		0.0017	0.00500
Beryllium	U		0.0007	0.00200
Boron	U		0.0126	0.200
Cadmium	U		0.0007	0.00200
Calcium	U		0.0463	1.00
Chromium	U		0.0014	0.0100
Cobalt	U		0.0023	0.0100
Lithium	U		0.0053	0.0150
Molybdenum	U		0.0016	0.00500

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

(LCS) R3251329-2 09/22/17 00:53 • (LCSD) R3251329-3 09/22/17 00:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Barium	1.00	1.01	1.01	101	101	80-120			0	20
Beryllium	1.00	1.01	1.00	101	100	80-120			0	20
Boron	1.00	0.957	0.965	96	96	80-120			1	20
Cadmium	1.00	0.975	0.970	98	97	80-120			1	20
Calcium	10.0	9.59	9.60	96	96	80-120			0	20
Chromium	1.00	0.999	0.991	100	99	80-120			1	20
Cobalt	1.00	1.01	0.999	101	100	80-120			1	20
Lithium	1.00	1.02	1.02	102	102	80-120			1	20
Molybdenum	1.00	1.01	1.01	101	101	80-120			1	20

L936894-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L936894-03 09/22/17 00:59 • (MS) R3251329-5 09/22/17 01:06 • (MSD) R3251329-6 09/22/17 01:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	1.00	0.146	1.14	1.16	100	101	1	75-125			1	20
Beryllium	1.00	ND	1.04	1.01	104	101	1	75-125			3	20
Boron	1.00	ND	1.15	1.12	100	97	1	75-125			2	20
Cadmium	1.00	ND	0.993	0.999	99	100	1	75-125			1	20
Calcium	10.0	186	196	190	100	42	1	75-125		V	3	20
Chromium	1.00	ND	0.978	0.985	98	99	1	75-125			1	20
Cobalt	1.00	ND	1.00	1.01	100	101	1	75-125			0	20
Lithium	1.00	0.0428	1.13	1.11	109	107	1	75-125			2	20
Molybdenum	1.00	ND	1.01	1.02	101	102	1	75-125			1	20

Method Blank (MB)

(MB) R3251686-1 09/23/17 00:28

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.00025	0.00200
Lead	U		0.00024	0.00200
Selenium	U		0.00038	0.00200
Thallium	U		0.00019	0.00200

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

(LCS) R3251686-2 09/23/17 00:31 • (LCSD) R3251686-3 09/23/17 00:35

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	0.0499	0.0506	100	101	80-120			2	20
Arsenic	0.0500	0.0461	0.0481	92	96	80-120			4	20
Lead	0.0500	0.0459	0.0486	92	97	80-120			6	20
Selenium	0.0500	0.0467	0.0487	93	97	80-120			4	20
Thallium	0.0500	0.0455	0.0475	91	95	80-120			4	20

L936894-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L936894-03 09/23/17 00:38 • (MS) R3251686-5 09/23/17 00:46 • (MSD) R3251686-6 09/23/17 00:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	ND	0.0517	0.0508	103	102	1	75-125			2	20
Arsenic	0.0500	ND	0.0474	0.0475	94	94	1	75-125			0	20
Lead	0.0500	ND	0.0474	0.0472	95	94	1	75-125			1	20
Selenium	0.0500	0.0186	0.0661	0.0648	95	92	1	75-125			2	20
Thallium	0.0500	ND	0.0471	0.0470	94	94	1	75-125			0	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, 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.
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
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.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences 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.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

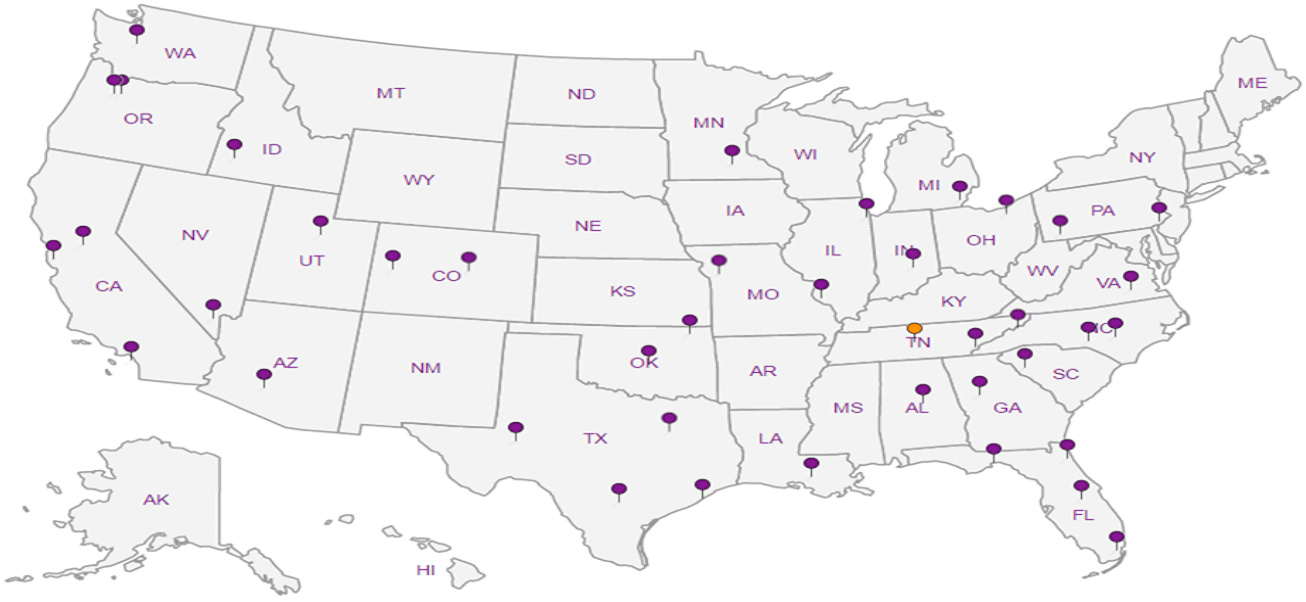
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

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

Our Locations

ESC Lab Sciences 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. **ESC Lab Sciences performs all testing at our central laboratory.**



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;bhoye@burnsmcd.com;kbrown

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 Hoarman

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed: STD

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,Fl,Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	Metals-Boron 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-2A	Grab	GW	—	9/14/17	1415	3	X	X		X		01
MW-3	Grab	GW	—	9/14/17	1500	3	X	X		X		02
MW-4	Grab	GW	—	9/14/17	1535	3	X	X		X		03
MW-8A	Grab	GW	—	9/14/17	1255	3	X	X		X		04
MW-10	Grab	GW	—	9/14/17	1335	3	X	X		X		05
MW-12	~~Grab~~ NA	GW	—	—	—	1			X		Not collected	
MW-1B	Grab	GW	—	9/14/17	1110	3	X	X		X		06
BA POND	Grab	GW	—	9/14/17	1200	3	X	X		X		07
DUP-1	Grab	GW	—	9/14/17	—	3	X	X		X		08
DUP-2	—	GW	—	—	—	3	X	X		X	Not collected	

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

Remarks: MW-12 Not collected
Dup-2 Not collected

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

Tracking # 7466 1465 0380

Trip Blank Received: Yes / No HCL / MeoH TBR

Temp: 0.9 °C Bottles Received: 33

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	9/14/17	1645	9/15/17 0845
Relinquished by : (Signature)	9/14/17	1700	
Relinquished by : (Signature)			Received for lab by: (Signature)

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

Chain of Custody Page 1 of 2

ESC LAB SCIENCES
a subsidiary of Accutest

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

L# 976894
B092

Acctnum: KCKAN02
Template: T122810
Prelogin: P618131
TSR: 650 - Linda Cashman
PB: 9/8/17 RW

Shipped Via: FedEx Ground

Chain of Custody — Page 2 of 2

ESC LABORATORIES — a subsidiary of Pace Analytical

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

L# 936894

Table #

Acctnum: KCKAN02

Template: T122810

Prelogin: P618131

TSR: 650 - Linda Cashman

PB: 9-8-17 MW

Shipped Via: FedEX Ground

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;bhoye@burnsmcd.com;kbrown

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 Herrmann

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed: STD

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,Fl,Sulfate 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	Metals-Boron 250mlHDPE-HNO3	TDS, pH 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MATRIX SPIKE	Grab	GW	—	9/14/17	1535	3	X	X		X		03
MATRIX SPIKE DUP	Grab	GW	—	9/14/17	1535	3	X	X		X		03
MO RIVER	Grab	GW	—	9/14/17	1140	3	X	X		X		09
		GW				3	X	X		X		

9-11-17

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

Remarks: ESCLC

pH ____ Temp ____
Flow ____ Other ____

Samples returned via: ___ UPS ___ FedEx ___ Courier ___ ____

Tracking # 7466 1465 0380

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: 0.9 °C Bottles Received: 33

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

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

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	9/14/17	1645	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	9/14/17	1700	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)
	Date: 9/15/17	Time: 0845	

APPENDIX F – DATA VALIDATION REPORTS

Memorandum

Date: January 8, 2016

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 – October 2015
Project No. 88777

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 October 29-30, 2015 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Metals (total & dissolved)[1]	SW-846 6010B
Metals (total & dissolved) [1]	SW-846 6020
Mercury (total & dissolved)	SW-846 7470A
Total Dissolved Solids (TDS)	SM 2540 C-2011
Alkalinity	SM 2320 B-2011
Phosphorus, Total	SW-846 9040C
Anions (chloride, fluoride, sulfate)	SW-846 9056MOD
Radium 226 and 228[2]	EPA 903.1 / 904.0

Notes:
[1]Metals performed by SW-846 6010B include aluminum, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, vanadium, and zinc. Metals performed by SW-846 6020 include antimony, arsenic, and thallium.
[2]The radium sample were sent to ESC; however, ESC subcontracted these samples to GEL Laboratories LLC (GEL) of Charleston, South Carolina.

A Stage I data review was performed for QA/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 Data Review* (NFGI) (USEPA, 2014). 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 COC were present.

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate background parameters for the October 2015 groundwater sampling event.

3. Holding Times – All samples were analyzed within the recommended method holding times except for the following:

4. The pH for all samples was 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.

5. Sample Preservation – All samples were received by the laboratory within the recommended 4 degrees Celsius (ºC) ± 2 ºC sample preservation temperature range.

6. Laboratory Method Blanks – Dissolved silver was detected in the metals method blank at 0.0113 milligrams per liter (mg/L). All associated samples were nondetect for silver; hence, cross contamination was not a concern. No data qualifiers were added based on this blank detection.

7. 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 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.

8. 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.

   The spikes amounts for total calcium, dissolved calcium, dissolved iron, and dissolved sodium were less than one-fourth the sample concentration of their parent sample. In other words, the spike amount was too low and the sample concentration too high to allow accurate recovery of the spike. No conclusion could be made for these MS/MSDs.

   All other site-specific MS/MSD RECs and/or RPDs were within QC limits.

9. 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 laboratory duplicate results were within control limits.

10. 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 ± 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.

Two field duplicate pairs were collected for the October 2015 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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-8A // Dup-1A: The fluoride results exhibited a sensitivity test failure for this field duplicate pair. Additionally, radium-226 was detected above its MDC, while the field duplicate was below its MDC (nondetect). When accounting for the noted uncertainty of both radium-226 samples, the results were adequately replicated, and no further review was necessary.
- BA Pond // Dup-2: The fluoride results exhibited a sensitivity test failure for this field duplicate pair while the chloride results exceeded the RPD QC limit. Additionally, the sulfate results between this field duplicate pair exceeded the RPD QC limit; however, these samples were analyzed at different dilution factors and no conclusions could be made. The radium-226 and radium-228 results were below their MDC in both samples; however, the combined radium calculation exhibited a factored difference. Because both samples were nondetect for the radium fractions, and the noted uncertainties provided adequately replicated results, no further review was necessary based on this combined calculation.

11. Detection and Quantitation Limits – Dilutions were noted for sulfate and/or alkalinity in one or more samples to account for high concentrations of target analytes and/or matrix interferences. No qualifiers were added based on dilutions.

12. Case Narrative/ Lab Summary – No other significant problems were noted in the case narratives involving problems with the analyses.

13. 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

Table 1
Data Qualifiers
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – October 2015

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-9	L798087-01	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	L798087-02			
MW-4	L798087-03			
MW-6	L798087-04			
MW-7	L798087-05			
MW-2A	L798087-06			
MW-8A	L798087-07			
MW-10	L798087-08			
BA Pond	L798087-09			
DUP-1A	L798087-10			
Dup-2	L798087-11			

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 – October 2015

		MW-8A L798087-07	Dup-1A L798087-10	Meets QC Criteria
Total Dissolved Solids	mg/l	1180	1130	Yes
Alkalinity	mg/l	329	322	Yes
pH	mg/l	6.94 J	6.97 J	Yes
Chloride	mg/l	26.5	30.3	Yes
Fluoride	mg/l	0.54	0.318	**STF**
Sulfate	mg/l	491	598	Yes
Barium, Total	mg/l	0.073	0.0738	Yes
Barium, Dissolved	mg/l	0.0706	0.0711	Yes
Boron, Total	mg/l	2.37	2.38	Yes
Calcium, Total	mg/l	186	185	Yes
Calcium, Dissolved	mg/l	186	183	Yes
Iron, Total	mg/l	5.78	5.75	Yes
Iron, Dissolved	mg/l	5.39	5.68	Yes
Lithium, Total	mg/l	0.0243	0.0242	Yes
Magnesium, Total	mg/l	31.4	31.2	Yes
Magnesium, Dissolved	mg/l	31	30.9	Yes
Manganese, Total	mg/l	2.47	2.47	Yes
Manganese, Dissolved	mg/l	2.47	2.49	Yes
Nickel, Total	mg/l	0.0129	0.0133	Yes
Nickel, Dissolved	mg/l	0.0124	0.012	Yes
Potassium, Total	mg/l	9.08	9.00	Yes
Potassium, Dissolved	mg/l	8.96	8.82	Yes
Sodium, Total	mg/l	159	158	Yes
Sodium, Dissolved	mg/l	158	155	Yes
Arsenic, Total	mg/l	0.0120	0.0132	Yes
Arsenic, Dissolved	mg/l	0.0120	0.0127	Yes
Radium-226	pCi/l	0.360	0.142 U	Yes
Radium-226 + 228 (Calc)	pCi/l	0.360	0.298	Yes

Table 2
Field Duplicate Results (Detections Only)
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – October 2015

		BA Pond L798087-09	Dup-2 L798087-11	Meets QC Criteria
Total Dissolved Solids	mg/l	703	716	Yes
Alkalinity	mg/l	70.8	67	Yes
pH	mg/l	8.16 J	7.74 J	Yes
Chloride	mg/l	19.3	26.4	**RPD 31.1%**
Fluoride	mg/l	0.109	0.535	**STF**
Sulfate	mg/l	282	490	**RPD 53.9% (See Text)**
Aluminum, Total	mg/l	0.826	0.812	Yes
Aluminum, Dissolved	mg/l	0.733	0.759	Yes
Barium, Total	mg/l	0.174	0.173	Yes
Barium, Dissolved	mg/l	0.168	0.168	Yes
Boron, Total	mg/l	2.89	2.9	Yes
Calcium, Total	mg/l	128	127	Yes
Calcium, Dissolved	mg/l	126	126	Yes
Magnesium, Total	mg/l	14.1	14.1	Yes
Magnesium, Dissolved	mg/l	13.9	13.7	Yes
Molybdenum, Total	mg/l	0.0534	0.053	Yes
Potassium, Total	mg/l	9.7	9.61	Yes
Potassium, Dissolved	mg/l	9.48	9.47	Yes
Sodium, Total	mg/l	75	74.2	Yes
Sodium, Dissolved	mg/l	73.2	73.4	Yes
Radium-226 + 228 (Calc)	pCi/l	0.354	0.0782	Yes (See Text)

J - Qualified as estimated
mg/l = milligrams per liter
pCi/l = picoCuries/liter
R - Data was rejected
RPD = Relative Percent Difference
STF = Sensitivity Test Failure

Memorandum

Date: March 8, 2016

To: Brian Hoye

From: Aleen Mathies

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 – January 2016
Project No. 88777

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 January 27, 2016 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Metals (total & dissolved)[1]	SW-846 6010B
Metals (total & dissolved) [1]	SW-846 6020
Mercury (total & dissolved)	SW-846 7470A
Total Dissolved Solids (TDS)	SM 2540 C-2011
Anions (chloride, fluoride, sulfate)	SW-846 9056A
Radium 226 and 228[2] (Combined)	EPA 903.1 / 904.0

Notes:
[1]Metals performed by SW-846 6010B include beryllium, boron, cadmium, calcium, cobalt, cobalt, lithium and molybdenum. Metals performed by SW-846 6020 include antimony, arsenic, lead, selenium and thallium.
[2]The radium sample were sent to ESC; however, ESC subcontracted these samples to GEL Laboratories LLC (GEL) of Charleston, South Carolina.

A Stage I data review was performed for QA/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 Data Review* (NFGI) (USEPA, 2014). 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 COC were present.

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate background parameters for the January 2016 groundwater sampling event.

3. Holding Times – All samples were analyzed within the recommended method holding times except for the following: The pH for all samples was 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 (ºC) ± 2 ºC 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. No detections of target analytes were noted in the method blanks.

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 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.

   All site-specific MS/MSD RECs and/or RPDs were within QC 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 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 ± 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.

Two field duplicate pairs were collected for the January 2016 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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: Boron was detected above its MDC in the field duplicate, while the original sample was below its MDC (nondetect). After applying a replication test, the difference between the detected sample and the reporting limit (0.021 mg/L) was lower than the reporting limit for the sample (0.200 mg/L). Therefore, the results were adequately replicated, and no further review was necessary.

- BA Pond // Dup-2: Field duplicate results were adequately replicated.

10. Detection and Quantitation Limits – Dilutions were noted for sulfate in one or more samples to account for high concentrations of target analytes and/or matrix interferences. No qualifiers were added based on dilutions.

11. Case Narrative/ Lab Summary – No other significant problems were noted in the case narratives involving problems with the analyses.

12. 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 – January 2016

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 BA Pond DUP-1 (MW-2A) DUP-2 (BA Pond)	L814632-01 L814632-02 L814632-03 L814632-04 L814632-05 L814632-06 L814632-07 L814632-08	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).

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 – January 2016

Parameter	Unit	MW-2A L814632-01	Dup-1 L814632-07	Meets QC Criteria
Total Dissolved Solids	mg/l	811	783	Yes
pH	mg/l	6.91 J	6.93 J	Yes
Chloride	mg/l	5.81	5.92	Yes
Fluoride	mg/l	0.159	0.154	Yes
Sulfate	mg/l	180	182	Yes
Barium, Total	mg/l	0.125	0.126	Yes
Boron, Total	mg/l	ND	0.221	Yes
Calcium, Total	mg/l	208	206	Yes
Lithium, Total	mg/l	0.0395	0.04	Yes
Arsenic, Total	mg/l	0.00468	0.00465	Yes
Radium-226 (Uncertainty)	pCi/l	0.801 (+/- 0.414)	0.256 U (+/- 0.256)	Yes
Radium-228 (Uncertainty)	pCi/l	1.65 (+/- 0.991)	0.950 U (+/- 1.09)	Yes
Radium-226 + 228 (Calc)	pCi/l	2.45	1.21	Yes

Table 2
Field Duplicate Results (Detections Only)
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – January 2016

Parameter	Unit	BA Pond L814632-06	Dup-2 L814632-08	Meets QC Criteria
Total Dissolved Solids	mg/l	674	678	Yes
pH	mg/l	8.19 J	8.07 J	Yes
Chloride	mg/l	24.3	24.4	Yes
Fluoride	mg/l	0.407	0.405	Yes
Sulfate	mg/l	323	315	Yes
Barium, Total	mg/l	0.24	0.238	Yes
Boron, Total	mg/l	1.81	1.8	Yes
Calcium, Total	mg/l	126	127	Yes
Lithium	mg/l	0.0249	0.0226	Yes
Molybdenum, Total	mg/l	0.0326	0.0327	Yes
Arsenic	mg/l	0.00224	0.00205	Yes
Radium-226 (Uncertainty)	pCi/l	0.275 U (+/- 0.330)	0.242 U (+/- 0.264)	Yes
Radium-228 (Uncertainty)	pCi/l	0.741 U (+/- 0.795)	0.478 U (+/- 0.830)	Yes
Radium-226 + 228 (Calc)	pCi/l	1.02	0.72	Yes

J - Qualified as estimated
mg/l = milligrams per liter
pCi/l = picoCuries/liter

Memorandum

Date: June 15, 2016

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 – April 2016
Project No. 88777

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 April 27-28, 2016 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

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

Notes:
[1]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.
[2]The radium samples were sent to ESC; however, these samples were analyzed at Outreach Laboratory of Broken Arrow, Oklahoma which is a division of ESC's network. 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 Data Review* (NFGI) (USEPA, 2014). 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 background parameters for the April 2016 groundwater sampling event.

3. Holding Times – All samples were analyzed within the recommended method holding times except for the following:

    - The pH value for all samples was 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 (ºC) ± 2 ºC 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 metals method blank for SW-846 6010B at a low-level concentration less than its reporting limit. All associated samples were greater than five times this blank detection; thus, cross-contamination was not a concern, and no data qualifiers were added.

   - Antimony was detected in the metals method blank for SW-846 6020 at a low-level concentration less than its reporting limit. All associated samples were nondetect for this analyte, hence, cross-contamination was not a concern. No data 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. All site-specific MS/MSD RECs and/or RPDs were within QC limits.

   Note that the radium MS/MSD sample volumes were assigned a laboratory number, and MS/MSD results were reported within the sample results. The MS RECs were within the United States Environmental Protection Agency (USEPA) standard control limits of 75-125 percent, and the MS/MSD RPDs were less than the USEPA standard control limit of 20 percent. No MSD REC was provided, however given the low RPD, the MSD REC was assumed to be within the noted control limits since no problems were noted by the lab. In the QC section of the report, a second set of MS/MSD results for the radium analyses was reported and also within the above-noted control

limits. It is unknown if this MS/MSD was performed on a project-specific sample. Overall, all radium results were within their respective control limits, and impact to the project was negligible.

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 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 ± 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.

   Two field duplicate pairs were collected for the April 2016 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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-10 // Dup-1: Field duplicate results were adequately replicated.
   - MW-8A // Dup-2: Field duplicate results were adequately replicated.

10. Detection and Quantitation Limits – Dilutions were noted for sulfate in one or more samples to account for high concentrations of target analytes and/or matrix interferences. No qualifiers were added based on dilutions.

11. Case Narrative/ Lab Summary – No other significant problems were noted in the case narratives involving problems with the analyses.

12. 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 – April 2016

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 BA Pond DUP-1 (MW-10) DUP-2 (MW-8A) MO RIVER MW-1B	L832453-01 L832453-02 L832453-03 L832453-04 L832453-05 L832453-06 L832453-07 L832453-08 L832453-09 L832454-01	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).

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 – April 2016

Parameter	Unit	MW-10 L832453-05	Dup-1 L832453-07	Meets QC Criteria
Total Dissolved Solids	mg/l	797	820	Yes
pH	mg/l	6.92	6.96	Yes
Chloride	mg/l	21.9	21.8	Yes
Fluoride	mg/l	0.125	0.105	Yes
Sulfate	mg/l	220	226	Yes
Barium, Total	mg/l	0.0871	0.0857	Yes
Boron, Total	mg/l	1.35	1.35	Yes
Calcium, Total	mg/l	179	178	Yes
Lithium, Total	mg/l	0.045	0.0446	Yes
Arsenic, Total	mg/l	0.0135	0.0115	Yes
Radium-226 + 228 (Calc)	pCi/l	1.77	1.16	Yes
(Uncertainty)		(+/- 1.16)	(+/- 1.05)	

Table 2
Field Duplicate Results (Detections Only)
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – April 2016

Parameter	Unit	MW-8A L832453-04	Dup-2 L832453-08	Meets QC Criteria
Total Dissolved Solids	mg/l	1170	1170	Yes
pH	mg/l	6.93	6.88	Yes
Chloride	mg/l	30.2	30.1	Yes
Fluoride	mg/l	0.339	0.339	Yes
Sulfate	mg/l	520	522	Yes
Barium, Total	mg/l	0.0937	0.0924	Yes
Boron, Total	mg/l	2.61	2.67	Yes
Calcium, Total	mg/l	186	182	Yes
Lithium	mg/l	0.0298	0.0298	Yes
Molybdenum, Total	mg/l	0.00584	0.00591	Yes
Arsenic	mg/l	0.0308	0.0299	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.673 (+/- 0.950)	0.127 (+/- 0.911)	Yes

mg/l = milligrams per liter
pCi/l = picoCuries/liter

Memorandum

Date: September 29, 2016

To: Brian Hoye

From: Kalli Travlos

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 2016
Project No. 88777

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 25-26, 2016 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Total Metals[1]	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[2] (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0/9320 (radium-228)

Notes:
[1]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.
[2]The radium samples were sent to ESC; however, these samples were analyzed at Outreach Laboratory of Broken Arrow, Oklahoma which is a division of ESC's network. 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 Data Review* (NFGI) (USEPA, 2014). 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 background parameters for the July 2016 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 all samples was 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 (ºC) ± 2 ºC sample preservation temperature range. Samples tested for radium (Lab number 20160702) were received at ambient temperature.

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:

   - Chromium was detected in the metals method blank for batch 893247 at a low-level concentration below the reporting limit. All of the associated samples were non-detect for chromium, so cross contamination was not a concern. No qualifiers were required.

   - Antimony was detected in the metals method blank for batch WG894088 at a low-level concentration less than its reporting limit. Associated sample BA POND (L849542-07) and DUP-2 (L849542-09) had antimony detections less than five times the method blank detection. The two samples were qualified as undetected (U).

   - Radium-226 (0.019 pCi/L) and radium-228 (0.063 pCi/L) were detected in the method blank in data package 20160702. All of the associated samples had combined radium values greater than five times the combined blank value with the exception of sample BA POND. Because this sample was used for a field duplicate analysis, and the duplicate had a significantly higher combined radium detection, sample BA POND was qualified as estimated (J) rather than undetected (U).

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-4. The following discrepancies regarding those results were noted:

- The MS/MSD results for sulfate were qualified by the lab as "E" to indicate they exceeded the calibration range, thus limiting the analytical assessment of the accuracy and precision for the MS/MSD results. Analytical assessment was completed using other QC tests, and no qualifiers were necessary.

- The MS/MSD RECs for calcium were below the QC limits; however, the amount of spike added to the sample was less than one-fourth of the parent sample concentration. Conclusions could not be drawn regarding the accuracy/precision of the MS/MSD, and no qualifiers were necessary.

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 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 ± 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.

   Two field duplicate pairs were collected for the July 2016 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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-10 // Dup-1: Field duplicate results were adequately replicated.
- BA POND // Dup-2: Field duplicate results were adequately replicated.

10. Detection and Quantitation Limits – Dilutions were noted for sulfate in all of the samples, with the exception of sample MW-4 (L849542-03), to account for high concentrations of target analytes and/or matrix interferences. No qualifiers were added based on dilutions.

11. Case Narrative/ Lab Summary – No other significant problems were noted in the case narratives for these analyses.

12. 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 2016

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 BA Pond DUP-1 (MW-10) DUP-2 (BA POND) MO RIVER MW-1B	L849542-01 L849542-02 L849542-03 L849542-04 L849542-05 L849542-07 L849542-08 L849542-09 L849542-10 L849542-06	pH	J	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).
BA Pond	L849542-07	Combined Radium	J	Method blank detection
BA POND DUP-2	L849542-07 L849542-09	Antimony	U	Method blank detection

J - Qualified as estimated during QC review
U - Compound was not detected

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 2016

Parameter	Unit	MW-10 L849542-05	Dup-1 L849542-08	Meets QC Criteria
Total Dissolved Solids	mg/l	905	903	Yes
pH	mg/l	6.73 J	6.78 J	Yes
Chloride	mg/l	20.4	20.4	Yes
Fluoride	mg/l	0.125	0.1 U	Yes
Sulfate	mg/l	223	217	Yes
Barium	mg/l	0.0875	0.0875	Yes
Boron	mg/l	1.05	1.04	Yes
Calcium	mg/l	218	217	Yes
Lithium	mg/l	0.0549	0.0545	Yes
Arsenic	mg/l	0.00519	0.00536	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.55 (+/- 0.781)	0.52 (+/- 0.917)	Yes

Parameter	Unit	BA POND L849542-07	Dup-2 L849542-09	Meets QC Criteria
Total Dissolved Solids	mg/l	516	522	Yes
pH	mg/l	8.22 J	8.51 J	Yes
Chloride	mg/l	24.4	24.5	Yes
Fluoride	mg/l	0.495	0.502	Yes
Sulfate	mg/l	273	273	Yes
Barium, Total	mg/l	0.265	0.264	Yes
Boron, Total	mg/l	1.78	1.75	Yes
Calcium, Total	mg/l	74.1	73.6	Yes
Lithium	mg/l	0.0219	0.0221	Yes
Molybdenum, Total	mg/l	0.0312	0.0309	Yes
Arsenic	mg/l	0.00254	0.00245	Yes
Antimony	mg/l	0.00219 U	0.00211 U	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.11 J (+/- 0.611)	0.457 (+/- 0.613)	Yes

mg/l = milligrams per liter
pCi/l = picoCuries/liter
U = compound was not detected
J = qualified as estimated during QC review

Memorandum

Date: January 4, 2017

To: Brian Hoye

From: Kalli Travlos

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 – October 2016
Project No. 88777

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 October 25 through 27, 2016 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Total Metals[1]	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[2] (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0/9320 (radium-228)

Notes:
[1]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.
[2]The radium samples were sent to ESC; however, these samples were analyzed at Outreach Laboratory of Broken Arrow, Oklahoma which is a division of ESC's network. 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 Data Review* (NFGI) (USEPA, 2014). 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 background parameters for the October 2016 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 all samples was 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 (ºC) ± 2 ºC sample preservation temperature range. Samples tested for radium (Lab number 20161076) were received at ambient temperature.

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:

   - Chloride was detected in the method blank for batch WG922731 at a low-level concentration below the reporting limit. All of the associated samples were greater than five times the method blank value for chloride, so no qualifiers were required.

   - Antimony was detected in the metals method blank for batch WG922947 at a low-level concentration less than its reporting limit. All of the associated samples were nondetect for the noted analyte, so cross contamination was not a concern and no qualifiers were necessary.

   - Radium-228 (0.236 pCi/L) were detected in the method blank in data package 20161076. All of the associated samples had combined radium values greater than five times the combined blank value with the exception of samples MW-10, BA POND, and DUP-2. Samples BA POND and DUP-2 were a field duplicate pair, and both were qualified as undetected (U) for combined radium. Sample MW-10 was used for a field duplicate analysis, and the duplicate had a significantly higher combined radium detection. Since there was a discrepancy between both the parent sample (MW-10) and its duplicate (DUP-1), both samples were qualified as estimated (J) rather than undetected (U) for combined radium.

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-8A. All site-specific MS/MSD analyses were within their respective QC 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 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 ± 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.

    Two field duplicate pairs were collected for the October 2016 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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-10 // Dup-1: Field duplicate results were adequately replicated.
    - BA POND // Dup-2: Field duplicate results were adequately replicated.

10. Detection and Quantitation Limits – Dilutions were noted for sulfate in all of the samples, with the exception of samples MW-4 and MW-1B (L868992-03 and L868992-06 respectively), to account for high concentrations of target analytes and/or matrix interferences. No qualifiers were added based

on dilutions.

11. Case Narrative/ Lab Summary – It was noted by lab that sample MW-10 (20161076-05) had a date discrepancy between the sample containers, as well as with the COC submitted to Outreach Laboratory. The containers had two different dates (10/25/2016 and 10/26/2016) on the labels, and the COC date was noted by the lab as 10/25/2016. The sample collection date was confirmed from the field log book as 10/26/2016, and no qualifiers were necessary from the data discrepancy.

12. 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 – October 2016

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 MW-1B BA Pond DUP-1 (MW-10) DUP-2 (BA POND) MO RIVER	L868992-01 L868992-02 L868992-03 L868992-04 L868992-05 L868992-06 L868992-07 L868992-08 L868992-09 L868992-10	pH	J	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-10 DUP-1	20161076-05 20161076-08	Combined Radium	J	Method blank detection
BA POND DUP-2	20161076-07 20161076-09	Combined Radium	U	Method blank detection

J - Qualified as estimated during QC review
U - Compound was not detected

Table 2
Field Duplicate Results (Detections Only)
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – October 2016

Parameter	Unit	MW-10 L868992-05	Dup-1 L868992-08	Meets QC Criteria
Total Dissolved Solids	mg/l	911	904	Yes
pH	mg/l	7.02 J	7.38 J	Yes
Chloride	mg/l	18	18	Yes
Fluoride	mg/l	0.111	0.110	Yes
Sulfate	mg/l	228	231	Yes
Barium	mg/l	0.0825	0.0820	Yes
Boron	mg/l	1.04	1.04	Yes
Calcium	mg/l	217	215	Yes
Lithium	mg/l	0.0578	0.0571	Yes
Arsenic	mg/l	0.00351	0.00365	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.524 J +/- 0.628	1.13 J +/- 0.535	Yes

Parameter	Unit	BA POND L868992-07	Dup-2 L868992-09	Meets QC Criteria
Total Dissolved Solids	mg/l	510	507	Yes
pH	mg/l	8.67 J	8.83 J	Yes
Chloride	mg/l	24.4	24.5	Yes
Fluoride	mg/l	0.503	0.519	Yes
Sulfate	mg/l	281	277	Yes
Barium, Total	mg/l	0.150	0.176	Yes
Boron, Total	mg/l	1.65	1.65	Yes
Calcium, Total	mg/l	78	83.9	Yes
Lithium	mg/l	0.0197	0.0215	Yes
Molybdenum, Total	mg/l	0.0337	0.0314	Yes
Arsenic	mg/l	0.00205	0.00213	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.192 U +/- 0.497	0.087 U +/- 0.606	Yes

mg/l = milligrams per liter
pCi/l = picoCuries/liter

U = compound was not detected

J = qualified as estimated during QC review

Memorandum

Date: February 27, 2017

To: Brian Hoye

From: Kalli Travlos

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 – January 2017
Project No. 88777

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 January 23 through 24 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Total Metals[1]	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[2] (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0/9320 (radium-228)

Notes:
[1]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.
[2]The radium samples were sent to ESC; however, these samples were analyzed at Outreach Laboratory of Broken Arrow, Oklahoma, which is a division of ESC's network. 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 Data Review* (NFGI) (USEPA, 2014). 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, except for the following:

    - Outreach Laboratory noted the container for sample MW-10 (20170052-05) did not have a collection time, so the reported time was taken from the COC.

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate background parameters for the January 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 all samples was 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 (ºC) ± 2 ºC sample preservation temperature range. Samples tested for radium (Lab number 20170052) were received at ambient temperature.

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:

    - Chromium was detected in the method blank for batch WG947085 at a low-level concentration below the reporting limit. All of the associated samples were either greater than five times the method blank value or were nondetect for chromium, so no qualifiers were required.

    - Radium-228 (0.176 pCi/L) was detected in the method blank in data package 20170052. All of the associated samples had combined radium values greater than five times the combined blank value with the exception of samples MW-4 and BA POND. Both samples were qualified as nondetect (U) for combined radium.

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-8A. All site-specific MS/MSD analyses were within their respective QC limits, except for the following:

- Sample MO RIVER had a high MS REC for sulfate. The sulfate result for this sample was qualified as estimated for potential high bias (J+)

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 ± 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.

   Two field duplicate pairs were collected for the January 2017 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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-1B // Dup-1: Field duplicate results were adequately replicated.
   - BA POND // Dup-2: Field duplicate results were adequately replicated.

10. Detection and Quantitation Limits – Dilutions were noted for sulfate in all of the samples, with the exception of sample DUP-1 (L886084-08), to account for high concentrations of target analytes and/or matrix interferences. 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 – January 2017

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 MW-1B BA Pond DUP-1 (MW-1B) DUP-2 (BA POND) MO RIVER	L886084-01 L886084-02 L886084-03 L886084-04 L886084-05 L886084-06 L886084-07 L886084-08 L886084-09 L886084-10	pH	J	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).
MO RIVER	L886084-10	Sulfate	J+	MS REC > QC Limits
MW-4 BA POND	20170052-03 20170052-07	Combined Radium	U*	Method blank detection

MS - matrix spike
REC - percent recovery
QC - quality control
J - Qualified as estimated during QC review
J+ - Qualified as estimated for potential high bias during QC review
U - Qualified as not detected during QC review

Table 2
Field Duplicate Results (Detections Only)
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – January 2017

Parameter	Unit	MW-1B L886084-06	Dup-1 L886084-08	Meets QC Criteria
Total Dissolved Solids	mg/l	568	581	Yes
pH	mg/l	6.63 J	6.69 J	Yes
Chloride	mg/l	14	13.9	Yes
Fluoride	mg/l	0.193	0.200	Yes
Sulfate	mg/l	34.7	37.9	Yes
Barium	mg/l	0.232	0.230	Yes
Calcium	mg/l	168	168	Yes
Lithium	mg/l	0.0182	0.0175	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.439 +/- 0.605	0.443 +/- 0.639	Yes

Parameter	Unit	BA POND L886084-07	Dup-2 L886084-09	Meets QC Criteria
Total Dissolved Solids	mg/l	652	659	Yes
pH	mg/l	7.96 J	8.01 J	Yes
Chloride	mg/l	26.1	25.4	Yes
Fluoride	mg/l	0.542	0.603	Yes
Sulfate	mg/l	303	304	Yes
Barium, Total	mg/l	0.223	0.225	Yes
Boron, Total	mg/l	1.59	1.59	Yes
Calcium, Total	mg/l	121	120	Yes
Lithium	mg/l	0.0218	0.0221	Yes
Molybdenum, Total	mg/l	0.0412	0.0408	Yes
Antimony	mg/l	0.00302	0.0021	Yes
Arsenic	mg/l	0.00497	0.00426	Yes
Selenium	mg/l	0.002 U	0.00205	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.297 +/- 0.578	0.364 +/- 0.674	Yes

mg/l = milligrams per liter
pCi/l = picoCuries/liter
QC = quality control
U = compound was not detected
J = qualified as estimated during QC review

Memorandum

Date: June 6, 2017

To: Brian Hoye

From: Kalli Travlos

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 – April 2017
Project No. 88777

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 April 24 through 25, 2017 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Total Metals[1]	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[2] (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0/9320 (radium-228)

Notes:
[1]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.
[2]The radium samples were sent to ESC; however, these samples were analyzed at Outreach Laboratory of Broken Arrow, Oklahoma, which is a division of ESC's network. 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 Data Review* (NFGI) (USEPA, 2014). 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, except for the following:

    - Outreach Laboratory noted that the collection times for MW-1B and BA POND differed between the sample containers and the COC. The lab used the times indicated on the COC for reporting the sample results, which were the accurate times of collection. No further review or qualifiers were necessary for these discrepancies.

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate background parameters for the April 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 all samples was 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 (ºC) ± 2 ºC sample preservation temperature range. Samples tested for radium (Lab number 20170354) were received at ambient temperature.

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:

    - Sulfate was detected in the method blank for batch WG975159 at a low-level concentration below the reporting limit. All of the associated samples were greater than five times the method blank for sulfate, so no qualifiers were required.

    - Lead was detected in the method blank for batch WG974750 at a low-level concentration below the reporting limit. All of the associated samples were either greater than five times the method blank value or were nondetect for lead, so no qualifiers were required.

    - Radium-228 (0.851 pCi/L) was detected in the method blank for batch R3960. Additionally, radium-226 (0.038 pCi/L) was detected in the method blank for batch R1226. Because all 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 this high radium-228 method blank detection, and because these data will be used for statistical analyses, the samples were qualified as follows:

        - MW-2A, MW-3, MW-8A, MW-10, MW-1B, BA POND, DUP-1, and DUP-2: With the exception of MW-2A and BA Pond, these samples all exhibited detections of radium-228 which were included in the combined radium result. 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. While For MW-2A and BA POND did not yield radium-228 detections, they were field duplicates and qualified based on their corresponding field duplicate result.

- MW-4 and MO RIVER: These two samples were not qualified because their radium-226 and radium-228 results were either nondetect or greater than five times the respective blank value.

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-4. All site-specific MS/MSD analyses were within their respective QC limits, except for the following:

   - Sample MW-4 had low MS/MSD RECs for calcium; however, the amount of the target analyte used for the spike was less than four times the parent sample concentration. No conclusion could be drawn from this MS/MSD analysis, and no qualification was necessary.

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 ± 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.

Two field duplicate pairs were collected for the April 2017 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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.

- BA POND // Dup-1: TDS had an elevated RPD, and were qualified as estimated (J) for both samples. All other field duplicate results were adequately replicated.
- MW-2A // Dup-2: Combined radium for these two samples had a relative error ratio greater than 1.96, and were qualified as estimated (J) for both samples. All other field duplicate results were adequately replicated.

10. Detection and Quantitation Limits – Dilutions were noted for sulfate in all of the samples, with the exception of the following samples, to account for high concentrations of target analytes and/or matrix interferences: MW-2A, MW-1B, and DUP-2. 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 – April 2017

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 MW-1B BA Pond DUP-1 (BA POND) DUP-2 (MW-2A) MO RIVER	L905439-01 L905439-02 L905439-03 L905439-04 L905439-05 L905439-07 L905439-08 L905439-09 L905439-10 L905439-11	pH	J	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-2A MW-3 MW-8A MW-10 MW-1B BA Pond DUP-1 (BA POND) DUP-2 (MW-2A)	20170354-01 20170354-02 20170354-04 20170354-05 20170354-06 20170354-07 20170354-08 20170354-09	Combined Radium	J	Method blank detections for radium-226 and/or radium-228 (see text)
BA POND DUP-1	L905439-08 L905439-09	Total Dissolved Solids	J	Field duplicate RPD > QC Limits
MW-2A DUP-2	20170354-01 20170354-08	Combined Radium	J	Field duplicate relative error ratio > QC Limits

RPD - relative percent difference
QC - quality control
J - Qualified as estimated during QC review
R - 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 – April 2017

Parameter	Unit	BA POND L905439-08	Dup-1 L905439-09	Meets QC Criteria
Total Dissolved Solids	mg/l	702 J	7150 J	No
pH	mg/l	8.55 J	8.57 J	Yes
Chloride	mg/l	29.5	29.7	Yes
Fluoride	mg/l	0.588	0.611	Yes
Sulfate	mg/l	388	380	Yes
Barium	mg/l	0.146	0.145	Yes
Boron	mg/l	1.81	1.820	Yes
Calcium	mg/l	126	125	Yes
Lithium	mg/l	0.0314	0.0291	Yes
Molybdenum	mg/l	0.0529	0.0523	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.023 J +/- 0.704	0.165 J +/- 0.675	Yes

Parameter	Unit	MW-2A L905439-01	Dup-2 L905439-10	Meets QC Criteria
Total Dissolved Solids	mg/l	508	478	Yes
pH	mg/l	7.0 J	7.02 J	Yes
Chloride	mg/l	9.83	9.88	Yes
Fluoride	mg/l	0.181	0.191	Yes
Sulfate	mg/l	81.6	82.5	Yes
Barium, Total	mg/l	0.080	0.0796	Yes
Calcium, Total	mg/l	128	130	Yes
Lithium	mg/l	0.0305	0.0305	Yes
Arsenic	mg/l	0.00381	0.00326	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.214 J +/- 0.880	0.597 J +/- 0.589	No

mg/l = milligrams per liter
pCi/l = picoCuries/liter
QC = quality control
U = compound was not detected
J = qualified as estimated during QC review

Memorandum

Date: January 2, 2018

To: Brian Hoye

From: Kalli Travlos

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 2017
Project No. 88777

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 25 through 26, 2017 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Total Metals[1]	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

Notes:
[1]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.

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 collection date for sample MO RIVER was inadvertently reported as 7/25/17, while the COC correctly noted the collection date as 7/26/17. No further review nor qualifiers were necessary for this discrepancy.

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 all samples was 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 (ºC) ± 2 ºC 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:

   - Chloride and sulfate was detected in the method blank for batch WG1003767 at low-level concentrations below the reporting limits. All of the associated samples were greater than five times the method blank both analytes, so no qualifiers were required.

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-4. All site-specific MS/MSD analyses were within their respective QC limits, except for the following:

   - Sample MW-4 had low MS/MSD RECs for calcium; however, the amount of the target analyte used for the spike was less than four times the parent sample concentration. No conclusion could be drawn from this MS/MSD analysis, and no qualification was necessary.

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 ± 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.

    Two field duplicate pairs were collected for the July 2017 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.
    - BA POND // Dup-2: All field duplicate results were adequately replicated.

10. Detection and Quantitation Limits – Dilutions were noted for sulfate in all of the samples, with the exception of the following samples, to account for high concentrations of target analytes and/or matrix interferences: MW-2A, MW-1B, and DUP-1. Additionally, a dilution was noted for chloride in sample MW-1B to account for high concentrations of the target analyte. 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 2017

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 MW-1B BA Pond DUP-1 (MW-2A) DUP-2 (BA POND) MO RIVER	L925244-01 L925244-02 L925244-03 L925244-04 L925244-05 L925244-07 L925244-08 L925244-09 L925244-10 L925244-11	pH	J	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).

QC - quality control
J - Qualified as estimated during QC review
R - 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 2017

Parameter	Unit	MW-2A L925244-01	Dup-1 L925244-09	Meets QC Criteria
Total Dissolved Solids	mg/l	512	506	Yes
pH	su	6.94 J	7.01 J	Yes
Chloride	mg/l	9.67	9.67	Yes
Fluoride	mg/l	0.189	0.192	Yes
Sulfate	mg/l	74.6	74.7	Yes
Barium, Total	mg/l	0.111	0.111	Yes
Calcium, Total	mg/l	138	140	Yes
Lithium	mg/l	0.0206	0.0221	Yes
Arsenic	mg/l	0.00578	0.00553	Yes

Parameter	Unit	BA POND L925244-08	Dup-2 L925244-10	Meets QC Criteria
Total Dissolved Solids	mg/l	660	699	Yes
pH	su	8.82 J	8.76 J	Yes
Chloride	mg/l	31.4	31.4	Yes
Fluoride	mg/l	0.628	0.624	Yes
Sulfate	mg/l	422	425	Yes
Barium	mg/l	0.269	0.269	Yes
Boron	mg/l	2.03	2.01	Yes
Calcium	mg/l	103	104	Yes
Lithium	mg/l	0.0202	0.0187	Yes
Molybdenum	mg/l	0.0402	0.0405	Yes
Arsenic	mg/l	0.003	0.00303	Yes

mg/l = milligrams per liter
pCi/l = picoCuries/liter
QC = quality control
J = qualified as estimated during QC review
su = standard unit

Memorandum

Date: December 27, 2017

To: Brian Hoye

From: Kalli Travlos

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 – September 2017
Project No. 88777

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 September 14, 2017 and submitted to ESC Lab Sciences of Mount Juliet, Tennessee (ESC) for analysis by one or more of the following methods:

Parameters	Analytical Method
Total Metals[1]	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[2] (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0/9320 (radium-228)

Notes:
[1]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.
[2]The radium samples were sent to ESC; however, these samples were analyzed at Outreach Laboratory of Broken Arrow, Oklahoma, which is a division of ESC's network. 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, except for the following:

    - Outreach Laboratory inadvertently reported the collection time for MW-1B as 1116, while the accurate time of collection was 1110, as indicated on the COC. No further review or qualifiers were necessary for this discrepancy.

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate background parameters for the September 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 all samples was 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 below the recommended 4 degrees Celsius (ºC) ± 2 ºC sample preservation temperature range. Since none of the samples were frozen, results are considered viable and no qualifiers were necessary. Samples tested for radium (Sample Delivery Group [SDG] 20170864) were received at ambient temperature.

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:

    - Radium-226 (0.114 pCi/L) was detected in the in batch R1283, as well as at 0.006 pCi/L in batch R1285. Additionally, radium-228 (0.080 pCi/L) was detected in the method blank for batch R4009. Since several of the associated samples had combined radium values less than five times the combined blank value, the data were 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. Rather than qualifying all samples nondetect (U) based on these radium-228 method blank detections, as these data will be used for statistical analyses, the samples were qualified as follows:

        - Samples MW-2A, MW-3, MW-4, MW-8A, and MW-10 had radium-226 detections less than five times their associated blank value. Of those, MW-3 and MW-4 also had combined radium results less than five times the associated combined blank result. Because combined radium has historically been detected in these wells, they were qualified as estimated (J) based on professional judgment. Sample DUP-1 was also qualified as estimated (J) due to the qualification of its parent sample, MW-2A.

        - Sample BA POND had a combined radium result less than five times the associated combined blank result; however, the radium-226 result was greater than the blank result, while the radium-228 result was nondetect. Since the combined result was based solely on radium-226, this sample was not qualified.

- MW-1B and MO RIVER: These two samples were not qualified because their radium-226 and radium-228 results were either nondetect or greater than five times the respective blank value.

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-4. All site-specific MS/MSD analyses were within their respective QC limits, except for the following:

   - Sample MW-4 had low MSD REC for fluoride. This result was qualified as estimated for potential low bias (J-). Additionally, this sample had a low MSD REC for calcium; however, the amount of the target analyte used for the spike was less than four times the parent sample concentration. No conclusion could be drawn from this MS/MSD analysis, and no qualification was necessary.

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, except for the following:

   - ESC flagged the laboratory duplicate fluoride result for sample MW-4 for an RPD exceedance. However, since the results were less than five times the reporting limit, a sensitivity test was more appropriate. The results passed the sensitivity test, and no qualifiers were necessary.

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 ± 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 for the September 2017 sampling event. Table 2 presents the side-by-side comparison of the field duplicate results. 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 all the samples, except for the following samples, to account for high concentrations of target analytes and/or matrix interferences: MW-2A and MW-1B. 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 – September 2017

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 MW-1B BA Pond DUP-1 (MW-2A) MO RIVER	L936894-01 L936894-02 L936894-03 L936894-04 L936894-05 L936894-06 L936894-07 L936894-08 L936894-09	pH	J	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-2A MW-3 MW-4A MW-8A MW-10 DUP-1 (MW-2A)	20170864-01 20170864-02 20170864-03 20170864-06 20170864-07 20170354-10	Combined Radium	J	Method blank detections for radium-226 and/or radium-228 (see text)
MW-4	L936894-03	Fluoride	J-	MSD REC < QC Limits

MSD = matrix spike duplicate
REC = percent recovery
QC = quality control
J = qualified as estimated
J- = qualified as estimated potential low bias
R = 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 – September 2017

Parameter	Unit	MW-2A L936894-01	Dup-1 L936894-08	Meets QC Criteria
Total Dissolved Solids	mg/l	571	568	Yes
pH	su	6.91 J	6.99 J	Yes
Chloride	mg/l	6.26	6.33	Yes
Fluoride	mg/l	0.186	0.181	Yes
Sulfate	mg/l	89	89.6	Yes
Barium	mg/l	0.116	0.115	Yes
Calcium	mg/l	155	155	Yes
Lithium	mg/l	0.0294	0.0298	Yes
Arsenic	mg/l	0.00487	0.00487	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	1.31 J +/- 0.706	1.10 J +/- 0.725	Yes

mg/l = milligrams per liter
pCi/l = picoCuries/liter
QC = quality control
J = qualified as estimated during QC review
su = standard unit

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