2018 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
1/31/2019

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prepared for

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Nearman Creek Power Station

Kansas City, Kansas

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prepared by

Burns & McDonnell Engineering Company, Inc.
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LIST OF ABBREVIATIONS

Abbreviation	**Term/Phrase/Name**
ASD	Alternate Source Demonstration
BA Pond	Bottom Ash Pond
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
EC	electrical conductivity
Groundwater Monitoring Program	*Groundwater Monitoring Plan for the Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2016a)
GWPS	groundwater protection standard
HPT	hydraulic profiling tool
mg/L	Milligrams per liter
NCPS	Nearman Creek Power Station
Pace	Pace Analytical Laboratory
Report	Annual Groundwater Monitoring and Corrective Action Report
SAP	*Sampling and Analysis Plan for the Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2016b)
Site	Nearman Creek Power Station
SSI	statistically significant increase
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

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

- Statistical evaluation of groundwater data for samples collected from 2015 through 2018.
- Initiation of an assessment monitoring program per §257.95.
- Establishing groundwater protection standards (GWPSs) for those Appendix IV parameters detected during the assessment monitoring program being implemented at the BA Pond.
- Completing a hydraulic profiling tool (HPT) / electrical conductivity (EC) investigation to assess subsurface lithology at locations down-gradient of the pond followed by the installation and sampling of three new groundwater monitoring wells to delineate the extent of arsenic above GWPS at Monitoring Wells MW-8A and MW-10.
- Completing a successful Alternate Source Demonstration (ASD) for arsenic which included:
    - Collection of direct-push groundwater samples for dissolved-arsenic to support the placement of permanent wells.
    - Installation of an additional Monitoring Well at a location upgradient from the BA Pond.

  - Statistical evaluation of groundwater samples collected in November 2018 for analysis of arsenic.

1.1 Purpose and Scope

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

1.2 Overview

This Report is organized in sections as summarized below:

- **Section 1.0 Introduction**
- **Section 2.0 Groundwater Monitoring Activities and Results–** Section 2.0 presents a narrative of the background, detection, and assessment monitoring activities that have been performed during the reporting period. Groundwater monitoring results are also included in this section.
- **Section 3.0 Statistical Analysis –** Section 3.0 discusses statistical analyses of data generated during the reporting period.
- **Section 4.0 Certifications and Notifications to the Operating Record –** Section 4.0 lists certifications and notifications that were prepared during the reporting period and placed in the operating record.
- **Section 5.0 – Key Activities for the Upcoming Year** – Section 5.0 presents an account of anticipated activities for 2019.
- **Section 6.0 References -** Section 6.0 includes a full bibliography for references made within this report.

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

2.0 GROUNDWATER MONITORING ACTIVITIES AND RESULTS

2.1 Description of the Groundwater Monitoring Program

On January 1, 2018, the BA Pond was in detection monitoring. At that time a total of 9 background monitoring events had 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. These events were reported on in the *2017 Annual Groundwater Monitoring and Corrective Action Study Report* (Burns & McDonnell, 2018a). In January 2018, Burns & McDonnell completed the statistical evaluation of the Appendix III background data set in accordance with the *Selection of Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2017). This assessment identified statistically significant increases (SSIs) in the concentrations of the following parameters in one or more down-gradient monitoring wells:

- Boron (MW-8A and MW-10),
- Chloride (MW-8A and MW-10),
- Dissolved solids (MW-8A and MW-10),
- Fluoride (MW-8A), and
- Sulfate (MW-8A and MW-10).

The results of the Sanitas™ statistical output for this evaluation was placed in the Facility Operating Record and in a letter titled *Statistical Assessment of Groundwater Monitoring Data* (Burns & McDonnell, 2018b).

Per 40 CFR §257.94(e), BPU initiated an assessment monitoring program in March 2018 in response to the findings that an SSI had been observed in groundwater monitoring data collected as part of the detection monitoring program implemented at the BA Pond.

A total of 4 groundwater monitoring events were conducted at the BA Pond during 2018. The following bullets present a summary of the timing of each of the groundwater sampling events that were performed and presents the analytes that were sampled and gives rational for each sampling event. Sampling was performed in accordance with the Groundwater Monitoring Program. Once the assessment monitoring program was initiated, there were no transitions between assessment and detection groundwater monitoring programs during the reporting period.

- March 2018 –.Groundwater samples were collected from Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, and MW-10 for the complete list of Appendix IV parameters per the requirements of 40 CFR §257.95(b).
- June 2018 – Within 90 days of completing the March 2018 sampling event, Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, and MW-10 were sampled for the complete list of Appendix III parameters and those Appendix IV parameters that were detected during the March 2018 sampling event (herein after referred to as the "reduced list of Appendix IV parameters"). The results of this sampling event were statistically evaluated and compared to background concentrations that were developed using the statistical methods included in the September 13, 2018 *Update to Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ask Pond* (Burns & McDonnell, 2018c). The results of this evaluation, which is summarized in the September 13, 2018 *Comparison of June 2018 Assessment Data to Groundwater Protection Standards* (Burns & McDonnell, 2018d), indicated that arsenic was detected in monitoring wells MW-10 and MW-8A at concentrations above its GWPS of 0.010 milligrams per liter (mg/L).
- October 2018 – Following the completion of a HPT / EC survey discussed in Section 2.3, three monitoring wells, MW-13, MW-14, and MW-15 were installed at the locations presented on Figure 2-1 to aid in the delineation of arsenic above the GWPS. Once installed and developed, these wells and Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, and MW-10 were sampled for Appendix III parameters and the reduced list of Appendix IV parameters. Upon reviewing the results of groundwater samples collected from MW-13, MW-14, and MW-15, it was determined that an alternate source demonstration was warranted as arsenic was observed at MW-13, a location hydraulically up- or side-gradient to wells MW-8A and MW-10. The *Alternate Source Demonstration Report* (Burns & McDonnell, 2018e) documenting the alternate source demonstration (ASD) assessment and the results of groundwater sampling performed in late October and November is presented in Appendix A.
- November 2018 – As part of the ASD, Monitoring Well MW-16 was installed at the location presented on Figure 2-1. All of the wells presented on Figure 2-1 were sampled again in November 2018 in support of the ASD.

2.2 Groundwater Sampling Activities

During each sampling event identified above, the depth to groundwater was gauged prior to sampling using a decontaminated water level meter. The measured depth to groundwater and calculated water level elevations for each event as well as the direct push sampling event discussed below in Section 2.4 are presented on Tables 2-1 through 2-5. Once gauged, the wells were purged using low-flow sampling pumps until stabilization criteria had been met and the turbidity was below 5 Nephelometric Turbidity Units. Once stabilized, the BA Pond monitoring wells were sampled for the parameters presented in Section 2.1 using the analytical methods presented on Table 2-6. Samples were maintained in accordance with the SAP included in the Groundwater Monitoring Program and were provided to Pace Analytical Laboratory (Pace) for analysis. No issues were encountered during the sampling events performed at the BA Pond in 2018. Monitoring well sampling forms for each of the groundwater monitoring events are presented in Appendix B. While analytical data are summarized in Table 2-6, copies of laboratory analytical data packages are included in Appendix C. All laboratory data was validated by Burns & McDonnell chemists in accordance with the SAP. Copies of data validation reports are provided in Appendix C and all data are considered suitable for reporting as qualified.

As presented on Figures 2-2 through 2-6, the primary groundwater gradients observed during the reporting period were predominantly to the northwest.

2.3 HPT/EC Investigation

To support the identification of the locations and screen intervals of monitoring wells MW-13, MW-14, and MW-15, an HPT/EC survey was performed to assess the hydraulic conductivity and homogeneity of the unconsolidated aquifer. By assessing the subsurface lithology, BPU and Burns & McDonnell were able to increase the level of confidence that MW-13, MW-14, and MW-15 were screened within unconsolidated units that are in hydraulic connection with the rest of the BA Pond well network. When conducting this investigation, an HPT/EC probe was attached to the front of a direct-push stem which was then advanced to refusal at the locations presented on Figure 2-7. Refusal was encountered at depths ranging from approximately 95 to 172 feet below ground surface (bgs). The HPT/EC probe operates by passing an electrical charge through the subsurface material to measure the unconsolidated matrices' electrical conductivity as the probe is advanced. While this is occurring, a small amount of deionized water is injected through a screened injection port located on the side of the probe. As water is injected the pressure of the water line is monitored. These changes in electrical conductivity and hydraulic pressure are recorded with depth and are indicative of changes in formation type (clay, sand, or silt) and the relative hydraulic conductivity of the subsurface. The HPT/EC logs included in Appendix D indicate interbedded sands and silts are commonly present across the survey area from ground surface to depths of approximately 30 to 40 feet bgs at which point there is a transition to a more consistent sand unit that was present down to bedrock. While there is some localized variability within the subsurface, the HPT/EC survey did not identify features that were anticipated to prevent the migration of groundwater from the BA Pond to MW-13, MW-14, or MW-15.

2.4 Direct-Push Groundwater Sampling Activities

In October 2018, eight direct push groundwater sampling probes were advanced in general proximity to the BA Pond to assess the range of naturally occurring arsenic concentrations within the unconsolidated aquifer and aid in the placement of one or more permanent monitoring wells for sampling via low-flow sampling techniques. Direct push boring locations are presented in Figure 2-8. Prior to collecting direct-push groundwater samples, soils were sampled using dual-tube sampling techniques and logged by a Geologist to assess the soil characteristics and to identify groundwater sampling horizons at each location. Groundwater samples were then collected by advancing a direct push rod equipped with a drop-screen sampling device to depths between 20 and 30 feet bgs. A groundwater sample was collected at each direct push boring location using an inertia pump. Samples were field-filtered and submitted to Pace for the analysis of dissolved arsenic under standard chain of custody procedures. The resulting boreholes were abandoned by backfilling with bentonite chips to 1.0 ft bgs. The remainder of the borehole was allowed to collapse or was filled with material matching the surrounding grade. Direct push boring logs are provided in Appendix B. The BA Pond well network was also gauged in conjunction with the direct-push event and the resulting potentiometric surface is presented on Figure 2-5.

Table 2-7 presents the results of the October 2018 direct push sampling event. As presented on Table 2-7 dissolved arsenic was detected at a concentration above the GWPS in samples collected from DPGW-1 and DPGW-5.

2.5 Well Installation Activities

To aid in the delineation of the GWPS exceedances and in support of the ASD described in Section 2.1, four new monitoring wells (MW-13, MW-14, MW-15, and MW-16) were installed in 2018 to supplement the existing monitoring well network. While Monitoring Wells MW-13, MW-14, and MW-15 were installed to provide down- and side-gradient monitoring locations for the purpose of delineating GWPS exceedances identified during the June 2018 sampling event, monitoring well MW-16 was installed at a location upgradient of the BA Pond. The location of MW-16 was selected to provide an additional upgradient monitoring location that was likely to provide data indicative of the full variability of naturally occurring arsenic concentrations at locations up-gradient of and near the BA Pond.

Drilling and well installation activities for Monitoring Wells MW-13, MW-14, MW-15, and MW-16 were conducted by Razek Environmental, LLC, a Kansas-licensed water well contractor, using the procedures presented in the SAP. These wells were screened below the top of the uppermost water bearing unit, consistent with the well construction of MW-2A, MW-3, MW-4, MW-8A, and MW-10. All drilling, sampling and investigation equipment was decontaminated prior to beginning field activities, between boring/well locations, and upon completion of well installation activities.

As presented in Appendix B, Monitoring Wells MW-13, MW-14, MW-15, and MW-16 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 2 feet above the top of the screen. The remaining annulus was then filled to within approximately 3 feet bgs with bentonite chips that were hydrated in 1-foot lifts or bentonite grout. The remainder of the borehole was filled with Portland cement and completed at the surface with 4 to 6-inch thick well pads. Monitoring wells were finished with a lockable, stick-up completions and four concrete-filled bollards were installed around each monitoring well. Appendix B includes drilling logs and well construction diagrams for Monitoring Wells MW-13, MW-14, MW-15, and MW-16.

2.6 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 B.

2.7 Well Surveying

The new groundwater monitoring wells were surveyed for both vertical and horizontal control by Atlas Surveyors, 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. The surveyed location of MW-13, MW-14, MW-15, and MW-16 is presented on Figure 2-1.

3.0 STATISTICAL ANALYSIS

In accordance with 40 CFR §257.93(h)(2), statistical analysis of the background groundwater quality data collected from October 2015 through October 17, 2017 was completed by January 15, 2018, within 90 days following analysis of the samples collected during the final background sampling event.

4.0 CERTIFICATIONS AND NOTIFICATIONS TO THE OPERATING RECORD

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

- Statistical Assessment of Background Monitoring Data – *Statistical Assessment of Groundwater Monitoring Data* (Burns & McDonnell, 2018b)
- Notification of Assessment Monitoring Program – *Notification of the Establishment of Assessment Monitoring Program at the Bottom Ash Pond* (Burns & McDonnell, 2018c)
- Update of Statistical Method - *Update to Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ash Pond* (Burns & McDonnell, 2018c)
- Groundwater Protection Standards
  - *Comparison of June 2018 Assessment Data to Groundwater Protection Standards* (Burns & McDonnell, 2018d)
  - *Notification Regarding Groundwater Protection Standards* (Burns & McDonnell, 2018f)
- Alternate Source Demonstration
  - *Assessment Monitoring Notification – Alternate Source Demonstration* (Burns & McDonnell, 2018h)
  - *Alternate Source Demonstration Report* (Burns & McDonnell, 2018f)

5.0 KEY ACTIVITIES FOR THE UPCOMING YEAR

Groundwater monitoring and statistical assessments are expected to be performed in 2019 as required by the BA Pond assessment monitoring program. BPU plans to evaluate the existing BA Pond groundwater monitoring network in 2019, based on activities conducted in 2018. Additionally, BPU plans to initiate closure of the BA Pond by removal of CCR in 2019.

6.0 REFERENCES

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

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

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

Burns & McDonnell, 2018a. *2018 Annual Groundwater Monitoring and Corrective Action Report for the Nearman Creek Power Station Bottom Ash Pond.* January 31.

Burns & McDonnell, 2018b. *Statistical Assessment of Groundwater Monitoring Data.* January 15.

Burns & McDonnell, 2018c. *Update to Statistical Method for Evaluating Groundwater at Kansas City Board of Public Utilities Nearman Creek Power Station Bottom Ask Pond.* September 13.

Burns & McDonnell, 2018d. *Comparison of June 2018 Assessment Data to Groundwater Protection Standards*. September 13.

Burns & McDonnell, 2018e . *Alternate Source Demonstration Report.* December 12.

Burns & McDonnell, 2018f. 2018 *Notification of the Establishment of Assessment Monitoring Program at the Bottom Ash Pond.* April 13.

Burns & McDonnell, 2018g. *Notification Regarding Groundwater Protection Standards.* October 13.

Burns & McDonnell, 2018h. *Assessment Monitoring Notification – Alternate Source Demonstration.* October 13.

United States Environmental Protection Agency (USEPA), 2015, *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, 40 CFR Parts 257 and 261, Federal Register, Vol. 80, No. 74, April 17, http://www.gpo.gov/fdsys/pkg/FR-2015-04-17/pdf/2015-00257.pdf.

USEPA, 2018. *Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Amendments to the National Minimum Criteria (Phase One, Part One).* 40 CFR Part 257, Federal Registrar, Vol. 83, No. 146, July 30. https://www.federalregister.gov/documents/2018/07/30/2018-16262/hazardous-and-solid-waste-management-system-disposal-of-coal-combustion-residuals-from-electric-utilities

TABLES

Table 2-1
Monitoring Well Gauging Data - March 8, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	Top of Casing Elevation (ft MSL)[1]	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	3/8/2018	747.86	31.68	NM	24.88	722.98
MW-3	3/8/2018	750.48	34.7	NM	27.44	723.04
MW-4	3/8/2018	746.99	31.75	NM	24.34	722.65
MW-8A	3/8/2018	750.12	35.17	NM	28.25	721.87
MW-10	3/8/2018	745.30	29.5	NM	22.65	722.65

Notes:

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

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level

NM - Not Measured

Table 2-2
Monitoring Well Gauging Data - May 29, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	Top of Casing Elevation (ft MSL)[1]	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	5/29/2018	747.86	31.68	NM	20.21	727.65
MW-3	5/29/2018	750.48	34.7	NM	22.76	727.72
MW-4	5/29/2018	746.99	31.75	NM	19.47	727.52
MW-8A	5/29/2018	750.12	35.17	NM	23.21	726.91
MW-10	5/29/2018	745.30	29.5	NM	18.07	727.23

Notes:

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

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level

NM - Not Measured

Table 2-3
Monitoring Well Gauging Data - October 1, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	Top of Casing Elevation (ft MSL)[1]	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	10/1/2018	747.86	31.68	NM	14.32	733.54
MW-3	10/1/2018	750.48	34.7	NM	17.26	733.22
MW-4	10/1/2018	746.99	31.75	NM	14.03	732.96
MW-8A	10/1/2018	750.12	35.17	NM	17.12	733.00
MW-10	10/1/2018	745.30	29.5	NM	11.92	733.38
MW-13	10/1/2018	747.81	33.48	NM	12.25	735.56
MW-14	10/1/2018	749.18	33.27	NM	15.65	733.53
MW-15	10/1/2018	752.88	32.7	NM	15.33	737.55

Notes:

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

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level

NM - Not Measured

Table 2-4
Monitoring Well Gauging Data - October 31, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	Top of Casing Elevation (ft MSL)[1]	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	10/31/2018	747.86	31.68	NM	14.26	733.60
MW-3	10/31/2018	750.48	34.7	NM	16.55	733.93
MW-4	10/31/2018	746.99	31.75	NM	13.05	733.94
MW-8A	10/31/2018	750.12	35.17	NM	17.40	732.72
MW-10	10/31/2018	745.30	29.5	NM	12.20	733.10
MW-13	10/31/2018	747.81	33.48	NM	12.51	735.30
MW-14	10/31/2018	749.18	33.27	NM	20.05	729.13
MW-15	10/31/2018	752.88	32.7	NM	16.86	736.02

Notes:

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

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level

NM - Not Measured

Table 2-5
Monitoring Well Gauging Data - November 19, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	Top of Casing Elevation (ft MSL)[1]	Total Depth Constructed (ft bTOC)	Measured Total Depth (ft bTOC)	Measured Water Level (ft bTOC)	Elevation of Water Level (ft MSL)
MW-2A	11/19/2018	747.86	31.68	NM	15.35	732.51
MW-3	11/19/2018	750.48	34.7	NM	17.63	732.85
MW-4	11/19/2018	746.99	31.75	NM	14.17	732.82
MW-8A	11/19/2018	750.12	35.17	NM	18.58	731.54
MW-10	11/19/2018	745.30	29.5	NM	13.27	732.03
MW-13	11/19/2018	747.81	33.48	NM	13.64	734.17
MW-14	11/19/2018	749.18	33.27	NM	20.15	729.03
MW-15	11/19/2018	752.88	32.7	NM	18.41	734.47
MW-16	11/19/2018	748.43	32.51	NM	14.89	733.54

Notes:

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

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level

NM - Not Measured

Table 2-6
Summary of Analytical Results
October 2015 through November 2018 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-3
					Sample Date	10/29/2015	1/27/2016	4/27/2016	7/25/2016	10/25/2016	1/24/2017	4/24/2017	7/25/2017	9/14/2017	3/8/2018
Analytical Method	**Analyte**	**Unit**	**Calculated Background Limit[1]**	**GWPS[2]**	**ASD Background Limit[3]**										
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	0.272	--	--	0.218	0.219	0.244	0.272	0.24	0.208	0.2 U	0.218	0.226	NS
6010B	Calcium	mg/l	240.5	--	--	194	199	201	235	218	212	191	218	195	NS
9056MOD	Chloride	mg/l	14.14	--	--	4.45	4.65	4.64	4.37	5.23	5.88	7.83	6.69	5.63	NS
9056MOD	Fluoride	mg/l	0.2144	--	--	0.158	0.125	0.139	0.1 U	0.138	0.176	0.136	0.141	0.157	NS
9040C	pH	su	7.206	--	--	6.83 J	6.93 J	6.82 J	6.75 J	8.29 J	6.56 J	6.85 J	6.78 J	6.79 J	NS
In Situ	pH	su	8.29	--	--	6.93	6.7	6.33	6.87	6.74	6.75	6.68	6.63	6.6	6.45
9056MOD	Sulfate	mg/l	165.9	--	--	109	114	121	117	121	130	115	143	106	NS
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	717	749	771	845	697	831	715	827	733	NS
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
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.0021	0.00269	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00219
6010B	Barium	mg/l	0.1955	2	--	0.151	0.152	0.154	0.197	0.173	0.165	0.145	0.159	0.177	0.164
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.2144	4	--	0.158	0.125	0.139	0.1 U	0.138	0.176	0.136	0.141	0.157	0.134
6020	Lead	mg/l	--	--	--	0.005 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.06654[4]	0.06023[4]	--	0.0441	0.0525	0.0528	0.0536	0.0551	0.0542	0.0548	0.0461	0.0486	0.0608
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	--	--	--	0.01 U	0.00576	0.00406	0.0196	0.00685	0.002 U	0.002 U	0.00411	0.00568	0.01 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
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	0.637	1.63	2.09	0.630 J	1.06	4.26	1.27 J	NA	1.27 J	1.06

Notes:

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

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

1 = Calculated background limit as calculated as part of the January 9, 2019 assessment of the October 2018 assessment monitoring event.
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J- = Result qualified as estimated with potential low bias
mg/l = milligram per liter
NA = Not Available
NS = Not Sampled or Not Measured
pCi/L = picocurie per liter
su = Standard Units
U - Non Detect at the identified concentration
U* = Qualified as non detect during data validation process
V = The sample concentration is too high to evaluate accurate spike recoveries

Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location	MW-3	MW-3	MW-3	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4
					Sample Date	6/4/2018	10/2/2018	11/20/2018	10/30/2015	1/27/2016	4/27/2016	7/25/2016	10/25/2016	1/24/2017
Analytical Method	**Analyte**	**Unit**	**Calculated Background Limit[1]**	**GWPS[2]**	**ASD Background Limit[3]**									
Appendix III - Detection Monitoring														
6010B	Boron	mg/l	0.272	--	--	0.212	0.2 U	NS	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2
6010B	Calcium	mg/l	240.5	--	--	215	207	NS	200	191	206	181 V	186	207
9056MOD	Chloride	mg/l	14.14	--	--	5.74	7.13	NS	9.72	8.98	13.4	3.9	6.27	11.2
9056MOD	Fluoride	mg/l	0.2144	--	--	0.173 J+	0.186	NS	0.112	0.12	0.108	0.104	0.131	0.172
9040C	pH	su	7.206	--	--	6.94 J	6.83 J	NS	6.92 J	7.02 J	6.84 J	6.87 J	7.30 J	6.87 J
In Situ	pH	su	8.29	--	--	7.18	6.66	6.6	6.8	6.7	6.11	6.81	6.86	6.81
9056MOD	Sulfate	mg/l	165.9	--	--	137	136	NS	116	109	128	74.5	96.2	148
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	788	747	NS	780	736	755	683	837	774
Appendix IV - Assessment Monitoring														
6020	Antimony	mg/l	--	--	--	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.002 U	0.0021	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	0.1955	2	--	0.159	0.163	NS	0.16	0.148	0.152	0.141	0.149	0.173
6010B	Beryllium	mg/l	--	--	--	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	NS	NS	NS	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	NS	NS	NS	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.2144	4	--	0.173 J+	0.186	NS	0.112	0.12	0.108	0.104	0.131	0.172
6020	Lead	mg/l	--	--	--	NS	NS	NS	0.005 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.06654 [4]	0.06023 [4]	--	0.0606	0.0481	NS	0.0372	0.0439	0.0418	0.0425	0.0464	0.0411
7470A	Mercury	mg/l	--	--	--	NS	NS	NS	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	NS	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	--	--	--	NS	NS	NS	0.0423	0.0562	0.00642	0.0315	0.0383	0.0155
6020	Thallium	mg/l	--	--	--	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	1.62	0.555 J	NS	0.266	1.16	0.46	0.700 J	0.756	0.18 U*

Notes:

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

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

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U - Non Detect at the identified concentration
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Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-2A
					Sample Date	4/24/2017	7/26/2017	9/14/2017	3/8/2018	6/4/2018	10/2/2018	11/20/2018	10/29/2015
Analytical Method	**Analyte**	**Unit**	**Calculated Background Limit[1]**	**GWPS[2]**	**ASD Background Limit[3]**								
Appendix III - Detection Monitoring													
6010B	Boron	mg/l	0.272	--	--	0.2 U	0.2 U	0.2 U	NS	0.2 U	0.2 U	NS	0.2 U
6010B	Calcium	mg/l	240.5	--	--	224	193	186	NS	214 O1 V	176	NS	223
9056MOD	Chloride	mg/l	14.14	--	--	12.4	6.6	4.92	NS	3.59	1.95	NS	7.54
9056MOD	Fluoride	mg/l	0.2144	--	--	0.119	0.135	0.148 J-	NS	0.156 J+	0.177	NS	0.129
9040C	pH	su	7.206	--	--	6.86 J	6.71 J	6.88 J	NS	6.93 J	6.91 J	NS	6.86 J
In Situ	pH	su	8.29	--	--	6.69	6.79	6.7	6.68	6.94	6.80	6.7	6.96
9056MOD	Sulfate	mg/l	165.9	--	--	148	117	100	NS	116	87	NS	227
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	840	736	732	NS	741	619	NS	852
Appendix IV - Assessment Monitoring													
6020	Antimony	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00361
6010B	Barium	mg/l	0.1955	2	--	0.151	0.14	0.146	0.135	0.134	0.121	NS	0.127
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	NS	NS	NS	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	NS	NS	NS	0.0112
9056MOD	Fluoride	mg/l	0.2144	4	--	0.119	0.135	0.148 J-	0.132	0.156 J+	0.177	NS	0.129
6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.005 U
6010B	Lithium	mg/l	0.06654 [4]	0.06023 [4]	--	0.0442	0.0353	0.0428	0.0458	0.051	0.0304	NS	0.0357
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	NS	NS	NS	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NS	0.005 U
6010B	Selenium	mg/l	--	--	--	0.002 U	0.022	0.0186	0.01 U	NS	NS	NS	0.01 U
6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	0.191	NA	0.191 J	0.168	0.876	0.186 J	NS	0.763

Notes:

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

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

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su = Standard Units
U - Non Detect at the identified concentration
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V = The sample concentration is too high to evaluate accurate spike recoveries

Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location	MW-2A	DUP-1	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	DUP-2	MW-2A	DUP-1
					Sample Date	1/27/2016	1/27/2016	4/27/2016	7/25/2016	10/25/2016	1/23/2017	4/24/2017	4/24/2017	7/25/2017	7/25/2017
						Duplicate Pair						*Duplicate Pair*		*Duplicate Pair*	
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	0.272	--	--	0.2 U	0.221	0.353	0.261	0.2 U	0.495	0.2 U	0.2 U	0.2 U	0.2 U
6010B	Calcium	mg/l	240.5	--	--	208	206	200 V	231	163	193	128	130	138	140
9056MOD	Chloride	mg/l	14.14	--	--	5.81	5.92	6.47	6.64	9.7	14.9	9.83	9.88	9.67	9.67
9056MOD	Fluoride	mg/l	0.2144	--	--	0.159	0.154	0.158	0.114	0.13	0.187	0.181	0.191	0.189	0.192
9040C	pH	su	7.206	--	--	6.91 J	6.93 J	6.85 J	6.69 J	7.00 J	6.84 J	7.0 J	7.02 J	6.94 J	7.01 J
In Situ	pH	su	8.29	--	--	6.8	6.8	6.26	6.63	6.86	6.75	6.85	6.85	6.84	6.84
9056MOD	Sulfate	mg/l	165.9	--	--	180	182	153	196	127	153	81.6	82.5	74.6	74.7
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	811	783	848	865	616	734	508	478	512	506
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
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.00468	0.00465	0.00416	0.00492	0.00499	0.00541	0.00381	0.00326	0.00578	0.00553
6010B	Barium	mg/l	0.1955	2	--	0.125	0.126	0.12	0.135	0.102	0.129	0.0796	0.0796	0.111	0.111
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.2144	4	--	0.159	0.154	0.158	0.114	0.13	0.187	0.181	0.191	0.189	0.192
6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.06654[4]	0.06023[4]	--	0.0395	0.04	0.0442	0.0457	0.0351	0.0334	0.0305	0.0305	0.0206	0.0221
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	2.45	1.21	1.33	1.68	0.72	1.7	0.214 J	0.597 J	NA	NA

Notes:

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

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

1 = Calculated background limit as calculated as part of the January 9, 2019 assessment of the October 2018 assessment monitoring event.
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J- = Result qualified as estimated with potential low bias
mg/l = milligram per liter
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NS = Not Sampled or Not Measured
pCi/L = picocurie per liter
su = Standard Units
U - Non Detect at the identified concentration
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Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location Sample Date	MW-2A 9/14/2017	DUP-1 9/14/2017	MW-2A 3/8/2018	MW-2A 6/4/2018	MW-2A 10/1 &	MW-2A 11/20/2018	MW-8A 10/29/2015	DUP-1A 10/29/2015	MW-8A 1/27/2016
Analytical Method	**Analyte**	**Unit**	**Calculated Background Limit[1]**	**GWPS[2]**	**ASD Background Limit[3]**	*Duplicate Pair*						*Duplicate Pair*		
Appendix III - Detection Monitoring														
6010B	Boron	mg/l	0.272	--	--	0.2 U	0.2 U	NS	0.2 U	0.2 U	NS	2.37	2.38	2.48
6010B	Calcium	mg/l	240.5	--	--	155	155	NS	156	163	NS	186	185	168
9056MOD	Chloride	mg/l	14.14	--	--	6.26	6.33	NS	4.34	5.12	NS	26.5	30.3	30.4
9056MOD	Fluoride	mg/l	0.2144	--	--	0.186	0.181	NS	0.274 J+	0.208	NS	0.54	0.318	0.267
9040C	pH	su	7.206	--	--	6.91 J	6.99 J	NS	7.05 J	6.96 J	NS	6.94 J	6.97 J	7.04 J
In Situ	pH	su	8.29	--	--	6.8	6.8	6.39	6.81	6.80	6.7	6.94	6.94	6.9
9056MOD	Sulfate	mg/l	165.9	--	--	89	89.6	NS	53.8	68.5	NS	491	598	471
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	571	568	NS	537	580	NS	1180	1130	1060
Appendix IV - Assessment Monitoring														
6020	Antimony	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.00487	0.00487	0.00428	0.002 U	0.00359	0.00324	0.012	0.0132	0.0127
6010B	Barium	mg/l	0.1955	2	--	0.116	0.115	0.184	0.147	0.157	NS	0.073	0.0738	0.0635
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	NS	NS	NS	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	NS	NS	NS	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.2144	4	--	0.186	0.181	0.166	0.274 J+	0.208	NS	0.54	0.318	0.267
6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.005 U	0.005 U	0.002 U
6010B	Lithium	mg/l	0.06654[4]	0.06023[4]	--	0.0294	0.0298	0.0372	0.0352	0.027	NS	0.0243	0.0242	0.0309
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	NS	NS	NS	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NS	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	--	--	--	0.002 U	0.002 U	0.01 U	NS	NS	NS	0.01 U	0.01 U	0.002 U
6020	Thallium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	NS	NS	NS	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	1.31 J	1.10 J	0.864	1.64	1.25 J	NS	0.36	0.298	1.44

Notes:

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

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

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Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location	MW-8A	DUP-2	MW-8A	MW-8A	MW-8A	MW-8A	MW-8A	MW-8A	MW-8A	DUP-1
					Sample Date	4/28/2016	4/28/2016	7/25/2016	10/25/2016	1/23/2017	4/24/2017	7/25/2017	9/14/2017	3/8/2018	3/8/2018
Analytical Method	Analyte	Unit	Calculated Background Limit[1]	GWPS[2]	ASD Background Limit[3]	*Duplicate Pair*								*Duplicate Pair*	
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	0.272	--	--	2.61	2.67	2.66	2.29	2.38	2.26	2.4	2.27	NS	NS
6010B	Calcium	mg/l	240.5	--	--	186	182	204	156	146	126	161	153	NS	NS
9056MOD	Chloride	mg/l	14.14	--	--	30.2	30.1	29.3	30.3	26.9	29.6	28.9	28.4	NS	NS
9056MOD	Fluoride	mg/l	0.2144	--	--	0.339	0.339	0.292	0.355	0.413	0.37	0.325	0.268	NS	NS
9040C	pH	su	7.206	--	--	6.93 J	6.88 J	6.78 J	7.97 J	6.72 J	6.91 J	6.88 J	6.89 J	NS	NS
In Situ	pH	su	8.29	--	--	6.75	6.75	6.56	6.92	6.88	6.86	6.73	6.74	6.91	6.91
9056MOD	Sulfate	mg/l	165.9	--	--	520	522	453	412	386	383	477	380	NS	NS
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	1170	1170	1190	1040	935	880	1020	1000	NS	NS
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
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.0308	0.0299	0.0122	0.0134	0.0156	0.0232	0.0145	0.0144	0.0206	0.021
6010B	Barium	mg/l	0.1955	2	--	0.0937	0.0924	0.0624	0.0473	0.0524	0.0565	0.0539	0.0541	0.0657	0.065
6010B	Beryllium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.2144	4	--	0.339	0.339	0.292	0.355	0.413	0.37	0.325	0.268	0.348	0.347
6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.06654[4]	0.06023[4]	--	0.0298	0.0298	0.0368	0.0316	0.0268	0.0275	0.0201	0.0269	0.029	0.0281
7470A	Mercury	mg/l	--	--	--	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.00584	0.00591	0.005 U	0.005 U	0.00623	0.00685	0.00569	0.005 U	0.00833	0.00816
6010B	Selenium	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	0.01 U	0.01 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
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	0.673	0.127	1.45	1.11	0.536	1.07 J	NA	0.980 J	0.628	0.308

Notes:

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

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

1 = Calculated background limit as calculated as part of the January 9, 2019 assessment of the October 2018 assessment monitoring event.
2 = Groundwater Protection Standards established for the BA Pond on September 13, 2018.
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4 = Calculated background limit was determined using a more recent background window than the GWPS resulting in different values.
B = The same analyte is found in the associated blank
BA = Bottom Ash
J = Result qualified as estimated
J+ = Result qualified as estimated with potential high bias
J- = Result qualified as estimated with potential low bias
mg/l = milligram per liter
NA = Not Available
NS = Not Sampled or Not Measured
pCi/L = picocurie per liter
su = Standard Units
U - Non Detect at the identified concentration
U* = Qualified as non detect during data validation process
V = The sample concentration is too high to evaluate accurate spike recoveries

Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location Sample Date	MW-8A 6/4/2018	DUP-1 6/4/2018	MW-8A 10/1 &	MW-8A 11/20/2018	MW-10 10/29/2015	MW-10 1/27/2016	MW-10 4/27/2016	DUP-1 4/27/2016	MW-10 7/25/2016	DUP-1 7/25/2016
Analytical Method	**Analyte**	**Unit**	**Calculated Background Limit[1]**	**GWPS[2]**	**ASD Background Limit[3]**	*Duplicate Pair*						*Duplicate Pair*			
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	0.272	--	--	2.44	2.47	2.31	NS	1.08	0.907	1.35	1.35	1.05	1.04
6010B	Calcium	mg/l	240.5	--	--	129	129	122	NS	217	213	179	178	218	217
9056MOD	Chloride	mg/l	14.14	--	--	25.7	25.5	26.2	NS	30.2	17	21.9	21.8	20.4	20.4
9056MOD	Fluoride	mg/l	0.2144	--	--	0.453 J+	0.441 J+	0.394	NS	0.327	0.104	0.125	0.105	0.125	0.1 U
9040C	pH	su	7.206	--	--	6.97 J	6.98 J	6.95 J	NS	6.82 J	6.89 J	6.92 J	6.96 J	6.73 J	6.78 J
In Situ	pH	su	8.29	--	--	6.86	6.86	6.86	6.6	7.03	7.1	6.5	6.5	6.66	6.66
9056MOD	Sulfate	mg/l	165.9	--	--	353	360	419	NS	623	227	220	226	223	217
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	853	881	920	NS	1130	916	797	820	905	903
Appendix IV - Assessment Monitoring															
6020	Antimony	mg/l	--	--	--	NS	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.0204	0.0195	0.0278	0.0183	0.00743	0.00489	0.0135	0.0115	0.00519	0.00536
6010B	Barium	mg/l	0.1955	2	--	0.0559	0.0548	0.0602	NS	0.183	0.106	0.0871	0.0857	0.0875	0.0875
6010B	Beryllium	mg/l	--	--	--	NS	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Cadmium	mg/l	--	--	--	NS	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Chromium	mg/l	--	--	--	NS	NS	NS	NS	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
6010B	Cobalt	mg/l	--	--	--	NS	NS	NS	NS	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
9056MOD	Fluoride	mg/l	0.2144	4	--	0.453 J+	0.441 J+	0.394	NS	0.327	0.104	0.125	0.105	0.125	0.1 U
6020	Lead	mg/l	--	--	--	NS	NS	NS	NS	0.005 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6010B	Lithium	mg/l	0.06654[4]	0.06023[4]	--	0.0262	0.031	0.0174	NS	0.0501	0.0571	0.045	0.0446	0.0549	0.0545
7470A	Mercury	mg/l	--	--	--	NS	NS	NS	NS	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
6010B	Molybdenum	mg/l	0.005	0.100	--	0.00865	0.00876	0.00967	NS	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
6010B	Selenium	mg/l	--	--	--	NS	NS	NS	NS	0.01 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
6020	Thallium	mg/l	--	--	--	NS	NS	NS	NS	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	1.61	1.54	0.589 J	NS	0.442	2.32	1.77	1.16	0.550 J	0.520 J

Notes:

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

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

1 = Calculated background limit as calculated as part of the January 9, 2019 assessment of the October 2018 assessment monitoring event.
2 = Groundwater Protection Standards established for the BA Pond on September 13, 2018.
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J- = Result qualified as estimated with potential low bias
mg/l = milligram per liter
NA = Not Available
NS = Not Sampled or Not Measured
pCi/L = picocurie per liter
su = Standard Units
U - Non Detect at the identified concentration
U* = Qualified as non detect during data validation process
V = The sample concentration is too high to evaluate accurate spike recoveries

Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location Sample Date	MW-10 10/26/2016	DUP-1 10/26/2016	MW-10 1/23/2017	MW-10 4/24/2017	MW-10 7/25/2017	MW-10 9/14/2017	MW-10 3/8/2018	MW-10 6/4/2018	MW-10 10/1 &	DUP-1 10/3/2018
Analytical Method	**Analyte**	**Unit**	**Calculated Background Limit[1]**	**GWPS[2]**	**ASD Background Limit[3]**	*Duplicate Pair*								*Duplicate Pair*	
Appendix III - Detection Monitoring															
6010B	Boron	mg/l	0.272	--	--	1.04	0.2 U	1.29	1.24	1.29	1.19	NS	1.5	1.22	1.23
6010B	Calcium	mg/l	240.5	--	--	217	221	191	157	193	195	NS	168	179	179
9056MOD	Chloride	mg/l	14.14	--	--	18	46.3	23.2	21.6	26	22.6	NS	19.6	18.6	18.7
9056MOD	Fluoride	mg/l	0.2144	--	--	0.111	0.101	0.183	0.161	0.143	0.144	NS	0.235 J+	0.219	0.217
9040C	pH	su	7.206	--	--	7.02 J	7.46 J	6.86 J	7.01 J	6.88 J	6.82 J	NS	6.94 J	6.98 J	6.96 J
In Situ	pH	su	8.29	--	--	6.7	6.7	6.78	6.87	6.7	6.64	6.41	6.61	6.80	6.80
9056MOD	Sulfate	mg/l	165.9	--	--	228	75	238	193	280	258	NS	214	234	232
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	911	739	845	709	852	880	NS	748	822	808
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	NS	NS	NS
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.00351	0.00365	0.0107	0.0143	0.00612	0.00635	0.0158	0.0126	0.0245	0.0241
6010B	Barium	mg/l	0.1955	2	--	0.0825	0.082	0.0897	0.088	0.0748	0.0705	0.0993	0.107	0.129	0.128
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	NS	NS	NS
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	NS	NS	NS
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	NS	NS	NS
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	NS	NS	NS
9056MOD	Fluoride	mg/l	0.2144	4	--	0.111	0.11	0.183	0.161	0.143	0.144	0.164	0.235 J+	0.219	0.217
6020	Lead	mg/l	--	--	--	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	NS	NS	NS
6010B	Lithium	mg/l	0.06654[4]	0.06023[4]	--	0.0578	0.0571	0.0494	0.0399	0.0376	0.0495	0.0418	0.0445	0.0281	0.0286
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	NS	NS	NS
6010B	Molybdenum	mg/l	0.005	0.100	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	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	0.002 U	0.002 U	0.002 U	0.002 U	0.01 U	NS	NS	NS
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	NS	NS	NS
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	0.877 J	0.603 J	0.253	0.848 J	NA	1.10 J	0.102	1.18	0.35 J	0.35

Notes:

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

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

1 = Calculated background limit as calculated as part of the January 9, 2019 assessment of the October 2018 assessment monitoring event.

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4 = Calculated background limit was determined using a more recent background window than the GWPS resulting in different values.

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BA = Bottom Ash

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J+ = Result qualified as estimated with potential high bias

J- = Result qualified as estimated with potential low bias

mg/l = milligram per liter

NA = Not Available

NS = Not Sampled or Not Measured

pCi/L = picocurie per liter

su = Standard Units

U - Non Detect at the identified concentration

U* = Qualified as non detect during data validation process

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

Table 2-6
Summary of Analytical Results
October 2015 through November 2018 Sampling Events
Nearman Power Station
Bottom Ash Pond

					Sample Location	MW-10	DUP	MW-13	MW-13	MW-14	MW-14	MW-15	MW-15	MW-16
					Sample Date	11/20/2018	11/20/2018	10/1/2018	11/19/2018	10/1/2018	11/19/2018	10/1/2018	11/19/2018	11/19/2018
Analytical Method	**Analyte**	**Unit**	**Calculated Background Limit[1]**	**GWPS[2]**	**ASD Background Limit[3]**									
Appendix III - Detection Monitoring														
6010B	Boron	mg/l	0.272	--	--	NS	NS	0.2 U	NS	0.2 U	NS	0.2 U	NS	NS
6010B	Calcium	mg/l	240.5	--	--	NS	NS	95	NS	200	NS	78.3	NS	NS
9056MOD	Chloride	mg/l	14.14	--	--	NS	NS	19.5	NS	21.5	NS	16.4	NS	NS
9056MOD	Fluoride	mg/l	0.2144	--	--	NS	NS	0.38	NS	0.208	NS	0.462	NS	NS
9040C	pH	su	7.206	--	--	NS	NS	7.1 J	NS	6.7 J	NS	7.45 J	NS	NS
In Situ	pH	su	8.29	--	--	6.6	6.6	8.67	6.979	6.7	6.804	6.9	6.878	6.863
9056MOD	Sulfate	mg/l	165.9	--	--	NS	NS	155	NS	221	NS	194	NS	NS
2540 C-2011	Total Dissolved Solids	mg/l	902.8	--	--	NS	NS	542	NS	839	NS	505	NS	NS
Appendix IV - Assessment Monitoring														
6020	Antimony	mg/l	--	--	--	NS	NS	NS		NS		NS		
6020	Arsenic	mg/l	0.00269	0.010	0.035	0.00789	0.00821	0.0252	0.024	0.002 U	0.002 U	0.00482	0.00509	0.035
6010B	Barium	mg/l	0.1955	2	--	NS	NS	0.205	NS	0.0765	NS	0.107	NS	NS
6010B	Beryllium	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
6010B	Cadmium	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
6010B	Chromium	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
6010B	Cobalt	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
9056MOD	Fluoride	mg/l	0.2144	4	--	NS	NS	0.38	NS	0.208	NS	0.462	NS	NS
6020	Lead	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
6010B	Lithium	mg/l	0.06654[4]	0.06023[4]	--	NS	NS	0.0296	NS	0.0297	NS	0.0428	NS	NS
7470A	Mercury	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
6010B	Molybdenum	mg/l	0.005	0.100	--	NS	NS	0.005 U	NS	0.005 U	NS	0.005 U	NS	NS
6010B	Selenium	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
6020	Thallium	mg/l	--	--	--	NS	NS	NS	NS	NS	NS	NS	NS	NS
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	3.89	5	--	NS	NS	0.765 J	NS	0.138 J	NS	1.35 J	NS	NS

Notes:

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

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

1 = Calculated background limit as calculated as part of the January 9, 2019 assessment of the October 2018 assessment monitoring event.
2 = Groundwater Protection Standards established for the BA Pond on September 13, 2018.
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pCi/L = picocurie per liter
su = Standard Units
U - Non Detect at the identified concentration
U* = Qualified as non detect during data validation process
V = The sample concentration is too high to evaluate accurate spike recoveries

Table 2-7
Summary of Direct-Push Groundwater Sample Results
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Sample Identification:		GWPS	DPGW-1/GW01	DPGW-DUP/GW01	DPGW-2/GW01	DPGW-3/GW01	DPGW-4/GW01
Date(s) Sampled:			10/30/2018	10/30/2018	10/29/2018	10/30/2018	10/30/2018
Data Package(s):			L1039637-04	L1039637-05	L1039637-01	L1039637-06	L1039637-09
Note(s):				*(Dup of DPGW-1/GW01)			
Analyte	**Unit**						
Arsenic, Dissolved	mg/l	0.010 *(Total arsenic)	**0.0258**	**0.0239**	0.002 U	0.002 U	0.002 U

Sample Identification:		GWPS	DPGW-5/GW01	DPGW-6/GW01	DPGW-7/GW01	DPGW-8/GW01	
Date(s) Sampled:			10/30/2018	10/30/2018	10/29/2018	10/29/2018	
Data Package(s):			L1039637-08	L1039637-07	L1039637-03	L1039637-02	
Note(s):							
Analyte	**Unit**						
Arsenic, Dissolved	mg/l	0.010 *(Total arsenic)	**0.0314**	0.00273	0.002 U	0.002 U	

BOLD and SHADED Parameter was detected in well(s) located downgradient of the Bottom Ash Pond or direct-push samples at a concentration above the GWPS.

GWPS - Groundwater Protection Standard
J - Estiimated Value
mg/l - Milligrams per Liter
N/A - Not Applicable

su - Standard Units
U -Nondetect

FIGURES

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

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0 1,000 2,000

Feet

N

BURNS McDONNELL

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

Source: ESRI and Burns & McDonnell Engineering.

Issued: October, 9 2015

Path: Z:\Clients\ENV\KCBPU\85458_CCRActivities\Studies\Geospatial\ArcDocs\Figure 1-1_Site Location Map.mxd

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

Legend

- ⊕ BA Pond Monitoring Well - Upgradient
- ⊕ BA Pond Monitoring Well - Downgradient
- ⊕ Assessment Monitoring Well
- ⊕ ASD Monitoring Well

0 250 500
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

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

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-1_20190115_CCR Well Locations.mxd

Issued: January, 16 2019

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

Legend

- ● Monitoring Well
- ⊕ Abandoned Monitoring Well
- ▨ Well Not Used in CCR Monitoring
- — Piezometric Surface Contour
- ➡ Apparent Groundwater Flow Direction

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on March 8, 2018 and should be considered approximate.

0 100 200
Feet
N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 2-2
MARCH 8 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-2_20180308_CCR Piezometric Surface Map.mxd

Issued: January, 29 2019

Copyright:© 2013 National Geographic Society, i-cubed

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

Legend

- ⊕ Monitoring Well
- ⊕ Abandoned Monitoring Well
- ▨ Well Not Used in CCR Monitoring
- ─ Piezometric Surface Contour
- → Apparent Groundwater Flow Direction

Note

1 - Piezometric surface contours were inferred using groundwater levels measured on May 29, 2018 and should be considered approximate.

0 100 200
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 2-3
MAY 29 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-3_20180529_CCR Piezometric Surface Map.mxd

Issued: January, 29 2019

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

Legend

⊕ Monitoring Well

→ Approximate Groundwater Flow Direction

— Piezometric Surface Contour

Notes

Groundwater levels used to create piezometric surface gauged on October 1, 2018

0 200 400

Feet

N

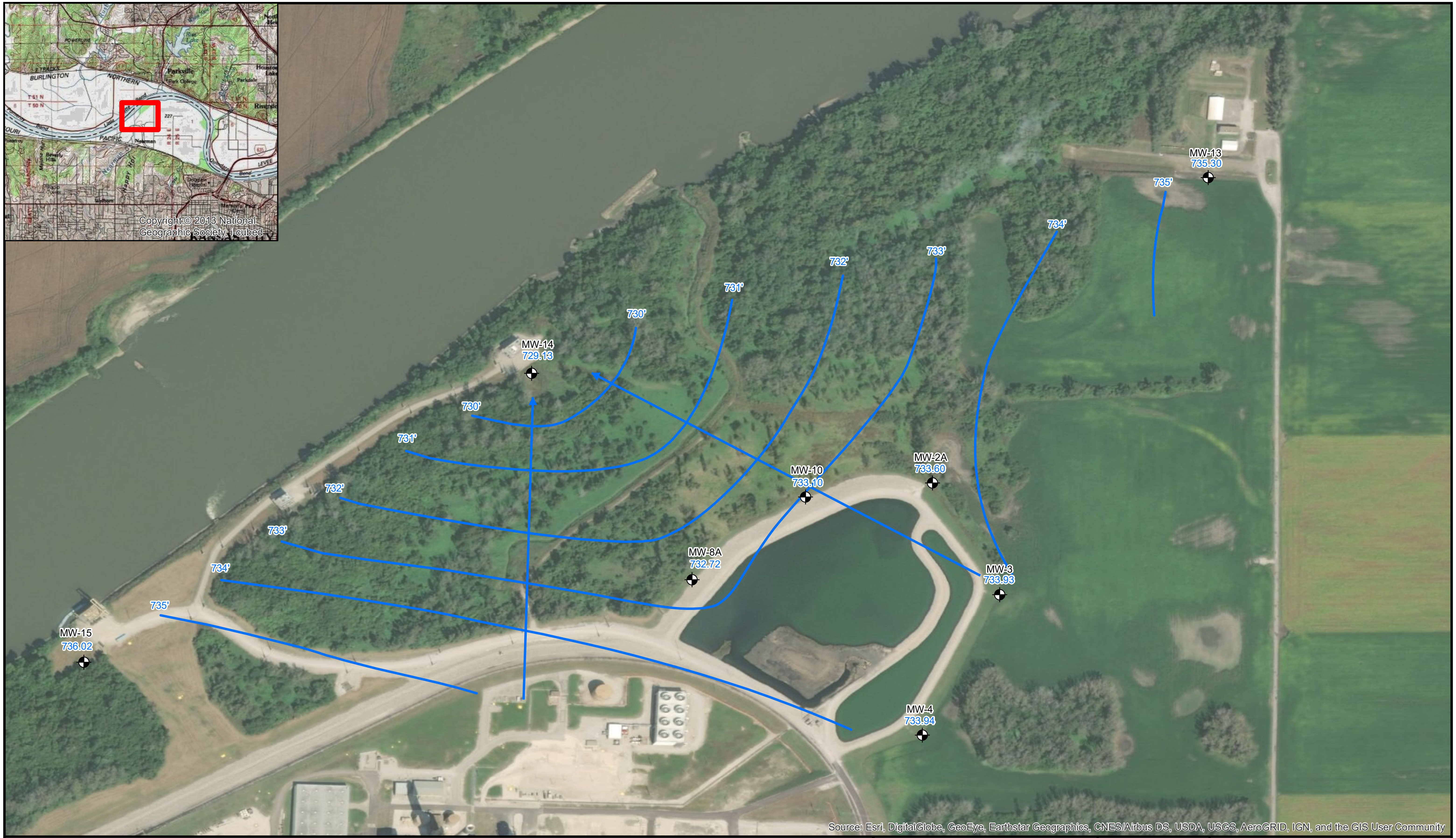
Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 2-4
OCT. 1 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-4_20181017_CCR Piezometric Surface Map.mxd

Issued: January, 29 2019



Legend

⊕ Monitoring Well

→ Approximate Groundwater Flow Direction

— Piezometric Surface Contour

Notes

Groundwater levels used to create piezometric surface gauged on October 31, 2018

0 200 400
Feet

N

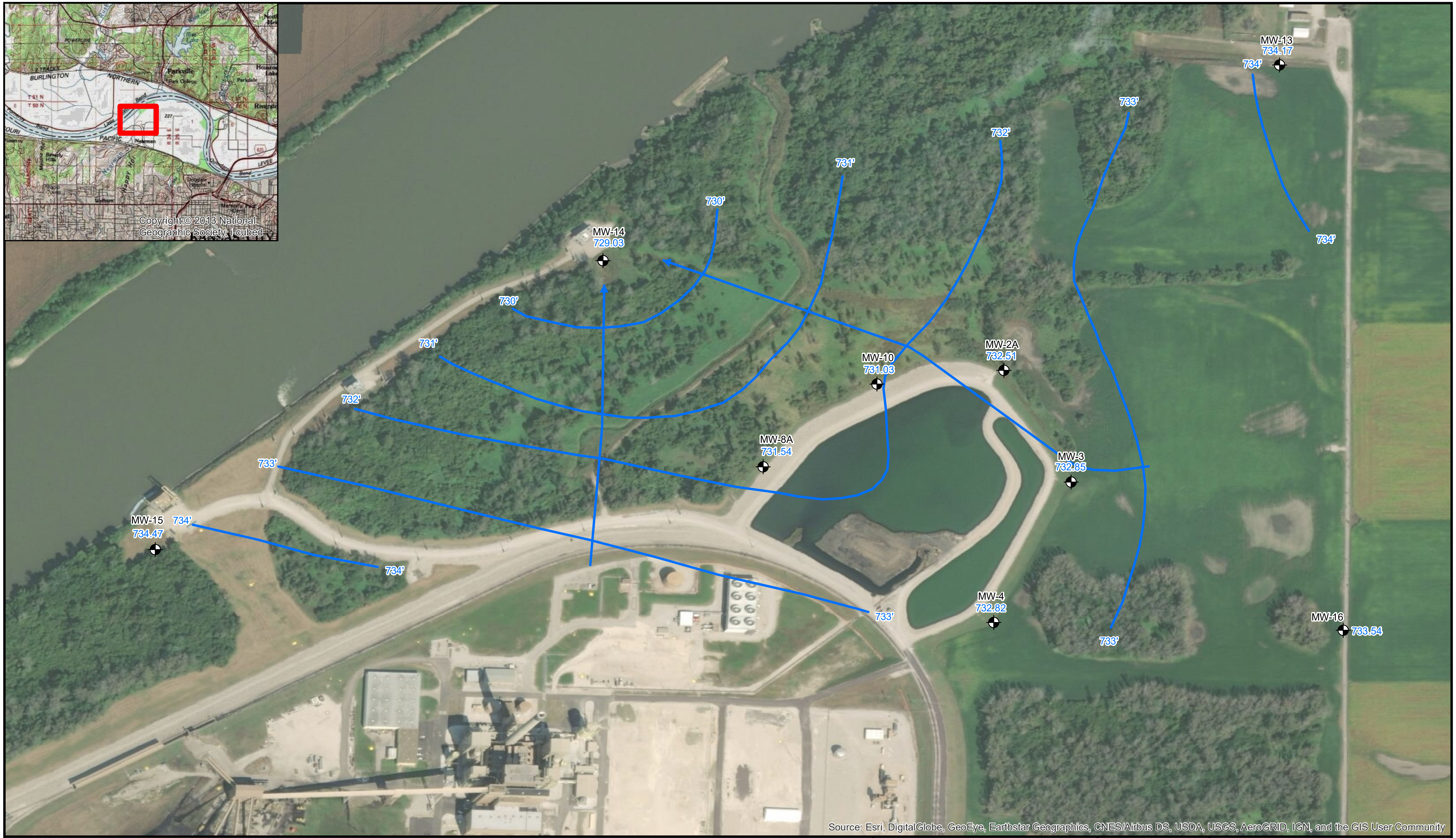
Source: ESRI and Burns & McDonnell Engineering.

BURNS MCDONNELL

FIGURE 2-5
OCT. 31 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-5_Oct 31 2018 Potentiometric Map.mxd

Issued: January, 29 2019



Legend

⊕ Monitoring Well

→ Approximate Groundwater Flow Direction

— Piezometric Surface Contour

733.54 Water Level Elevation

Notes

1 - Piezometric surface was inferred using groundwater elevation data collected on November 19, 2018 and should be considered approximate.

0 200 400
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 2-6
NOV. 19 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-6 20181205_CCR Piezometric Surface Map.mxd

Issued: January, 29 2019

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

Legend

● HPT / EC Boring Location
⊕ BA Pond Monitoring Well - Upgradient
⊕ BA Pond Monitoring Well - Downgradient
⊕ Assessment Monitoring Well
⊕ ASD Monitoring Well
⊕ Horizontal Collector Well

Notes

1 - Figure presents the location of EC / HPT borings completed at the Nearman Creek Power Station.

0 150 300
Feet

N

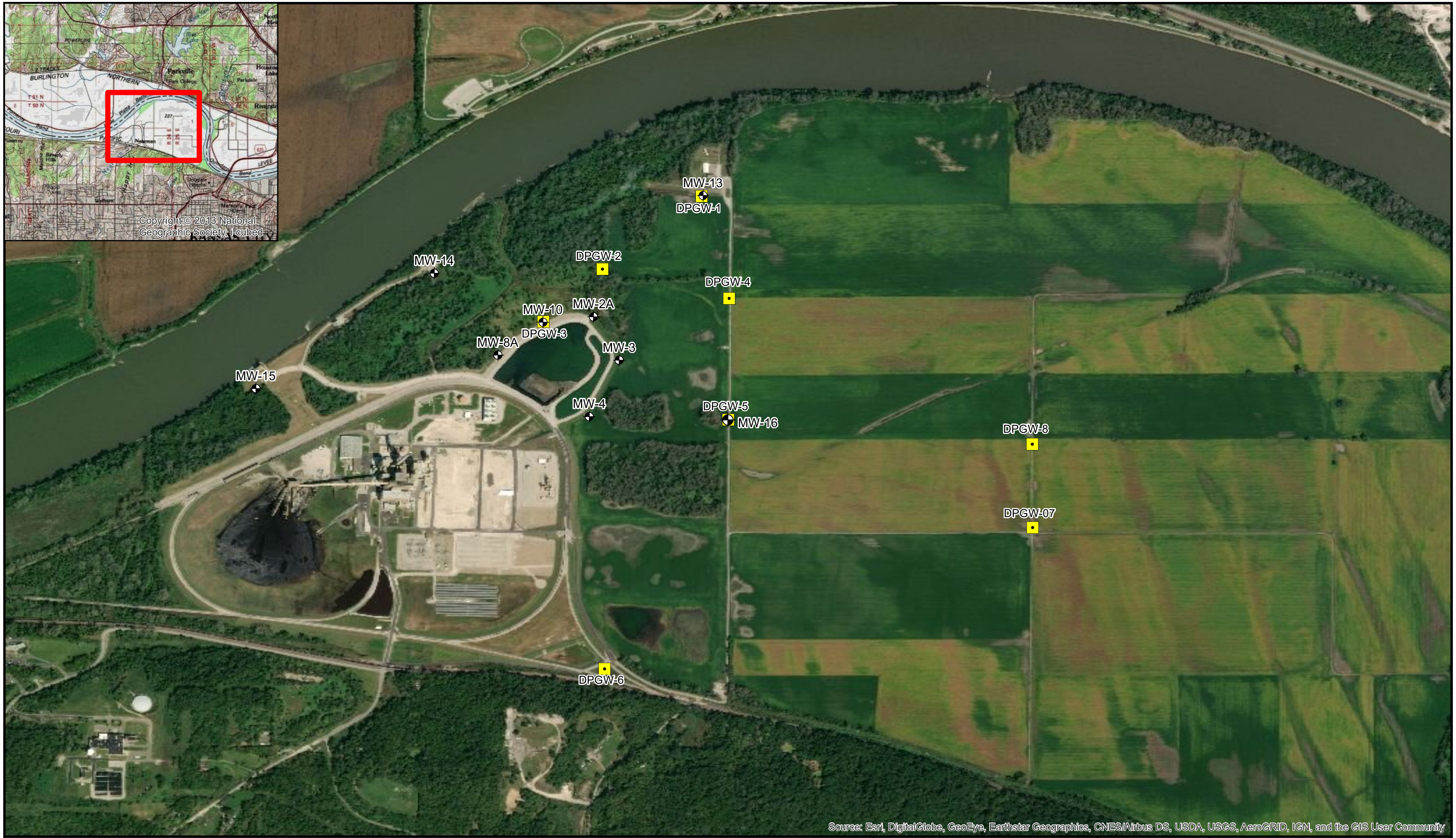
Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 2-7
HPT/EC PROBE LOCATIONS
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-7_HPT-EC Borings.mxd

Issued: January, 16 2019



Legend

- ⊕ Monitoring Wells
- ▣ Direct-Push Sample Location

0 500 1,000
Feet

N

BURNS McDONNELL

FIGURE 2-8
DIRECT-PUSH LOCATIONS
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 2-8_20181206_DirectPushSampleLocations.mxd

Issued: January, 16 2019

Source: ESRI and Burns & McDonnell Engineering.

APPENDIX A – ALTERNATE SOURCE DEMONSTRATION REPORT

Alternate Source Demonstration for the Nearman Creek Power Station Bottom Ash Pond

Kansas City Board of Public Utilities

Nearman Creek Power Station
Project No. 88777

Revision 0
12/12/2018

Alternate Source Demonstration for the Nearman Creek Power Station Bottom Ash Pond

prepared for

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

Project No. 88777

Revision 0
12/12/2018

prepared by

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

INDEX AND CERTIFICATION

Kansas City Board of Public Utilities
Alternate Source Demonstration
for the
Nearman Creek Power Station
Bottom Ash Pond

Project No. 88777

Report Index

Certification

I hereby certify, as a Professional Engineer in the state of Kansas, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the Kansas City Board of Public Utilities or others without specific verification or adaptation by the Engineer.

SCOTT ALSON MARTIN
24713
Scott A Martin

Scott Martin, P.E.
Kansas License #24713
License Renewal Date: April 30, 2019

Date: December 12, 2018

12/12/18 11:34 AM

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LIST OF ABBREVIATIONS

Abbreviation	**Term/Phrase/Name**
ASD	Alternate Source Demonstration
bgs	below ground surface
BPU	Kansas City Board of Public Utilities
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
Nearman Creek	Nearman Creek Power Station
CCR	Coal Combustion Residual
CCR Rule	Title 40 Code of Federal Regulations, Parts 257 and 261, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule, April 17, 2015
CFR	Code of Federal Regulations
CY	Cubic Yards
DPGW	Direct push drilling groundwater sample location
KDHE	Kansas Department of Health and Environment
Groundwater Monitoring Program	Groundwater Monitoring Plan for the Nearman Creek Power Station Bottom Ash Pond (Burns & McDonnell, 2016a)
GWPS	Groundwater protection standards
mg/L	Milligrams per liter
MW	Monitoring Well
RCRA	Resource Conservation and Recovery Act
Report	Alternate Source Demonstration Report
SAP	Sampling and Analysis Plan
SSI	Statistically significant increase
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION AND BACKGROUND INFORMATION

This Alternate Source Demonstration (ASD) Report (Report) was prepared by Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) on behalf of Kansas City Board of Public Utilities (BPU) to present the results of an alternate source investigation performed under the United States Environmental Protection Agency's (USEPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities; Final Rule, 40 Code of Federal Regulations (CFR) Part 257, dated April 17, 2015 (USEPA, 2015) (Final CCR Rule) at the existing utility bottom ash pond (hereinafter referred to as the "Bottom Ash Pond") located at BPU's Nearman Creek Power Station (Nearman Creek or Site).

This Report has been prepared to provide a summary of groundwater data collected as part of the alternate source investigation in conjunction with routine monitoring network data collected from 2015 through 2018, and to document that statistically significant increases (SSI's) over background levels for arsenic are resultant from the natural variation of groundwater quality in proximity to the Bottom Ash Pond.

Routine groundwater monitoring activities are conducted 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). The Bottom Ash Pond groundwater monitoring network is presented in Figure 1-1. Included within Figure 1-1, are monitoring wells installed as part of assessment monitoring activities and to support the ASD.

1.1 Recent Groundwater Monitoring Activities

BPU initiated assessment monitoring activities for the Bottom Ash Pond in March 2018. Per 40 CFR §257.95(b), each of the monitoring wells included in the Bottom Ash Pond monitoring well network were sampled for the full list of 40 CFR Part 257 Appendix IV parameters in March of 2018, within 90 days of triggering the assessment monitoring program. In June 2018, the Bottom Ash Pond monitoring wells were resampled for 40 CFR Part 257 Appendix III parameters and those Appendix IV parameters that were detected during March 2018 monitoring (herein referred to as the "reduced Appendix IV list").

Groundwater protection standards (GWPS) were established in September 2018 in accordance with §257.95(h) for Appendix IV constituents that were detected in one or more monitoring wells from the March 2018 sampling event in accordance with §257.95(b). When establishing GWPSs, background concentrations were compared to maximum concentration limits (MCLs) and the concentrations presented for lithium and molybdenum in §257.95(h)(2). Background limits were generated using prediction interval analysis consistent with §257.93(f)(3). The prediction interval assessment was performed using historic data from upgradient monitoring wells MW-3 and MW-4 as the background dataset. As presented on Table 1-1, background concentrations were compared to the levels identified in §257.95(h)(1) or §257.95(h)(2) and the higher of the two values was selected as the GWPS.

Table 1-2 presents the results of the June 2018 groundwater monitoring event and compares detected constituents to their respective GWPS and background concentrations. The June 2018 sampling event conducted at the Bottom Ash Pond was performed per the requirements presented in §257.95(d)(1). As presented on Table 1-2, arsenic was detected at a concentration above the GWPS in samples collected from monitoring wells MW-8A and MW-10. None of the other Appendix IV constituents were detected at concentrations above their respective GWPS.

Three groundwater monitoring wells (MW-13, MW-14, and MW-15) were installed in September 2018 at the locations presented on Figure 1-1 to assess the extent of arsenic at concentrations above the GWPS of 0.010 milligrams per liter (mg/L) in groundwater. Prior to installing these wells, a subsurface investigation was performed using a hydraulic profiling tool (HPT) and electrical conductance (EC) tool to assess the lithology present downgradient of the site. The HPT/EC survey results supported the placement of MW-13, MW-14, and MW-15 at locations that are hydraulically connected to the rest of the groundwater monitoring network and which were believed to be down-gradient and cross-gradient of the pond. On October 1, 2018, the three newly installed monitoring wells were sampled along with existing well network for 40 CFR Part 257 Appendix III parameters and the reduced Appendix IV list. This event also served as the second assessment monitoring event performed in 2018, the results of which are summarized on Table 1-3. As presented on Table 1-3, arsenic was detected in October 2018 at a concentration above the GWPS in samples collected from monitoring wells MW-10, and MW-13. Monitoring well locations are shown on Figure 1-1 and drill logs for MW-13, MW-14, and MW-15 are provided in Appendix A.

Based on review of historical groundwater gradients near the Bottom Ash Pond and the October 2018 and November 2018 potentiometric surface maps, presented as Figures 1-2 through 1-4, MW-13 is believed to be either upgradient or cross gradient of the Bottom Ash Pond. Groundwater elevation data for well gauging events performed in October and December of 2018 are presented on Tables 1-4 through 1-6.

1.2 Alternate Source Investigation Activities

Following review of the October 2018 monitoring event results and potentiometric surface information, Burns & McDonnell, on behalf of BPU, notified the Kansas Department of Health and Environment

(KDHE) of BPU’s intent to conduct an alternate source investigation. KDHE concurred with BPU's approach of conducting an alternate source investigation based on the documented presence of naturally occurring arsenic in Kansas soils and groundwater. The notification to KDHE and KDHE’s concurrence letter are included as Appendix B.

In October 2018, eight direct push borings were advanced in general proximity to the Bottom Ash Pond to assess the range of naturally occurring arsenic concentrations within the unconsolidated aquifer and aid in the placement of a one or more permanent monitoring wells for sampling via low-flow sampling techniques. Direct push boring locations are presented in Figure 1-5. Prior to collecting direct-push groundwater samples, soils were sampled using dual-tube sampling techniques and logged by a Geologist to assess the soil characteristics and to identify groundwater sampling horizons at each location. Groundwater samples were then collected by advancing a direct push rod equipped with a drop-screen sampling device to depths between 20 and 30 below ground surface (bgs). A groundwater sample was collected at each direct push boring location using an inertia pump. Samples were field-filtered and submitted to the project laboratory for the analysis of dissolved arsenic under standard chain of custody procedures. The resulting boreholes were abandoned by backfilling with bentonite chips to 1.0 ft bgs. The remainder of the borehole was allowed to collapse or was filled with material matching the surrounding grade. Direct push boring logs are provided in Appendix C. The Bottom Ash Pond well network was also gauged in conjunction with the direct-push event and the resulting potentiometric surface is presented on Figure 1-3.

Table 1-3 presents the results of the October 2018 direct push sampling event. As presented on Table 1-3, dissolved arsenic was detected at a concentration above the GWPS in samples collected from DPGW-1 and DPGW-5.

Monitoring Well MW-16 was installed in November 2018 in proximity to DPGW-5 to support the collection of groundwater samples for total arsenic using low flow sampling procedures consistent with the Final Rule. This location was selected to better represent the full range of naturally occurring background conditions at locations upgradient of the Bottom Ash Pond and to provide data for use in statistical assessment. Monitoring Wells MW-2A, MW-3, MW-4, MW-8A, MW-10, MW-13, MW-14, MW-15, and MW-16 were sampled in November 2018 for laboratory analysis of total and dissolved arsenic. As presented on Table 1-3, total arsenic was detected at a concentration above the GWPS in samples collected from MW-8A, MW-13, and MW-16. Monitoring well locations are shown on Figure 1-1 with MW-16 drill log provided in Appendix D. Based on review of groundwater gradients near the

Bottom Ash Pond and the November 2018 potentiometric surface map, presented as Figure 1-4, MW-16 is upgradient of the Bottom Ash Pond.

2.0 ALTERNATE SOURCE DEMONSTRATION

Per 40 CFR §257.94.(e)(2), an owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from natural variation in groundwater quality. USEPA's *Solid Waste Disposal Facility Criteria Technical Manual, Subpart E* (EPA530-R-93-017, November 1993) states that an ASD shall document that:

- An alternative source exists.
- Hydraulic connection exists between the alternative source and the groundwater monitoring well(s) with the significant increase.
- Constituent(s) are present at the alternative source or along the flow path from the alternative source prior to possible release from the [CCR] unit.
- The relative concentration and distribution of constituents in the zone of contamination are more strongly linked to the alternative source than to the [CCR] unit when the fate and transport characteristics of the constituents are considered.
- The concentration observed in groundwater could not have resulted from the [CCR] unit given the waste constituents and concentrations in the [CCR] unit impoundment water that is in contact with CCR, and site hydrogeologic conditions.
- The data supporting conclusions regarding the alternative source are historically consistent with hydrogeologic conditions and findings of the monitoring program.

2.1 Hydrogeologic Setting

2.1.1 Local Hydrogeology

The hydrogeology beneath the Bottom Ash Pond is characterized by a single groundwater aquifer comprised of the Missouri River Alluvium (Miller and Vandike, 1997). The Missouri River alluvium receives recharge from four sources: infiltration from the Missouri River, bedrock adjacent to and underlying the alluvium, precipitation falling upon the floodplain, and downward leakage of water from streams, other than the Missouri River, flowing across the alluvium. In areas where surficial materials are sandy and permeable, the amount of recharge water is significant. Where there is a clay or silt overlying the more permeable deposits, the recharge is less. The typical geologic sequences encountered beneath the Site in the alluvial aquifer includes the following (from top to bottom):

- Alluvial silt with some sand and little clay
- Alluvial sand – fine to medium grain, loose, and poorly graded

2.2 Groundwater Occurrence and Flow

The uppermost water bearing zone lies within the thick sand deposits of the alluvial aquifer and is considered to be unconfined. Groundwater depth measurements were collected from the wells presented on Figure 1-1 on October 1, 2018, October 31, 2018, and November 19, 2018 and are summarized in Tables 1-4 through 1-6, respectively. Potentiometric surface maps (Figures 1-2 through 1-4) were prepared using this data and present hydraulic gradients and the general direction of groundwater flow near the Bottom Ash Pond. Figures 1-2 through 1-4 indicate that the direction of groundwater flow beneath the Site is generally to the west-northwest. This is consistent with historical groundwater monitoring activities that show fluctuations in groundwater flow ranging from west-northwest to north-northwest.

Historical groundwater gradients present at the Site and the piezometric surface contours presented on Figures 1-2 through 1-4 indicate that the direction of groundwater flow is predominantly controlled by the presences of horizontal collector wells (HCW)-1 and HCW-2 and the Missouri River elevation. While river stage can affect the direction of groundwater flow at locations near the Bottom Ash Pond during periods of pronounced high water elevations, fluctuations from the predominant north-westerly flow pattern are short lived.

2.2.1 Hydraulic Connectivity and Position of MW-13 and MW-16

Based on review of drill logs and direct sensing (HPT/EC) profiles, the upper unconsolidated water-bearing units consists predominately of alluvial sands and silt with relatively high hydraulic conductivity. These water-bearing units have been observed across the site and are believed to be in hydraulic connection at locations near the Bottom Ash Pond. All the monitoring wells presented in Figure 1-1 and used as part of the Bottom Ash Pond groundwater monitoring program and this ASD are screened within these upper water-bearing units and are expected to be in hydraulic connection with one another. As presented on Figures 1-2 through 1-4, monitoring well MW-13 is upgradient or cross-gradient of the Bottom Ash Pond and monitoring well MW-16 is upgradient of the Bottom Ash Pond. As a result, it can be concluded that the arsenic detected in samples from these monitoring wells did not originate from the Bottom Ash Pond.

2.2.2 Potential for a Release of Arsenic from the Bottom Ash Pond

Bottom Ash Pond surface water samples were collected during select background groundwater monitoring events conducted from 2015 and 2016 for the analysis of 40 CFR Part 257 Appendix III and IV parameters. The Bottom Ash Pond surface water is in contact with CCR and was historically utilized to transport (sluice) CCR into the Bottom Ash Pond as part of a closed loop bottom ash handling system. The results of the Bottom Ash Pond surface water sampling events are presented on Table 2-1. As presented on Table 2-1, total arsenic was either not detected or detected at concentrations well below the GWPS. Based upon a review of the data presented in Table 2-1, the arsenic concentrations observed in MW-8A and MW-10 are not believed to be resultant from the CCR unit given the observed arsenic concentrations in the Bottom Ash Pond surface water samples.

2.3 Natural Variation in Groundwater Quality

As provided in Table 1-1, the Bottom Ash Pond's historical arsenic background concentration of 0.00269 mg/L was determined utilizing interwell prediction limits and sample data collected from October 2015 through June 2018 at upgradient monitoring wells MW-3 and MW-4. Since MW-16 is also located upgradient of the Bottom Ash Pond and provides additional information on the full range of naturally occurring arsenic in the upper portions of the aquifer, it is appropriate to include this location in the development of site-specific background concentration for arsenic at the Bottom Ash Pond. When the total arsenic concentration observed at MW-16 is included in an interwell prediction limit assessment, the background concentration for arsenic was determined to be 0.035 mg/L utilizing data from October 2015 through November 2018 at upgradient wells MW-16, MW-3, and MW-4. A Sanitas ™ output for this statistical evaluation is included in Appendix E.

With the exception of MW-16, concentrations of arsenic observed throughout the CCR Groundwater Monitoring Program do not exceed the calculated background limit of 0.035 mg/L. This along with the gradients presented on Figures 1-2 through 1-4 indicate that arsenic observed in the upper portion of the aquifer is more strongly linked to the natural variation in groundwater quality than to the Bottom Ash Pond.

2.4 Results Summary

Per USEPA's *Solid Waste Disposal Facility Criteria Technical Manual, Subpart E* (EPA530-R-93-017, November 1993), this ASD has documented that:

- ❖ An alternative source exists. Monitoring well MW-16 has arsenic present at three times the GWPS established for the bottom ash pond (0.010 mg/L). The arsenic observed in samples collected from MW-16 is believed to be naturally occurring and representative of background conditions. The highest concentration of arsenic in groundwater was observed at MW-16, which is approximately 1,500 ft upgradient of the Bottom Ash Pond.

- Hydraulic connection exists between the alternative source and the groundwater monitoring well(s) with the significant increase. The alluvial aquifer is consistent across the Site. The established monitoring well network and newly installed monitoring wells at the Site are all screened within the same hydrostratigraphic zone of the alluvial aquifer and are all considered to be hydraulically connected.

- Constituent(s) are present at the alternative source or along the flow path from the alternative source prior to possible release from the [CCR] unit. The highest concentration of arsenic in groundwater was observed at MW-16, which is upgradient of the Bottom Ash Pond.

- The relative concentration and distribution of constituents in the zone of contamination are more strongly linked to the alternative source than to the [CCR] unit when the fate and transport characteristics of the constituents are considered. The highest concentration of arsenic in groundwater was observed at MW-16, which is upgradient of the Bottom Ash Pond.

- The concentration observed in groundwater could not have resulted from the [CCR] unit given the waste constituents and concentrations in the [CCR] unit leachate and wastes, and site hydrogeologic conditions. Arsenic present in the surface water samples collected from the Bottom Ash Pond is more than an order of magnitude lower than the concentration present at MW-16, which is upgradient of the Bottom Ash Pond.

- The data supporting conclusions regarding the alternative source are historically consistent with hydrogeologic conditions and findings of the monitoring program. See Section 2.5.

2.5 Concluding Remarks

As presented in prior sections of this Report, groundwater data collected as part of the alternate source investigation was compared with routine monitoring network data collected from 2015 through 2018. The data presented herein supports the conclusion that the uppermost groundwater zone within the alluvial aquifer is hydraulically connected across the Site and the highest concentration of arsenic observed at the Site is present upgradient of the Bottom Ash Pond at MW-16. Therefore, based on the findings presented in this Report, the detections of arsenic in proximity to the Bottom Ash Pond are believed to be from the natural variation in background groundwater quality that is present at the Site.

3.0 REPORT LIMITATIONS

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

BMcD has exercised reasonable skill, care, and diligence in preparation of this report in accordance with customarily accepted standards of good professional practice in effect at the time this report was prepared. Special risks are inherently associated with the characterization and description of groundwater quality, including, but not limited to: groundwater occurrence, groundwater contaminant concentrations, site geology and site hydrogeology. Even a comprehensive groundwater assessment and/or monitoring program using appropriate equipment, implemented by experienced personnel under the direction of trained professionals may fail to detect certain conditions. Therefore, such conditions may not be identified in this report. For similar reasons, conditions inferred to exist between sampling points might differ significantly from the conditions that actually exist.

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

TABLES

Table 1-1
Summary of Groundwater Protection Standards
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Appendix IV Parameter	Units	Background*	MCL	§257.95(h)(2) Criteria	Groundwater Protection Standard
Arsenic	mg/L	0.00269	0.010	--	0.010
Barium	mg/L	0.182	2	--	2
Fluoride	mg/L	0.1836	4	--	4
Lithium	mg/L	0.06023	--	0.040	0.06023
Molybdenum	mg/L	0.005	--	0.100	0.100
Combined Radium 226 and 228	pCi/L	2.611**	5	--	5

Notes:

*Background concentrations were determined utilizing interwell prediction limits. Upgradient wells MW-3 and MW-4 were used to determine these background concentrations. This included data from October 2015 through June 2018.

**Combined radium is reported with an associated range. However, this range cannot be incorporated into statistical calculations as it varies per result and is not a standard value. Therefore, to maintain consistency in reporting these results, the reported laboratory concentration was used for the statistical analyses.

mg/L - milligrams per Liter
pCi/L - picocuries per Liter
MCL - Maximum Contaminant Level

Table 1-2
Summary of June 2018 Results
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Sample Location Sample Date Lab ID			Calculated Background[1]	GWPS[2]	MW-2A 6/4/2018 L999032-01	MW-3 6/4/2018 L999032-02	MW-4 6/4/2018 L999032-03	MW-8A 6/4/2018 L999032-04	DUP-1 6/4/2018 L999032-06	MW-10 6/4/2018 L999032-05
Analytical Method	**Analyte**	**Unit**						*Duplicate Pair*		
Appendix III - Detection Monitoring										
6010B	Boron	mg/L	0.272	--	0.2 U	0.212	0.2 U	2.44	2.47	1.5
6010B	Calcium	mg/L	228.5	--	156	215	214 O1 V	129	129	168
9056MOD	Chloride	mg/L	12.1	--	4.34	5.74	3.59	25.7	25.5	19.6
9056MOD	Fluoride	mg/L	0.1836	--	0.274 J+	0.173 J+	0.156 J+	0.453 J+	0.441 J+	0.235 J+
9040C	pH	su	6.34	--	7.05 J	6.94 J	6.93 J	6.97 J	6.98 J	6.94 J
In Situ	pH	su	6.56	--	6.81	7.18	6.94	6.86	6.86	6.61
9056MOD	Sulfate	mg/L	150	--	53.8	137	116	353	360	214
2540 C-2011	Total Dissolved Solids	mg/L	852.6	--	537	788	741	853	881	748
Detected Appendix IV - Assessment Monitoring[3]										
6020	Arsenic	mg/L	0.00269	0.010	0.002 U	0.002 U	0.002 U	**0.0204**	**0.0195**	**0.0126**
6010B	Barium	mg/L	0.182	2	0.147	0.159	0.134	0.0559	0.0548	0.107
9056MOD	Fluoride	mg/L	0.1836	4	0.274 J+	0.173 J+	0.156 J+	0.453 J+	0.441 J+	0.235 J+
6010B	Lithium	mg/L	0.06023	0.06023	0.0352	0.0606	0.051	0.0262	0.031	0.0445
6010B	Molybdenum	mg/L	0.005	0.100	0.005 U	0.005 U	0.005 U	0.00865	0.00876	0.005 U
Calculated 904/903.1	Radium 226/228 Combined	pCi/L	2.611	5	1.64	1.62	0.876	1.61	1.54	1.18

Notes

1 - Background concentrations were determined utilizing interwell prediction limits. Upgradient wells MW-3 and MW-4 were used to determine these background concentrations. This included data ranging from October 2015 through June 2018.

2 - GWPSs were developed in accordance with §257.95(h).

3 - Samples were analyzed for Appendix IV parameters which were detected at one or more monitoring wells during the sampling event conducted in accordance with §257.95(b).

BOLD and SHADED Parameter was detected in well(s) located downgradient of the Bottom Ash Pond at a concentration greater than the GWPS.

GWPS - Groundwater Protection Standard

J - qualified as estimated during data validation

J+ - qualified as estimated, biased high, during data validation

mg/l - milligram per liter

pCi/L - picocurie per liter

su - standard unit

U - Non Detect at the identified concentration

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

Table 1-3
Summary of Groundwater Results
October & November 2018 Sampling Events
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Groundwater Sampling Event - October 1 - 3, 2018

Sample Identification:		GWPS	MW-2A	MW-3	MW-4	MW-8A	MW-10	DUP-1
Date(s) Sampled:			10/1 & 10/3/2018	10/2/2018	10/2/2018	10/1 & 10/3/2018	10/1 & 10/3/2018	10/3/2018
Data Package(s):			L1031071-01/10 & L1031413-06	L1031071-02/11 & l1031413-01	L1031071-03/12 & L1031413-02	L1031071-04/13 & L1031413-07	L1031071-05/14 & L1031413-08	L1031071-09/18 & L1031413-09
Note(s):								*Dup of MW-10
Analyte	**Unit**							
Dissolved Solids	mg/l	N/A	580	747	619	920	822	808
Chloride	mg/l	N/A	5.12	7.13	1.95	26.2	18.6	18.7
Fluoride	mg/l	4	0.208	0.186	0.177	0.394	0.219	0.217
Sulfate	mg/l	N/A	68.5	136	87	419	234	232
Arsenic, Total	mg/l	0.01	0.00359	0.0021	0.002 U	0.00278	**0.0245**	**0.0241**
Barium, Total	mg/l	2	0.157	0.163	0.121	0.0602	0.129	0.128
Boron, Total	mg/l	N/A	0.2 U	0.2 U	0.2 U	2.31	1.22	1.23
Calcium, Total	mg/l	N/A	163	207	176	122	179	179
Lithium, Total	mg/l	0.06023	0.027	0.0481	0.0304	0.0174	0.0281	0.0286
Molybdenum, Total	mg/l	0.1	0.005 U	0.005 U	0.005 U	0.00967	0.005 U	0.005 U
pH	su	N/A	6.96 J	6.83 J	6.91 J	6.95 J	6.98 J	6.96 J
Combined Radium	pCi/l	2.611	1.25 J	0.555 J	0.186 J	0.589 J	0.35 J	0.35

Sample Identification:		GWPS	MW-13	MW-14	MW-15			
Date(s) Sampled:			10/1/2018	10/1/2018	10/1/2018			
Data Package(s):			L1031071-06/15 & L1031413-03	L1031071-07/16 & L1031413-04	L1031071-08/17 & L1031413-05			
Note(s):								
Analyte	**Unit**							
Dissolved Solids	mg/l	N/A	542	839	505			
Chloride	mg/l	N/A	19.5	21.5	16.4			
Fluoride	mg/l	4	0.38	0.208	0.462			
Sulfate	mg/l	N/A	155	221	194			
Arsenic, Total	mg/l	0.01	**0.0252**	0.002 U	0.00482			
Barium, Total	mg/l	2	0.205	0.0765	0.107			
Boron, Total	mg/l	N/A	0.2 U	0.2 U	0.2 U			
Calcium, Total	mg/l	N/A	95	200	78.3			
Lithium, Total	mg/l	0.06023	0.0296	0.0297	0.0428			
Molybdenum, Total	mg/l	0.1	0.005 U	0.005 U	0.005 U			
pH	su	N/A	7.1 J	6.7 J	7.45 J			
Combined Radium	pCi/l	2.611	0.765 J	0.138 J	1.35 J			

Note 2: The radium results were presented in a separate data package than the other noted analytes. The first two noted laboratory numbers are the data package for all results except radium. Radium results are presented in the second noted data package.

BOLD and SHADED Parameter was detected in well(s) located downgradient of the Bottom Ash Pond or direct-push samples at a concentration greater than the GWPS.

GWPS - Groundwater Protection Standard
J - Estiimated Value
mg/l - Milligrams per Liter
N/A - Not Applicable
pCi/l - picoCuries per Liter
su - Standard Units
U -Nondetect

Table 1-3
Summary of Groundwater Results
October & November 2018 Sampling Events
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Direct-Push Groundwater Sampling Event - October 29-30, 2018

Sample Identification:		**GWPS**	**DPGW-1/GW01**	**DPGW-DUP/GW01**	**DPGW-2/GW01**	**DPGW-3/GW01**	**DPGW-4/GW01**	
Date(s) Sampled:			**10/30/2018**	**10/30/2018**	**10/29/2018**	**10/30/2018**	**10/30/2018**	
Data Package(s):			**L1039637-04**	**L1039637-05**	**L1039637-01**	**L1039637-06**	**L1039637-09**	
Note(s):				***(Dup of DPGW-1/GW01)**				
Analyte	**Unit**							
Arsenic, Dissolved	mg/l	0.010 *(Total arsenic)	**0.0258**	**0.0239**	0.002 U	0.002 U	0.002 U	

Sample Identification:		**GWPS**	**DPGW-5/GW01**	**DPGW-6/GW01**	**DPGW-7/GW01**	**DPGW-8/GW01**		
Date(s) Sampled:			**10/30/2018**	**10/30/2018**	**10/29/2018**	**10/29/2018**		
Data Package(s):			**L1039637-08**	**L1039637-07**	**L1039637-03**	**L1039637-02**		
Note(s):								
Analyte	**Unit**							
Arsenic, Dissolved	mg/l	0.010 *(Total arsenic)	**0.0314**	0.00273	0.002 U	0.002 U		

Alternative Source Invesigation Sampling Event - November 19-20, 2018

Sample Identification:		**GWPS**	**MW-2A**	**MW-3**	**MW-4**	**MW-8A**	**MW-10**	**DUP**
Date(s) Sampled:			**11/20/2018**	**11/20/2018**	**11/20/2018**	**11/20/2018**	**11/20/2018**	**11/20/2018**
Data Package(s):			**L1046228-01**	**L1046228-02**	**L1046228-03**	**L1046228-04**	**L1046228-05**	**L1046228-10**
Note(s):								**Dup of MW-10**
Analyte	**Unit**							
Arsenic, Total	mg/l	0.010 *(Total arsenic)	0.00324	0.002 U	0.002 U	**0.0183**	0.00789	0.00821
Arsenic, Dissolved	mg/l		0.0023	0.002 U	0.002 U	**0.0146**	0.00453	0.00472

Sample Identification:		**GWPS**	**MW-13**	**MW-14**	**MW-15**	**MW-16**		
Date(s) Sampled:			**11/19/2018**	**11/19/2018**	**11/19/2018**	**11/19/2018**		
Data Package(s):			**L1046228-06**	**L1046228-07**	**L1046228-08**	**L1046228-09**		
Note(s):								
Analyte	**Unit**							
Arsenic, Total	mg/l	0.010 *(Total arsenic)	**0.024**	0.002 U	0.00509	**0.035**		
Arsenic, Dissolved	mg/l		**0.0233**	0.002 U	0.00535	**0.0356**		

Bold and shaded indicates the noted GWPS was exceeded. Note that only a total arsenic GWPS was available for the arsenic screening.

Note 2: The radium results were presented in a separate data package than the other noted analytes. The first two noted laboratory numbers are the data package for all results except radium. Radium results are presented in the second noted data package.

BOLD and SHADED Parameter was detected in well(s) located downgradient of the Bottom Ash Pond or direct-push samples at a concentration greater than the GWPS.

GWPS - Groundwater Protection Standard
J - Estiimated Value
mg/l - Milligrams per Liter
N/A - Not Applicable

pCi/l - picoCuries per Liter
su - Standard Units
U -Nondetect

Table 1-4
Monitoring Well Gauging Data - October 1, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	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	10/1/2018	747.86	31.68	NM	14.32	733.54
MW-3	10/1/2018	750.44	34.7	NM	17.26	733.18
MW-4	10/1/2018	746.9	31.75	NM	14.03	732.87
MW-8A	10/1/2018	750.1	35.17	NM	17.12	732.98
MW-10	10/1/2018	745.25	29.5	NM	11.92	733.33
MW-13	10/1/2018	747.81	33.48	NM	12.25	735.56
MW-14	10/1/2018	749.18	33.27	NM	15.65	733.53
MW-15	10/1/2018	752.88	32.7	NM	15.33	737.55

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 1-5
Monitoring Well Gauging Data - October 31, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	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	10/31/2018	747.86	31.68	NM	14.26	733.60
MW-3	10/31/2018	750.44	34.7	NM	16.55	733.89
MW-4	10/31/2018	746.9	31.75	NM	13.05	733.85
MW-8A	10/31/2018	750.1	35.17	NM	17.40	732.70
MW-10	10/31/2018	745.25	29.5	NM	12.20	733.05
MW-13	10/31/2018	747.81	33.48	NM	12.51	735.30
MW-14	10/31/2018	749.18	33.27	NM	20.05	729.13
MW-15	10/31/2018	752.88	32.7	NM	16.86	736.02

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 1-6
Monitoring Well Gauging Data - November 19, 2018
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

Well	Date Measured	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	11/19/2018	747.86	31.68	NM	15.35	732.51
MW-3	11/19/2018	750.44	34.7	NM	17.63	732.81
MW-4	11/19/2018	746.9	31.75	NM	14.17	732.73
MW-8A	11/19/2018	750.1	35.17	NM	18.58	731.52
MW-10	11/19/2018	745.25	29.5	NM	13.27	731.98
MW-13	11/19/2018	747.81	33.48	NM	13.64	734.17
MW-14	11/19/2018	749.18	33.27	NM	20.15	729.03
MW-15	11/19/2018	752.88	32.7	NM	18.41	734.47
MW-16	11/19/2018	748.43	32.51	NM	14.89	733.54

Notes:

ft - feet

ft bTOC - feet below top of casing

ft MSL - feet above mean sea level.

NM - Not Measured

Table 2-1
2015-2016 Bottom Ash Pond Arsenic Results
Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond

		Sample Location Sample Date Lab ID	GWPS	BA POND 10/30/2015 L798087-09 L798090-06	DUP-2 10/30/2015 L798087-11 L798090-08	BA POND 1/27/2016 L814632-06 390438006	DUP-2 1/27/2016 L814632-08 390438008	BA POND 4/27/2016 L832453-06 20160407-06
Analytical Method	**Analyte**	**Unit**		*Duplicate Pair*		*Duplicate Pair*		
6020	Arsenic	mg/l	0.010	0.002 U	0.002 U	0.00224	0.00205	0.002 U

		Sample Location Sample Date Lab ID	GWPS	BA POND 7/25/2016 L849542-07 20160702-07	DUP-2 7/25/2016 L849542-09 20160702-09	BA POND 10/27/2016 L868992-07 20161076-07	DUP-2 10/27/2016 L868992-09 20161076-09
Analytical Method	**Analyte**	**Unit**		*Duplicate Pair*		*Duplicate Pair*	
6020	Arsenic	mg/l	0.010	0.00254	0.00245	0.00205	0.00213

Notes:

BA = Bottom Ash

mg/l = milligram per liter

U - Non Detect at the identified concentration

FIGURES

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

Legend

- ⊕ BA Pond Monitoring Well
- ⊕ Assessment Monitoring Well
- ⊕ ASD Monitoring Well

0 250 500
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

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

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 1-1_20181008_CCR Well Locations.mxd

Issued: December, 7 2018

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

Legend

⊕ Monitoring Well

→ Approximate Groundwater Flow Direction

— Piezometric Surface Contour

Notes

Groundwater levels used to create piezometric surface gauged on October 1, 2018

0 200 400

Feet

N

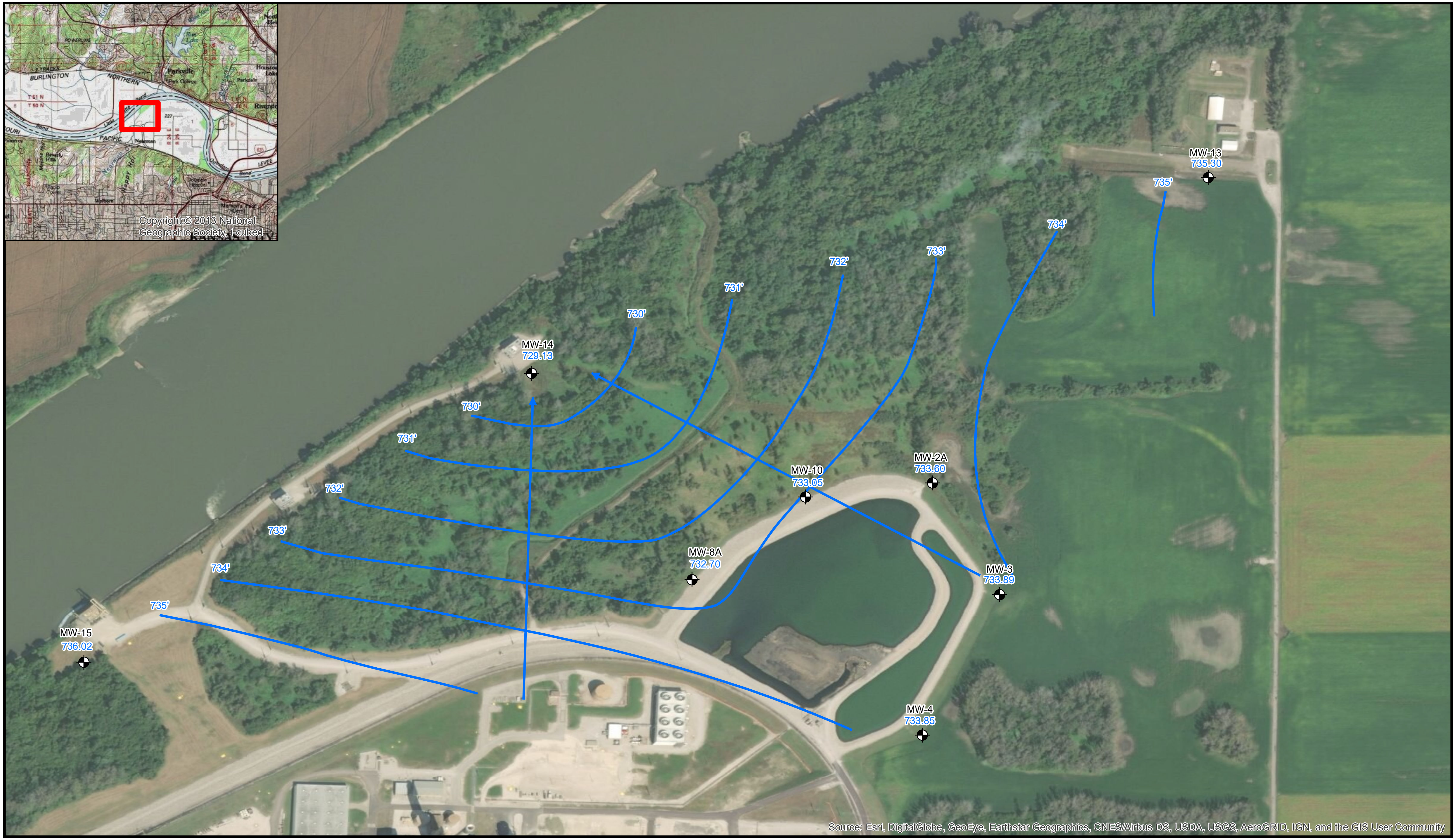
Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 1-2
OCT. 1 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 1-2_20181017_CCR Piezometric Surface Map.mxd

Issued: December, 7 2018



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

Legend

⊕ Monitoring Well

→ Approximate Groundwater Flow Direction

— Piezometric Surface Contour

736.02 Water Level Elevation

Notes

Groundwater levels used to create piezometric surface gauged on October 31, 2018

0 200 400

Feet

N

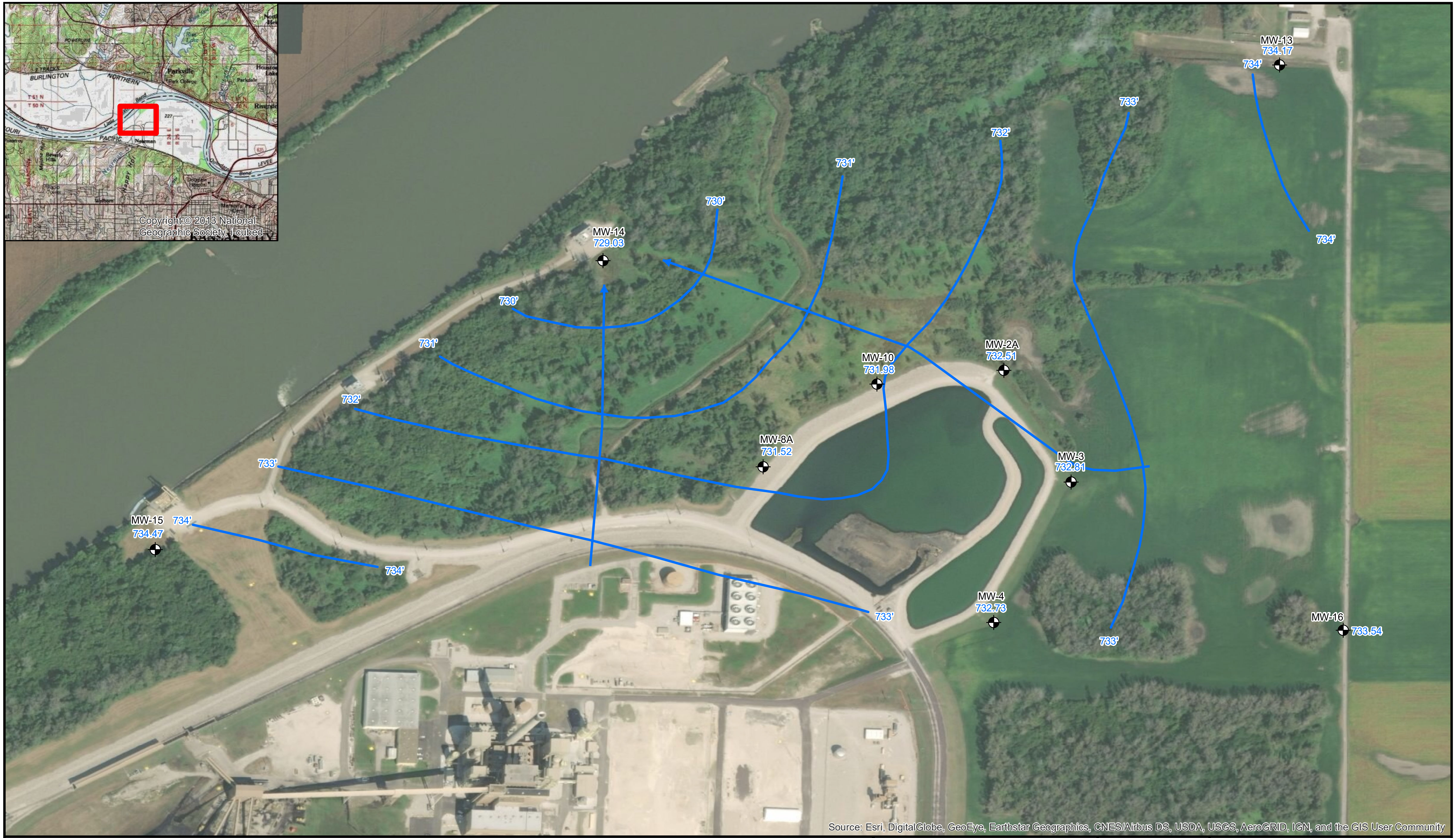
Source: ESRI and Burns & McDonnell Engineering.

BURNS McDONNELL

FIGURE 1-3
OCT. 31 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 1-3_Oct 31 2018 Potentiometric Map.mxd

Issued: December, 7 2018



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

Legend

⌖ Monitoring Well

→ Approximate Groundwater Flow Direction

— Piezometric Surface Contour

733.54 Water Level Elevation

Notes

Groundwater levels used to create piezometric surface gauged on November 19, 2018

0 200 400
Feet

N

Source: ESRI and Burns & McDonnell Engineering.

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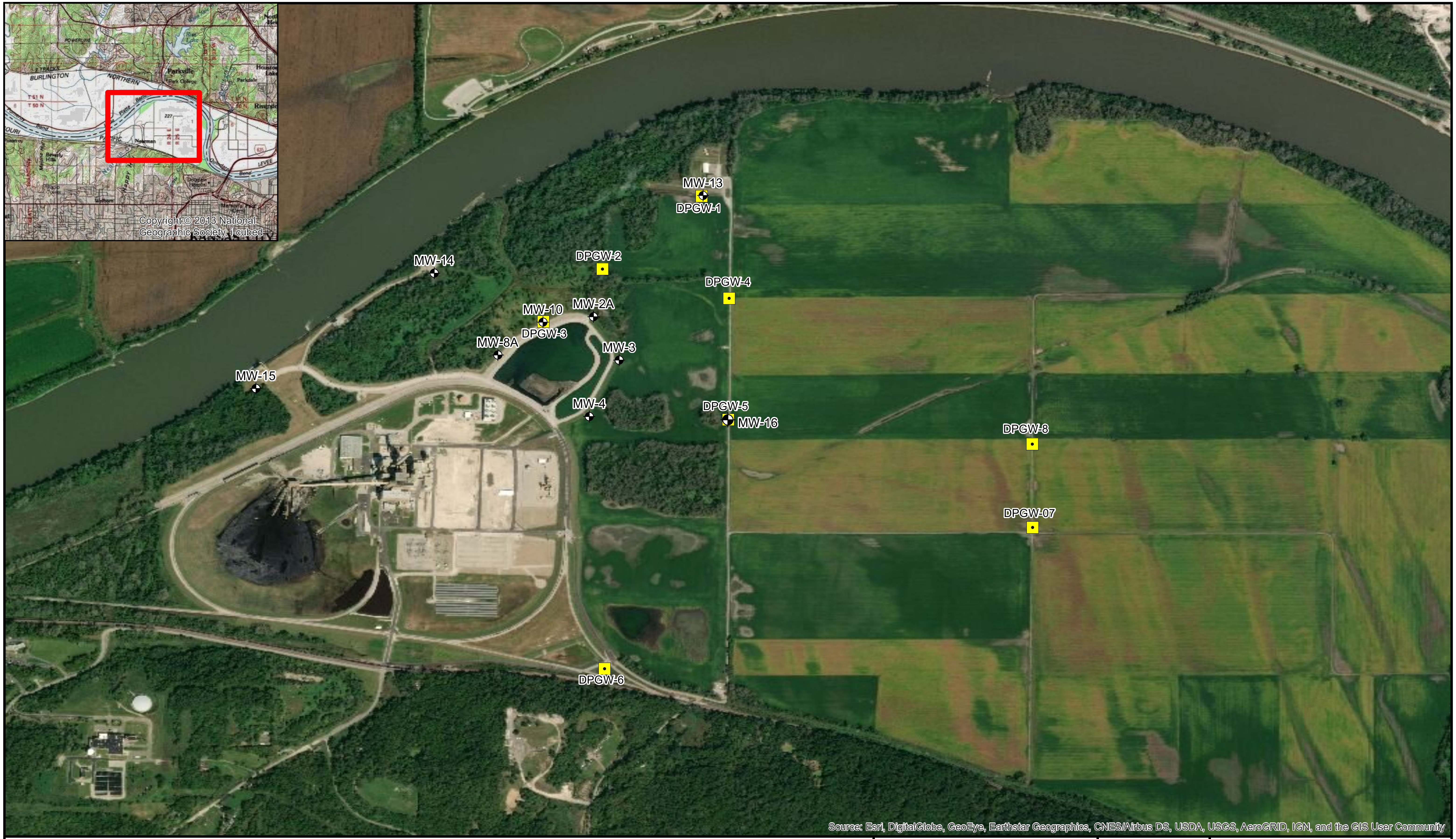
FIGURE 1-4
NOV. 19 2018 POTENTIOMETRIC MAP
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 1-420181205_CCR Piezometric Surface Map.mxd

Issued: December, 7 2018



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

Legend

⊕ Monitoring Wells

🟨 Direct-Push Sample Location

0 500 1,000

Feet

N

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FIGURE 1-5
DIRECT-PUSH LOCATIONS
NEARMAN CREEK POWER STATION
KANSAS CITY BPU
KANSAS CITY, KS

Path: Z:\Clients\ENS\KCBPU\88777_CCRGWMON\Studies\Geospatial\ArcDocs\FIGURE 1-5_20181206_DirectPushSampleLocations.mxd

Issued: December, 7 2018

Source: ESRI and Burns & McDonnell Engineering.

APPENDIX A - SEPTEMBER 2018 MONITORING WELL DRILL LOGS

Drilling Log

Project Name: KCBPU Nearman Creek
Project Number: 88777
Boring Number: MW-15
Ground Elevation:
Location: Kansas City KS
Page: 1 of 2
Air Monitoring Equipment: lel O2
Total Footage: 30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	2"/8¼	30	—	—	

Drilling Company: RAZEL
Driller(s): Tony Poulin
Greg Good
Drilling Rig: Geoprobe 7822DT
Type of Sampler: Macrocore
Date: 9-20-18 To: 9-20-18
Field Observer(s): Kevin Bollin

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	Silt, 10YR 4/3, dry									
	Limestone gravel									
	Silt 10YR 4/3									
1	Limestone gravel									
	Silty, 10YR 4/3, damp, soft			4/5						
2										
3	Sand, very fine to coarse, 10YR 4/3 damp loose									
4	Silt, 10YR 4/3, damp, soft									
5	SAND, 10YR 5/3, damp loose Silt to medium sand, trace gravel				1640					
6	Silt, 10YR 4/1, damp, medium stiff non plastic, trace roots			4/5						
7										
8										
9	SAND, fine sand, 10YR 6/3 damp, loose,									
10					1643					
11										
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

2

Drilling Log Continuation

	Boring Number MW-15
Project Name KCBPU	Page 2 of 2
Project Number 88777	Date 9-20-18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SAND, 10YR 4/3, fine grain, damp, loose									
15					1649					
16				3.5/5.0						
17										
18	wet,									
19	fine to medium grained									
20					1655					
21				2.0/5.0						
22										
23										
24										
25					1708					
26				1.6/50						
27										
28										
29	fine to coarse w gravels									
30										
	EOB 30' bgs									
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

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Drilling Log

Project Name: KC BPU	Project Number: 88777	Boring Number: MW-14
Ground Elevation:	Location: Kansas City KS	Page: 1 of 2
Air Monitoring Equipment: 4-Gas		Total Footage: 30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	8.25	30	—	—	—

Drilling Company: RAZEK	Driller(s): Tony Paltey Greg Goode
Drilling Rig: Geoprobe 7822DT	Type of Sampler: macrocore
Date: 9-20-18 To: 9-20-18	Field Observer(s): Kevin Bolling

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
0	SILT, dark grayish brown 10YR 4/2, damp, soft				1414					
1				3/5						
3	SILT, some clay 10YR 3/1 soft, low, plastic, damp,									
4	SAND, very fine grained									
5	SILT, Brown 10YR 5/3 moist, soft				1420					
6	CLAY, very dark grayish brown 10YR 3/2, damp, medium stiff medium plastic			4/5						
7	SAND, silty sand, fine grained, 10YR 6/3, damp									
8	SILT, 10YR 4/2, moist, soft									
9	SAND, 10YR 6/3, medium grained, damp, loose									
10	SILT, 10YR 4/2, moist, soft w/clay				1420					
11	stiff, med plastic			5/5						
13	SAND, medium grained 10YR 6/3, damp, loose, poorly graded									
14										

BZ=Breathing Zone   BH=Bore Hole   S=Sample

BURNS & McDONNELL

Drilling Log Continuation

Boring Number MW-14

Project Name KCBPU

Page 2 of 2

Project Number 88777

Date 9-2-15

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SAND, 10YR 6/3 damp, medium grained, poorly graded, loose									
15										
16				3/5						
17										
18	wet at 18.5									
19										
20					1430					
21'				2/5						
22	fine ~~medium~~ to coarse, well graded trace gravel									
23										
24	SAND, light yellowish brown 10 YR 4/4, fine to medium grained, wet loose, poorly graded									
25										
26				2.5/5						
27										
28										
29										
30					1445					
	EOB 30' bgs									
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

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Drilling Log

Project Name KCBPU	Project Number 88177	Boring Number MW-13
Ground Elevation	Location Kansas City KS	Page 1 of 2
Air Monitoring Equipment 4-gas		Total Footage 30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	8.25	30	–	–	–

Drilling Company KAZEK	Driller(s) Tony Poulter Greg Gade
Drilling Rig Geoprobe 7822DT	Type of Sampler Macro core
Date 9-20-18 To 9-20-18	Field Observer(s) Kevin Collins

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	Gravel/SILT, 10YR 4/2 dry SILTY, lean clay 10YR 4/3, damp, soft.									
1				3/5						
2										
3										
4	10YR 5/3 moist									
5	SAND, very fine to fine grained, 10YR 5/3 damp, loose poorly sorted				0921					
6				2/5						
7	SILT, 10YR 4/2, dry SAND, very fine to fine grained 10YR 5/3, damp, loose poorly graded									
8										
9										
10				3/5	0924					
11										
12	SILTY [illegible] 2/1, moist soft plastic SAND, dark gray, 10YR 4/1, fine grained, wet									
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number MW-13
Project Name KCBPU	Page 2 of 2
Project Number 85777	Date 9-26-18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	SAND, Da[illegible] 10YR/ [illegible] wet									
15	SAND: 10YR 5/3, fine grained 100%, wet				0914					
16				2/5						
17										
18										
19	SAND: ~~to~~ yellowish brown 10YR 5/6, wet bore, fine to medium grained									
20					0933					
21										
22				1/5						
23										
24	SAND, dark gray 10YR 4/1, well graded, fine to ~~coarse~~ medium, wet									
25	loose fine to coarse grained									
26	trace fine gravels			2/5						
27										
28										
29										
30					0924					
	EOB 30' 16 23									
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

APPENDIX B – KDHE NOTIFICATION AND CONCURRENCE LETTERS

BURNS McDONNELL

October 12, 2018

Mr. Bill Bider
Director - Bureau of Waste Management
Kansas Department of Health & Environment
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

Re: Kansas City Board of Public Utilities
Nearman Creek Power Station Bottom Ash Pond
KDHE Permit No.413
Assessment Monitoring Notification - Alternate Source Demonstration

Dear Mr. Bider:

As indicated in Burns & McDonnell Engineering Company, Inc.'s (Burns & McDonnell's) Notification Regarding Groundwater Protection Standards letter dated October 12, 2018, arsenic has been detected at three wells within the Bottom Ash Pond groundwater monitoring network at statistically significant levels above its groundwater protection standard.

As per §257.95, BPU is planning on conducting an investigation to assess whether a source other than the Bottom Ash Pond is causing the exceedance of the applicable groundwater protection standard. The assessment will include, but may not be limited to, evaluation of natural variation in groundwater quality near the Bottom Ash Pond, groundwater gradients and migration pathways, and will be completed within 90 days from September 13, 2018.

On behalf of BPU, Burns & McDonnell is requesting concurrence with the approach of conducting an alternate source demonstration prior to initiating an assessment of corrective measures for the Bottom Ash Pond, as allowed in 40 CFR, Part 257.

If you have questions regarding the information presented herein, please contact the undersigned at samartin@burnsmcd.com or bhoye@burnsmcd.com.

Sincerely,

Mr. Scott A. Martin, PE
Professional Engineer

Mr. Brian R. Hoye, PG
Project Manager

BRH/sam

Burns & McDonnell Engineering Company, Inc.
9400 Ward Parkway \ Kansas City, MO 64114
O 816-333-9400 \ **F** 816-333-3690 \ burnsmcd.com

STATE OF KANSAS

DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF ENVIRONMENT
CURTIS STATE OFFICE BUILDING
1000 SW JACKSON ST., SUITE 400
TOPEKA, KS 66612-1367

PHONE: (785) 296-1535
FAX: (785) 559-4264
WWW.KDHEKS.GOV

GOVERNOR JEFF COLYER, M.D.
JEFF ANDERSEN, SECRETARY

October 18, 2018

Ingrid Setzler
Director of Environmental Services
Kansas City Board of Public Utilities
300 N 65th St.
Kansas City, KS 66102

RE: Assessment Monitoring Notification – Alternate Source Demonstration
Nearman Creek Power Station, Bottom Ash Pond, Permit 413
Kansas City, Wyandotte County

Dear Ingrid Setzler:

The Kansas Department of Health and Environment – Bureau of Waste Management (KDHE/BWM) has received and reviewed the above referenced letter communicating the Board of Public Utilities' (BPU) plan to conduct an alternate source demonstration at the Nearman Creek Power Station's Bottom Ash Pond. This investigation would assess whether a source other than the Bottom Ash Pond is responsible for statistically significant increases of arsenic above the site's groundwater protection standard at three monitoring wells. KDHE/BWM concurs with BPU's approach of conducting an alternate source demonstration under 40 CFR, Part 257 based on the documented presence of naturally occurring arsenic in Kansas soils and groundwater.

If you have any questions, please contact me at William.Bider@ks.gov or 785-296-1612.

Sincerely,

William L Bider

William L. Bider
Director
Bureau of Waste Management

C: Tom Winn, KDHE/NEDO → Waste Programs
Dennis Degner, KDHE/BWM
Mike Selm, KDHE/BWM
Wally Mack, KDHE/BWM
Scott A. Martin, Burns & McDonnell
Brian R. Hoye, Burns & McDonnell

APPENDIX C – OCTOBER 2018 DIRECT-PUSH DRILL LOGS

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-1
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25"	20	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate Sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	Asphalt gravel 0.4' SILT, some clay, very dark grayish brown (10YR 3/2) damp, medium to low plasticity, medium consistency.		NA		NA		NA			START 0818 Dual-Tube
1		ML				DPGW-1 SS01 1-2'				Offset x2 low recovery
2				2/5						
3										
4										0830
5										
6	SAND, trace silt, pale brown (10YR 6/3) Fine grain, loose moist, poorly graded.	SP								
7	SILT, some clay, very dark grey GLEY1 (3N) wet, medium plasticity, soft consistency.	ML								
8						DPGW-1 SS02 8-9'				
9	SILTY SAND very dark grey Gley1 (3N) wet, trace plasticity, soft	SP								0835
10										▽ moisture
11	SAND. brown (10YR 4/3) Fine grain, loose, wet, poorly graded	SP								
12				4/5						
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number DPGW-1

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, brown (10YR 4/3) fine grain, loose, wet, poorly graded.	SP	NA		NA			NA		
15										0845
16										
17				5/5						
18										
19	SAND, brown (10YR 4/3) loose, fine to medium grain, wet, poorly graded	SP								
20										0850 Stop
	Bottom of Boring - SAND HEAVE.									
						DPGW-1 GW01 22-26' Dup				offset Boring for GW

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-2
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-push	3.25	25	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate Sleeve
Date 10/29/18 To 10/29/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	SILT, trace clay, very dark grayish brown (10YR 3/2), damp, trace plasticity to non plastic, medium to soft consistency.	ML	NA		NA			NA		START 1454 Dual-Tube
1				3.5/5		DPGW-2 SS01 1-2'				
2	trace iron color									
3	SAND, trace silt, yellowish brown (10YR 5/6) fine grain, loose, damp poorly graded.	SP								
4										1455
5	SILT, some sand, dark gray (10YR 4/1) damp, non plastic, soft consistency.	ML				DPGW-2 SS02 5-6'				
6				3.5/5						▼
7	SAND, trace silt, pale brown (10YR 6/3) Fine grain, loose, damp to moist to wet, poorly graded.	SP								moisture
8										
9										1457
10										
11				3.8/5						
12										
13	becomes very dark gray (Gley 1 3/N)									
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

Boring Number DPGW-2

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, dark grayish brown (10YR 4/2) Fine to medium grain, loose, wet	SP	NA		NA			NA		
15										1500
16										
17				4/5						
18										
19										
20	trace shale fragments									1510
21						DPGW-2 GW01 20-24'				Offsite Boring For GW
22				5/5						
23										
24										
25										1515 STOP
	Bottom of Boring - SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-3
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	20	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate Sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	CLAY with silt, very dark grayish brown (10YR3/2) damp, medium plasticity, stiff to medium.	CL	NA		NA					START 1013
1	SILT, trace clay brown (10YR4/3), damp nonplastic, soft consistency	ML		3/5		DPGW-3 SS01 1-2'				Dual-Tube
2	SAND, trace silt, brown (10YR4/3) fine grain, loose, damp, poorly graded.	SP								
3										
4	1 mm dark seam									1015
5										
6										
7				3.5/5						
8						DPGW-3 SS02 7.5-8.5' Dup				
9										▼ 1018
10	Becomes wet									moisture
11				4/5						
12										
13	SAND, trace silt, fine to medium grain brown (10YR4/3) loose, wet, poorly graded	SP								
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-3
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, trace silt, fine to coarse, finegravel traces. brown (10YR 4/3). loose, wet, wellgraded	SP	NA		NA			NA		
15										1020
16										
17				5/5						
18	Dark area black (10YR 2/1) 0.24'									
19										
20										1028 STOP
	Bottom of Boring. SAND HEAVE.									
						DPGW-3 GW01 22-26'				Offset Boring For GW

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-4
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25"	25	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SILT with clay, very dark grayish brown (10YR 3/2) damp, medium plasticity, soft.	ML	NA		NA			NA		START 1425 Dual Tube
1				2/5		DPGW-4 SS01 1-2'				
2										
3	2" sand seam.									
4	SILT very dark grayish brown (10YR 3/2) damp. non plastic, soft.	ML								1426
5										
6				2/5						
7	SAND, trace silt pale brown (10YR 6/3) finegrain loose, damp. poorly graded.	SP								
8										
9										1428
10						DPGW-4 SS02 10-11'				
11	SAND, trace silt, dark grayish brown (10YR 4/2) Fine grain, trace medium loose, damp. poorly graded becomes wet	SP								
12				3/5						▼ moisture
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number DPGW-4
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, trace silt, dark grayish brown (10YR 4/2) fine grain trace medium loose, wet, poorly graded	SP	NA		NA			NA		
15										1430
16										
17				4/5						
18										
19										
20										1438
21										
22				5/5						
23										
24						DPGW-4 GW01 24-28' MS/MSD				Boring offset for GW 1445 STOP
25										
	Bottom of Boring - SAND HEAVE.									

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-5
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	25	NA	3	NA

Drilling Company EPS	Driller(s) Blake Martin.
Drilling Rig 7822 DT	Type of Sampler Acetate Sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	SILT with clay very dark grayish brown (10YR 3/2) damp, medium plasticity, soft.	ML	NA		NA					START 1318 DUAL-TUBE
1						DPGW-5 SS01 1-2'				
2	SILT, very dark grayish brown (10YR 3/2) damp to moist. trace plasticity, soft.			2.5/5						
3		ML								
4										1319
5										
6										
7				3/5						
8										
9	SAND, trace silt. pale brown (10YR 6/3) brown (10YR 4/3), fine grain, loose, wet poorly graded	SP				DPGW-5 SS02 9-10'				1320
10						ms/msD				
11				3/5						▼ moisture
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number DPGW-5
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, pale brown (10YR6/3) brown (10YR4/3) fine grain, loose, wet, poorly graded.	SP	NA		NA			NA		
15										1324
16										
17				4/5						
18										
19	SAND, very dark gray (Gley 1 3/N) fine to coarse grain, loose, WET, moderately graded.	SP								
20										1327
21				5/5						
22	Fine grain									
23										
24	more gravel.					DPGW-5 GW01 24-28'				Offset Boring for GW 1340 STOP
25										
	Bottom of Boring - Heaving SAND									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-6
Ground Elevation	Location	Page 1 of 3
Air Monitoring Equipment NA		Total Footage 35

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	35	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
1	CLAY with silt, very dark grayish brown (10YR 3/2), damp, medium to trace plasticity. medium consistency	CL	NA		NA	DPGW-6 SS01 1-2'	NA			START 1140
2 3 4 5	SILT, trace clay very dark grayish brown (10YR 3/2) damp. trace plasticity. medium consistency.	ML		3/5						1142
6 7 8 9	SILT, trace clay, dark gray (10YR 4/1) damp. non plastic, medium consistency.	ML		5/5						
10	SILT with clay, brown (10YR 4/3) damp. medium plasticity, medium consistency	ML								1143
11 12 13 14	SILT with clay, brown (10YR 4/2) and very dark grayish brown (10YR 3/2) medium plasticity, damp, medium consistency.	ML		3.5/5						

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS McDONNELL

Drilling Log Continuation

	Boring Number DPGW-6
Project Name Nearman Creek	Page 2 of 3
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SILT, with clay, brown (10YR 4/2) and very dark grayish brown (10YR 3/2) damp medium plasticity, medium consistency.	ML	NA		NA			NA		1144
15						DPGW-6 SS02 15-16'				
16				5/5						
17	SILT with very fine sand, dark grayish brown (10YR 4/2) moist to wet, nonplastic, soft consistency.	ML								moisture ▽
18										
19										1146
20	SAND with silt, Fine grain, dark grayish brown (10YR 4/2) wet, loose, poorly graded.	SP				←	DPGW-6 GW01 20-24'			Offset Boring For GW.
21										
22				5/5						
23										
24										1148
25										
26										
27				5/5						
28										
29										1155
30	SILT with clay and fine sand, very dark greenish gray (Gley 1 3/1), wet, medium to high plasticity. Soft consistency	ML		5/5						
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

010515 Form WCD-KC-2-2

Drilling Log Continuation

Boring Number DPGW-6

Project Name Nearman Creek

Page 3 of 3

Project Number 88777

Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
32	SILT, with clay and fine sand, very dark greenish grey (Gley 1 3/1), wet, medium to high plasticity. soft consistency	ML	NA	5/5	NA			NA		
33										
34										
35										1200 STOP
	Bottom of Boring.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

Drilling Log

Project Name: Nearman Creek
Project Number: 88777
Boring Number: DPGW-7
Ground Elevation:
Location:
Page: 1 of 2
Air Monitoring Equipment: NA
Total Footage: 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	25	NA	3	NA

Drilling Company: EPS
Driller(s): Blase Martin
Drilling Rig: 7822DT
Type of Sampler: acetate sleeve
Date: 10/29/18
To: 10/29/18
Field Observer(s): Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SILT, trace clay, very dark grayish brown (10YR 3/2), damp, trace plasticity, soft consistency.	ML	NA		NA		NA			START 1751
1				2/5		DPGW-7/ SS01 1-2'				Dual-Tube
2	SAND, trace silt, pale brown (10YR 4/1) fine grain, loose, damp, poorly graded.	SP								
3										
4										1752
5										
6										
7				3/5						
8	SAND, trace silt, dark grayish brown (10 YR 4/2) Finegrain, trace medium. loose, ~~wet~~ damp LT, poorly graded									
9		Sp				DPGW-7 SS02 9-10'				1758
10										
11	becomes wet.			4/5						▽ moisture
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

Boring Number	DPGW-7
Project Name	Nearman Creek
Page	2 of 2
Project Number	88777
Date	10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, trace silt, dark grayish brown (10YR 4/2) fine grain, trace medium loose, damp to wet, poorly graded	SP	NA		NA			NA		
15										1801
16				5/5						
17										
18										
19										1805
20	SAND, very dark gray (10YR 3/1), fine grain, loose, wet, poorly graded. Some organic material.	SP								
21						DPGW-7 GW01 21-25				Offset boring for GW.
22				5/5						
23										
24	SAND, dark grayish brown (10YR 4/2) fine to coarse sand, fine gravel, loose, wet, well graded.	SP								
25										1810 STOP
	BOTTOM OF BORING. SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log

Project Name: Nearman Creek
Project Number: 88777
Boring Number: DPGW-8
Ground Elevation:
Location:
Page: 1 of 2
Air Monitoring Equipment: NA
Total Footage: 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	20	NA	3	NA

Drilling Company: EPS
Driller(s): Blase Martin
Drilling Rig: 7822DT
Type of Sampler: Acetate sleeve
Date: 10/29/18
To: 10/29/18
Field Observer(s): Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	SILT, trace clay, very dark grayish brown (10YR3/2), damp. trace plasticity, medium consistency.	ML	NA		NA		NA			START 1630
1				2.5/5		DPGW-8 SS01 1-2' Dup				Dual-Tube
2	SAND, trace silt, pale brown (10YR4/1) Fine grain, loose, damp, poorly graded.	SP								
3										
4										1633
5										
6				3/5						
7										
8										
9										1635
10	SAND, trace silt, dark grayish brown (10YR4/2) fine grain trace medium, loose, wet, poorly graded.	SP		3.5/5		DPGW-8 SS02 10-11'				
11										
12										Moisture ▽
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number DPGW-8
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, trace silt, dark grayish brown (10YR 4/2) Fine grain, trace medium, loose, wet, poorly graded.	SP	NA		NA			NA		
15										1640
16						DPGW-8 GW01 16-20'				offset boring for GW.
17				5/5						
18										
19										
20										1650 STOP
	Bottom of Boring. SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

APPENDIX D – NOVEMBER 2018 MONITORING WELL DRILL LOGS

Drilling Log

Project Name: KC BPU Nearman Creek
Project Number: 88777
Boring Number: MW-16
Ground Elevation:
Location: KCK
Page: 1 of 2
Air Monitoring Equipment: —
Total Footage:

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	8"				

Drilling Company: RAZEK
Driller(s): Tony Poulter, Greg Cool
Drilling Rig: Geoprobe 7822DT
Type of Sampler: Macro core
Date: 11-15-18 To: 11-15-18
Field Observer(s): Kevin Bolling

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
0	CLAY, 10YR 3/3, medium soft, moist, plastic,			25/5						
2.7	SILT, 10YR 5/3, damp, soft									
5				0941	0941					
6				3.5/4						
7	SAND, 10YR 6/3, very fine sand, some silt, damp, loose									
10				0943	0943					
11				4/5	4/5					
11.5	wet at 12'									
12	CLAY, some silt, 10YR 4/1, soft moist, medium plastic									
13.5	SAND, fine sand, some silt, 10YR 4/1 moist, loose									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

Drilling Log Continuation

Boring Number MW-16

Project Name KCBPU Nearman Creek

Page 2 of 2

Project Number 88777

Date 11-15-78

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SAND, fine grained, some silt, 10YR 4, moist, loose									
15					0946					
16				4/5						
17	Silt, trace fine sand, wet soft, w									
18										
19	SAND, 10YR 4/1, well graded fine to coarse, gravel, wet									
20										
21	SAND fine to medium grained, 10YR 4, wet, loose, trace wood, trace charcoal.									
22				3/5						
23										
24										
25										
26										
27				3/5						
28										
29										
30					0957					
	EOB · 30' 657									
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell SINCE 1898

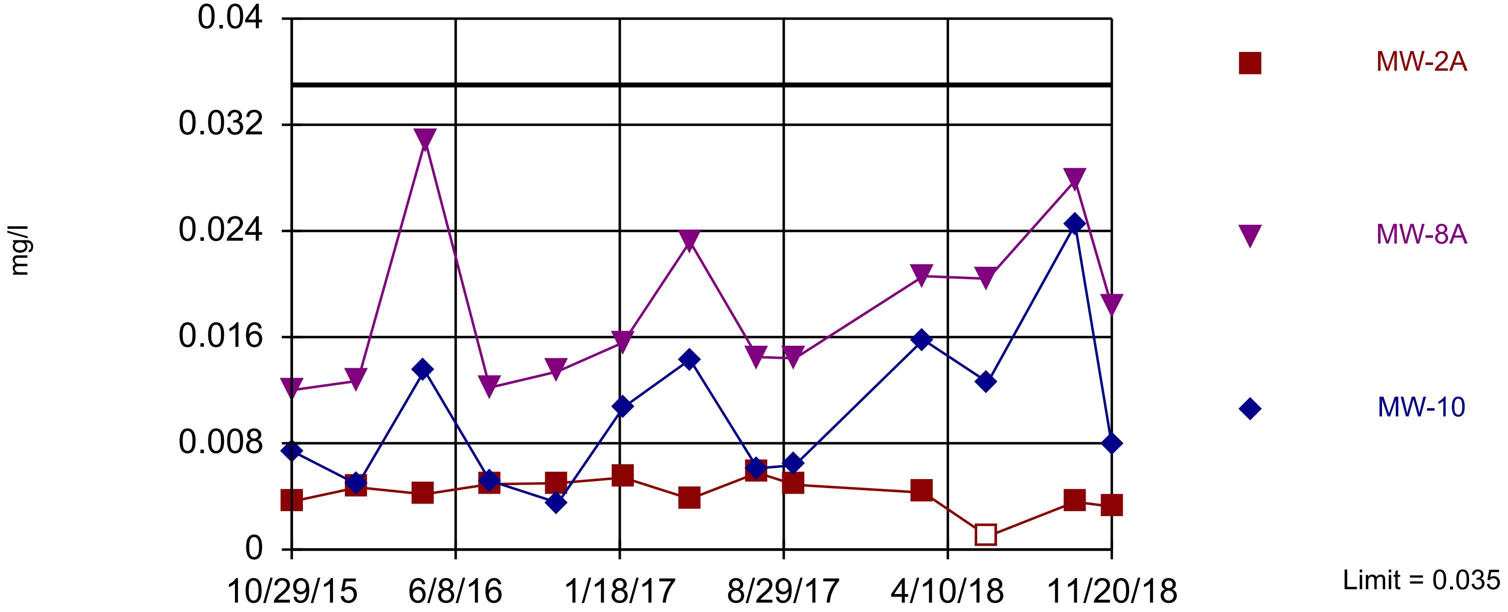
APPENDIX E – SANITAS^{TM} SOFTWARE STATISTICAL OUTPUT

Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 27 background values. 81.48% NDs. Report alpha = 0.1. Individual comparison alpha = 0.03451. Most recent point for each compliance well compared to limit. After outlier removal distribution was non-normal, so outlier results were invalidated. Seasonality was not detected with 95% confidence.

Constituent: Arsenic Analysis Run 12/4/2018 5:16 PM

BPU Client: Burns & McDonnell Data: BPU_Groundwater_CCR

Interwell Prediction Limits - BPU Alt Source Demonstration

BPU Client: Burns & McDonnell Data: BPU_Groundwater_CCR Printed 12/4/2018, 5:18 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Arsenic (mg/l)	MW-2A	0.035	n/a	11/20/2018	0.00324	No	27	81.48	n/a	0.03451	NP Inter (NDs)
Arsenic (mg/l)	MW-8A	0.035	n/a	11/20/2018	0.0183	No	27	81.48	n/a	0.03451	NP Inter (NDs)
Arsenic (mg/l)	MW-10	0.035	n/a	11/20/2018	0.00789	No	27	81.48	n/a	0.03451	NP Inter (NDs)

CREATE AMAZING.

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
O 816-333-9400
F 816-333-3690
www.burnsmcd.com

APPENDIX B – FIELD DOCUMENTATION

FIELD GROUND-WATER SAMPLING REPORT

DATE: 3-8-18 SITE: LCBPU PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 40s, 5mph by partly cloudy

WELL NUMBER

MW-2A

DEPTH TO WATER (ft): 24.88

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)
1245	I	400	6.75	14.65	0.989	47.7	45.9	6.82	24.88
1250	0.53	400	6.26	15.29	0.855	24.5	54.9	1.60	24.88
1255	1.07	400	6.25	15.39	1.060	9.43	51.0	0.97	24.88
1300	1.60	400	6.28	15.19	1.064	5.39	48.0	0.64	24.88
1305	2.14	400	6.29	15.18	1.066	3.08	46.7	0.40	24.88
1310	2.67	400	6.31	15.28	1.064	2.14	44.9	0.31	24.88
1315	3.21	400	6.37	15.21	1.068	2.01	39.6	0.26	24.88
1320	3.74	400	6.39	15.18	1.069	1.74	36.5	0.21	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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1325	3.74	6.39	15.18	1.069	1.74	36.5	0.21	24.88	—

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

SAMPLE ID: MW-2A SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Sb, As, Ba, Be, Cd, Cr, Co, F-, Pb, Li, Hg, Mo, Se, Th, Ra

FERROUS IRON (mg/L): — IDW TOTAL: 3.74

METER MODEL No.: YSI 556MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		3.8.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 3.8.18 SITE: KCBPW PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 40s, 5mph W, partly cloudy

WELL NUMBER

MW-3

DEPTH TO WATER (ft): 27.44

TOTAL DEPTH (ft): ________ 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)
1340	I	400	6.65	14.87	1.239	2.81	73.4	4.80	27.44
1345	0.53	400	6.27	15.05	1.229	2.53	89.3	1.78	27.77
1350	1.07	400	6.28	15.01	1.223	2.00	85.9	0.98	27.77
1355	1.60	400	6.40	15.10	1.220	1.24	79.6	0.65	27.77
1400	2.14	400	6.44	15.08	1.220	1.36	77.9	0.57	27.77
1405	2.67	400	6.45	15.04	1.219	1.27	76.5	0.47	27.77
1410	3.21	400	6.45	15.14	1.219	1.24	76.4	0.44	27.77
1415	3.74	400	6.45	15.16	1.219	1.31	75.8	0.42	

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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1415	3.74	6.45	15.16	1.219	1.31	75.8	0.42	27.77	—

FINAL DEPTH TO WATER (ft TOC): 27.77 TIME FINAL DEPTH TAKEN: 1415

SAMPLE ID: MW-3 SAMPLE ID FOR QC: MW-3 /ms msd

PARAMETERS REQUESTED FOR ANALYSIS: Sb, As, Ba, Be, Cd, Cr, Co, F, Pb, Li, Hg, Mo, Se, Tl, Ra

FERROUS IRON (mg/L): — IDW TOTAL: 3.74

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		3.8.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 3.8.18 SITE: KCBPA PID READING at WELL HEAD (ppm): -

PROJECT NUMBER: 83777 WEATHER: 60s, 5mph W, partly cloudy

WELL NUMBER

MW-4

DEPTH TO WATER (ft): 2434

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)
1610	I	400	7.07	14.05	1.140	0.51	94.6	4.63	24.34
1615	0.53	400	6.66	14.90	1.204	0.41	103.5	1.57	24.39
1620	1.07	400	6.65	15.06	1.203	0.43	99.6	0.96	24.39
1625	1.60	400	6.72	14.95	1.201	0.32	96.3	0.68	24.39
1630	2.14	400	6.70	14.90	1.197	0.35	97.2	0.45	24.39
1635	2.67	400	6.69	14.90	1.195	0.37	97.5	0.39	24.39
1640	3.21	400	6.68	14.87	1.194	0.34	97.4	0.35	24.34

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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1645	3.21	6.68	14.87	1.194	0.34	97.4	0.35	24.39	—

FINAL DEPTH TO WATER (ft TOC): 24.34 TIME FINAL DEPTH TAKEN: 1645

SAMPLE ID: MW-4 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Sb, As, Ba, Be, Cd, Ca, Co, Fr, Pb, Cr, Mo, Hg, Se, Th, Zn

FERROUS IRON (mg/L): — IDW TOTAL: 3.21

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		3.8.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: ~~10~~ 3-8-18. SITE: KCBPa-Normal PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 40s, 5mph N, partly cloudy

WELL NUMBER: MW-8A

DEPTH TO WATER (ft): 28.25

TOTAL DEPTH (ft): ____ 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1055	I	400	6.58	14.63	1.451	14.00	101.6	3.57	28.25
1100	0.53	400	6.78	15.50	1.462	11.7	-4.4	1.30	28.28
1105	1.07	400	6.89	15.51	1.460	8.31	-21.2	0.91	28.28
1110	1.60	400	6.94	15.51	1.462	5.26	-32.7	0.59	28.28
1115	2.14	400	6.94	15.56	1.463	2.47	-35.9	0.46	28.28
1120	2.67	400	6.92	15.56	1.465	2.02	-37.2	0.45	28.28
1125	3.21	400	6.91	15.57	1.466	1.67	-39.9	0.45	28.28

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.
1130	3.21	6.91	15.57	1.466	1.67	-39.9	0.45	28.28	—

FINAL DEPTH TO WATER (ft TOC): 28.28 TIME FINAL DEPTH TAKEN: 1130

SAMPLE ID: MW-8A SAMPLE ID FOR QC: Dup-1

PARAMETERS REQUESTED FOR ANALYSIS: ~~An~~ Sb, As, Ba, Be, Cd, Cr, Co, F, Pb, Li, Hg, Mo, Se, Th, & Ra

FERROUS IRON (mg/L): — IDW TOTAL: 3.21

METER MODEL No.: YSI 556 mps

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		3-8-18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 3-8-18 SITE: KCBPW PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 40s, 5 mph W, partly cloudy

WELL NUMBER

MW-10

DEPTH TO WATER (ft): 22.65

TOTAL DEPTH (ft): ______ 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1150	I	400	6.62	14.22	1.126	96.9	28.4	4.64	22.65
1155	0.53	400	6.31	14.50	1.114	23.8	29.3	1.95	22.65
1200	1.07	400	6.26	14.55	1.119	2.1	23.5	0.96	22.65
1205	1.60	400	6.34	14.56	1.124	~~6.4~~9.15	16.1	0.62	22.65
1210	2.14	400	6.39	14.52	1.124	6.94	11.1	0.50	22.65
1215	2.67	400	6.41	14.56	1.128	~~6.[illegible]~~5.21	7.9	0.41	22.65
1220	3.21	400	6.40	14.55	1.130	4.43	6.7	0.35	22.65
1225	3.74	400	6.41	14.52	1.130	3.75	7.0	0.32	22.65

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.
1230	3.74	6.41	14.52	1.130	3.75	7.0	0.32	22.65	—

FINAL DEPTH TO WATER (ft TOC): 22.65 TIME FINAL DEPTH TAKEN: 1230

SAMPLE ID: MW-10 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Sb, As, Ba, Be, Cu, Cr, Co, F, Pb, Li, Hg, Mo, Se, Th, Ra

FERROUS IRON (mg/L): — IDW TOTAL: 3.74

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		3.8.18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 6-4-18 SITE: **CCR BPU** PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 83°F, PARTLY CLOUDY, CALM

WELL NUMBER: MW-2A

DEPTH TO WATER (ft): 19.94 TOTAL DEPTH (ft): 31.68 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)
1130	1	500	6.72	14.91	891	35	18.3	3.12	19.95
1135	0.6	500	6.79	14.82	852	7.5	12.2	2.43	19.95
1140	1.2	500	6.79	14.83	846	6.1	3.1	2.08	19.95
1145	1.8	500	6.80	14.79	843	5.2	-2.5	2.01	19.95
1150	2.4	500	6.81	14.86	842	4.7	1.6	1.96	19.85

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 (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1155	2.4	6.81	14.86	842	4.7	1.6	1.96	19.95	—

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 19.95 TIME FINAL DEPTH TAKEN: 1205

SAMPLE ID: MW-2A/GW SAMPLE ID FOR QC: NA

PARAMETERS REQUESTED FOR ANALYSIS: TOTAL RADIUM 226/228, Chloride, Floride, SULFATES, pH, metals, TDS, Calcium, Boron, Lithium, molybdenum

IDW TOTAL: 2.4 gal Water Quality Instrument Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Katie Schwth		6-4-18
REVIEWED:	Jonathan Hermanson		6-11-18

FIELD GROUNDWATER SAMPLING REPORT

DATE: 6-4-18 SITE: **CCR BPU** PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 80°F, Partly cloudy, calm

WELL NUMBER: MW-3

DEPTH TO WATER (ft): 22.60 TOTAL DEPTH (ft): 33.90 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)
1045	I	500	7.13	15.03	1156	6.6	5.7	4.31	22.63
1050	0.6	500	7.18	15.01	1149	5.3	-2.6	3.00	22.62
1055	1.2	500	7.20	14.27	1145	4.1	-21.7	2.96	22.62
1100	1.8	500	7.26	14.36	1155	2.7	-24.3	2.89	22.62
1105	2.4	500	7.18	14.18	1150	2.1	-28.1	2.81	22.62

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.
1110	2.4	7.18	14.18	1150	2.1	-28.1	2.81	22.62	—

Ferrous Iron (mg/L): —

FINAL DEPTH TO WATER (ft TOC): 22.62 TIME FINAL DEPTH TAKEN: 1120

SAMPLE ID: MW-3/GW SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: RA 226/228, Chloride, Fluoride, Sulfates, pH, metals, TDS, Calcium, Molybdenum, Lithium, Boron

IDW TOTAL: 2.4 Water Quality Instrument Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schuth		6-4-18
REVIEWED:	Jonathan Hermanson	Jonathan Hermanson	6-11-18

FIELD GROUNDWATER SAMPLING REPORT

DATE: 6-4-18 SITE: **CCR BPU** PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 81°F, mostly cloudy, calm

WELL NUMBER: MW-4

DEPTH TO WATER (ft): 19.36 TOTAL DEPTH (ft): 31.86 WELL DIAMETER (inches): 4

DEPTH TO TOP OF PUMP (ft): — DEPTH TO TOP OF YSI (ft): NA (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)
0945	1	500	6.92	13.15	1127	5.2	22.1	2.73	19.76
0950	0.6	500	6.95	13.62	1077	4.7	-9.6	1.62	19.36
0955	1.2	500	6.94	13.41	1075	4.3	-13.1	1.59	19.36
1000	1.8	500	6.94	13.47	1071	3.2	-14.3	1.56	19.36
~~1005~~									

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.
1005	1.8	6.94	13.47	1071	3.2	-14.3	1.56	19.36	—

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 18.76 TIME FINAL DEPTH TAKEN: 1035

SAMPLE ID: MW-4/GW SAMPLE ID FOR QC: MS/MSD collected

PARAMETERS REQUESTED FOR ANALYSIS: Total Ra 226/228, Chloride, Flouride, Sulfates, TDS pH, metals, calcium, Boron, lithium, molybdenum

IDW TOTAL: 1.8 Water Quality Instrument Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schulte		6-4-18
REVIEWED:	Jonathan Hermanson	Jonathan Hermanson	6-11-18

FIELD GROUNDWATER SAMPLING REPORT

DATE: 6-4-18 SITE: **CCR BPU** PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 70°F, Mostly cloudy, calm

WELL NUMBER: MW-8A

DEPTH TO WATER (ft): 23.16 TOTAL DEPTH (ft): 35.19 WELL DIAMETER (inches): 2"

DEPTH TO TOP OF PUMP (ft): – DEPTH TO TOP OF YSI (ft): NA (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)
0735	I	500	7.01	13.16	1341	74	14.3	1.12	23.18
0740	0.6	500	6.86	13.15	1296	35	1.7	0.89	23.18
0745	1.2	500	6.85	13.26	1291	25	-13.0	0.78	23.18
0750	1.8	500	6.84	13.41	1285	18	-14.1	0.51	23.18
0755	2.4	500	6.83	13.31	1283	12	-14.5	0.23	23.18
0800	3.0	500	6.84	13.28	1282	9.2	-14.6	0.23	23.18
0805	3.6	500	6.84	13.31	1282	7.6	-14.9	0.22	23.18
0810	4.2	500	6.86	13.01	1281	4.7	-14.3	0.22	23.18

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.
0815	4.2	6.86	13.01	1281	4.7	-14.3	0.22	23.18	–

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 23.18 TIME FINAL DEPTH TAKEN: 0835

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

PARAMETERS REQUESTED FOR ANALYSIS: Ra 226/228, chloride, fluoride, sulfates, TDS pH, metals, calcium, Boron, lithium, molybdenum.

IDW TOTAL: 4.2 Water Quality Instrument Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schuth		6-4-18
REVIEWED:	Jonathan Hermanson		6-11-18

FIELD GROUNDWATER SAMPLING REPORT

DATE: 6-4-18 SITE: **CCR BPU** PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 78° F, cloudy, calm

WELL NUMBER: MW-10

DEPTH TO WATER (ft): 17.53 TOTAL DEPTH (ft): 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)
0845	1	500	6.67	13.71	1286	87	21.2	0.55	17.63
0850	0.6	500	6.61	13.63	1241	43	4.7	0.31	17.53
0855	1.2	500	6.61	12.82	1238	36	-12.6	0.34	17.53
0900	1.8	500	6.61	13.55	1227	22	-13.1	0.18	17.53
0905	2.4	500	6.61	13.56	1226	15	-15.0	0.17	17.53
0910	3.0	500	6.61	13.57	1225	11	-15.9	0.17	17.53
0915	3.6	500	6.60	13.54	1229	8.7	-15.8	0.17	17.53
0920	4.2	500	6.61	13.48	1223	4.4	-15.7	0.17	17.53

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.
0925	4.2	6.61	13.48	1223	4.4	-15.7	0.17	17.53	—

Ferrous Iron (mg/L): NA

FINAL DEPTH TO WATER (ft TOC): 17.53 TIME FINAL DEPTH TAKEN: 0935

SAMPLE ID: MW-10/GW SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Total Ra 226/228, chloride, fluoride, sulfates, TDS, pH, metals, calcium, Boron, lithium, molybdenum

IDW TOTAL: 4.2 Water Quality Instrument Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schotte		6-4-18
REVIEWED:	Jonathan Hermanson	Jonathan Hermanson	6-11-18

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10.3.18 SITE: KCBPU-Nearman PID READING at WELL HEAD (ppm): —

PROJECT NUMBER: 88777 WEATHER: 70s, 5-20 mph S, partly cloudy

WELL NUMBER

MW-2A

DEPTH TO WATER (ft): 14.26

TOTAL DEPTH (ft): 31.67 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0930	I	300	6.46	15.43	0.924	7.21	36.3	0.91	14.26
0935	0.40	300	6.77	14.74	0.912	4.67	32.6	0.26	14.26
0940	0.80	300	6.79	14.68	0.908	4.02	27.0	0.15	14.26
0945	1.20	300	6.80	14.58	0.906	3.46	21.5	0.07	14.26

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.
0950	1.20	6.80	14.58	0.906	3.46	21.5	0.07	14.26	-

FINAL DEPTH TO WATER (ft TOC): 014.26 TIME FINAL DEPTH TAKEN: 0955

SAMPLE ID: MW-2A SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Chloride, Flouride, TDS, + Radium

FERROUS IRON (mg/L): — IDW TOTAL: 1.20 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		10.3.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10.2.18 SITE: KCBPU-Newman PID READING at WELL HEAD (ppm): –

PROJECT NUMBER: 88777 WEATHER: 60s, 5mph W, overcast

WELL NUMBER

MW-3

DEPTH TO WATER (ft): 17.19

TOTAL DEPTH (ft): 39.01 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1010	I	300	6.64	14.90	1.291	3.92	83.9	1.45	17.19
1015	0.40	300	6.70	14.70	1.256	3.05	64.5	0.70	17.19
1020	0.80	300	6.67	14.07	1.252	2.76	51.7	0.37	17.19
1025	1.20	300	6.66	14.19	1.247	2.64	53.0	0.22	17.19
1030	1.60	300	6.66	14.29	1.245	2.40	53.8	0.19	17.19

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.
1035	1.60	6.66	14.24	1.245	2.40	53.8	0.19	17.19	–

FINAL DEPTH TO WATER (ft TOC): 17.19 TIME FINAL DEPTH TAKEN: 1035

SAMPLE ID: MW-3 SAMPLE ID FOR QC: –

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Chloride, Fluoride,

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

METER MODEL No.: YSI MPS556

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Hermanson	10.2.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10.2.18 SITE: KCBPU - Newman PID READING at WELL HEAD (ppm): –

PROJECT NUMBER: 88777 WEATHER: 70s, 5-10 w, partly cloudy

WELL NUMBER

MW-4

DEPTH TO WATER (ft): ~~32.~~ 13.90

TOTAL DEPTH (ft): 32.00 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1055	I	300	6.74	15.28	1.126	2.36	116.1	1.60	13.90
1100	0.40	300	6.73	14.37	1.070	1.19	116.2	0.48	13.90
1105	0.80	300	6.78	14.30	1.038	1.24	113.6	0.23	13.90
1110	1.20	300	6.79	14.26	1.023	1.03	104.3	0.17	13.90
1115	1.60	300	6.80	14.27	1.020	1.13	95.8	0.15	13.90

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.
1120	1.60	6.80	14.27	1.020	1.13	95.8	0.5	13.90	–

FINAL DEPTH TO WATER (ft TOC): 13.90 TIME FINAL DEPTH TAKEN: 1120

SAMPLE ID: MW-4 SAMPLE ID FOR QC: –

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Chloride, Fluoride, Radium, TDS

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

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		10.2.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10.3.18 SITE: KCBPa-Newman PID READING at WELL HEAD (ppm): –

PROJECT NUMBER: 88777 WEATHER: 70s, 5-20 mph,

WELL NUMBER

MW-8A

DEPTH TO WATER (ft): 17.45

TOTAL DEPTH (ft): 35.20 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0735	I	300	6.33	15.49	1.240	48.6	58.0	0.54	17.45
0740	0.40	300	6.78	14.91	1.237	25.4	5.0	0.30	17.45
0745	0.80	300	6.84	14.83	1.240	20.6	-25.0	0.36	17.45
0750	1.20	300	6.85	14.80	1.245	12.2	-46.5	0.34	17.45
0755	1.60	300	6.85	14.80	1.246	9.28	-59.6	0.19	17.45
0800	2.00	300	6.85	14.77	1.247	7.46	-60.4	0.16	17.45
0805	2.40	300	6.86	14.80	1.247	4.22	-61.6	0.14	17.45

Continued on back (circle one) yes / [✓ no]

SAMPLING

Equipment Used: [✓ Same as above] Other ________

Sample Time (24 hr)	Total Purged (gals)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
0810	2.40	6.86	14.80	1.247	4.22	-61.6	0.14	17.45	–

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

SAMPLE ID: MW-8A SAMPLE ID FOR QC: MW-8A/MS + MW-8A/MSD

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Chloride, Flouride, TDS, + Radium

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

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		10.3.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10.3.18 SITE: KCBPU-Nearman PID READING at WELL HEAD (ppm): –

PROJECT NUMBER: 88777 WEATHER: 70s, 5-20 mph S, partly cloudy

WELL NUMBER: MW-10

DEPTH TO WATER (ft): 12.20

TOTAL DEPTH (ft): 29.62 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0835	I	300	6.43	15.56	1.189	42.3	32.4	0.89	12.20
0840	0.40	300	6.75	15.98	1.184	32.0	-18.5	0.34	12.20
0845	0.80	300	6.79	14.92	1.184	24.4	-42.9	0.24	12.20
0880	1.20	300	6.79	14.86	1.184	19.0	-49.1	0.18	12.20
0855	1.60	300	6.79	14.84	1.185	15.7	-56.0	0.13	12.20
0900	2.00	300	6.80	14.86	1.185	11.0	-58.1	0.13	12.20
0905	2.40	300	6.80	14.77	1.183	7.21	-61.6	0.11	12.20
0910	2.80	300	6.80	14.79	1.182	4.53	-62.9	0.08	12.20

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	2.80	6.80	14.79	1.182	4.53	-62.9	0.08	12.20	–

FINAL DEPTH TO WATER (ft TOC): 12.20 TIME FINAL DEPTH TAKEN: 0915

SAMPLE ID: MW-10 SAMPLE ID FOR QC: Dup-1

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Chloride, Flouride, TDS, Radium

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

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Hermanson	10.3.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10-1-18 SITE: KCB PA-Norman PID READING at WELL HEAD (ppm): -

PROJECT NUMBER: 88777 WEATHER: 70s, 5-20 mphs, overcast

WELL NUMBER

MW-13

DEPTH TO WATER (ft): 12.25

TOTAL DEPTH (ft): 33.48 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1000	I	100	5.14	20.88	0.626	25.4	-79.2 ~~132.0~~	2.46	12.25
1005	0.13	100	5.81	20.61	0.647	21.7	-83.8	1.97	12.25
1010	0.26	100	5.98	20.03	0.678	18.3	-85.8	1.40	12.25
1015	0.40	100	6.23	19.49	0.701	14.1	-89.4	0.81	12.25
1020	0.53	100	6.86	19.20	0.712	10.7	-92.0	0.65	12.25
1025	0.66	100	7.49	19.34	0.715	8.62	-95.3	0.66	12.25
1030	0.79	100	8.20	19.54	0.718	7.09	-97.5	0.64	12.25
1035	0.92	100	8.61	19.39	0.714	5.34	-100.4	0.59	12.25
1040	1.05	100	8.65	19.44	0.720	4.15	-104.3	0.56	12.25

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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1050	1.18	8.67	19.32	0.718	4.58	-110.5	0.56	12.25	—

FINAL DEPTH TO WATER (ft TOC): 12.25 TIME FINAL DEPTH TAKEN: 1050

SAMPLE ID: MW-13 SAMPLE ID FOR QC: —

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Radon, TDS, Chloride, Floride

FERROUS IRON (mg/L): - IDW TOTAL: 1.18 gal

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson		10-1-18
REVIEWED:			

WELL NUMBER

MW-13

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)
1045	1.18	100	8.67	19.32	0.718	4.58	-10.5	0.54	12.25

COMMENTS

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10.1.18 SITE: KCBPU-Nearman PID READING at WELL HEAD (ppm): –

PROJECT NUMBER: 88777 WEATHER: 70s, 5-10 mph S-10, overcast

WELL NUMBER

mw-14

DEPTH TO WATER (ft): 1555

TOTAL DEPTH (ft): 33.27 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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1135	I	300	6.6	12.80	1.126	5.22	89.7	1.29	15.55
1140	0.40	300	6.6	17.18	1.127	2.23	79.5	1.04	15.55
1145	0.80	300	6.7	16.74	1.113	1.52	46.7	0.80	15.55
1150	1.20	300	6.7	16.58	1.110	2.10	62.0	0.37	15.55
1155	1.60	300	6.7	16.49	1.110	1.95	60.4	0.26	15.55
1200	2.00	300	6.7	16.38	1.110	1.83	56.2	0.17	15.55

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 (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1205	2.00	6.7	16.38	1.112	1.83	56.2	0.17	15.55	–

FINAL DEPTH TO WATER (ft TOC): 1555 TIME FINAL DEPTH TAKEN: 1205

SAMPLE ID: mw-14 SAMPLE ID FOR QC: –

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Radon, Chloride, Fluoride, TDS

FERROUS IRON (mg/L): – IDW TOTAL: 2-60gal

METER MODEL No.: YSI 556 MPS

CHECKED FLOW THROUGH CELL FOR LEAKS: ☑ COMMENTS: NA

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Hermanson	Jonathan Herman	10.1.18
REVIEWED:			

FIELD GROUND-WATER SAMPLING REPORT

DATE: 10.1.18 SITE: KCBPU-Nearman PID READING at WELL HEAD (ppm): –

PROJECT NUMBER: 38777 WEATHER: 70s, 5-10 mph S, overcast

WELL NUMBER

MW-15

DEPTH TO WATER (ft): 15.39

TOTAL DEPTH (ft): 32.70 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)
1235	I	300	6.8	21.62	0.699	1.06	-119.0	1.14	15.39
1240	0.40	300	6.8	22.28	0.688	1.18	-94.1	0.45	15.39
1245	0.80	300	6.9	22.31	0.686	1.42	-81.1	0.25	15.39
1250	1.20	300	6.9	22.39	0.686	1.31	-82.0	0.21	15.39
1255	1.60	300	6.9	22.48	0.686	1.25	-82.9	0.18	15.39

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	1.60	6.9	22.48	0.686	1.25	-82.9	0.18	15.39	–

FINAL DEPTH TO WATER (ft TOC): 15.39 TIME FINAL DEPTH TAKEN: 1300

SAMPLE ID: MW-15 SAMPLE ID FOR QC: –

PARAMETERS REQUESTED FOR ANALYSIS: Metals, Radon, Chloride, Fluoride, & TDS

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

METER MODEL No.: YSI 556 MPS

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

	NAME	SIGNATURE	DATE
PREPARED:	Jonathan Henerson		10.1.18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/20/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 35 F / Partly Cloudy / Calm

WELL NUMBER: MW-2A

DEPTH TO WATER (ft): 15.41 WELL DIAMETER (inches): 2

TOTAL DEPTH (ft): DEPTH TO TOP OF YSI (ft):

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

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE! Gallons per Casing Volume: #VALUE!

Gallons per foot: 0.1632

Equipment Used: Dedicated Bladder Pump

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)
11:35	I	250	7.1	14.47	0.89	44	118.4	4.38	15.43
11:40	0.33	250	6.6	14.75	0.904	27	56.1	1.37	15.43
11:45	0.66	250	6.6	14.77	0.906	12	21.6	0.83	15.43
11:50	0.99	250	6.6	14.7	0.908	9	-24.7	0.47	15.43
11:55	1.33	250	6.7	14.79	0.909	7	-27.5	0.45	15.43
12:00	1.66	250	6.7	14.81	0.908	6	-28.7	0.44	15.43

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
12:05	1.66	6.7	14.81	0.908	6	-28.7	0.44	15.43	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 15.43 TIME FINAL DEPTH TAKEN: 12:08

SAMPLE ID: MW-2A/GW SAMPLE ID FOR QC:

PARAMETERS REQUESTED FOR ANALYSIS:

☐ RCRA Metals 6010B short list

☐ Hexavalent Chromium 7195

☐ VOCs 8268 full list

☐ Perchlorate 6860

☑ Others Total and Dissolved Arsenic

☐ VOCs 8268 short list

☑ Explosives 8330 short list

☐ TDS 160.1

☐ PCBs 8082

IDW TOTAL: 1.66 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/20/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 35 F / Partly Cloudy / Calm

WELL NUMBER: MW-3

DEPTH TO WATER (ft): 17.75
TOTAL DEPTH (ft):
DEPTH TO TOP OF PUMP (ft):

WELL DIAMETER (inches): 4
DEPTH TO TOP OF YSI (ft): -162.3
(for downhole DO measurement)

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE!
Gallons per foot: 0.6528
Gallons per Casing Volume: #VALUE!

Equipment Used: Dedicated Bladder Pump

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)
10:45	I	250	6.7	13.12	1.089	12	41.8	3.76	17.76
10:50	0.33	250	6.6	14.07	1.126	8	-39.3	1.75	17.79
10:55	0.66	250	6.6	14.49	1.148	5	-71.4	0.75	17.8
11:00	0.99	250	6.6	14.39	1.147	4	-75.1	0.34	17.78
11:05	1.33	250	6.6	14.5	1.149	4	-78	0.32	17.78
11:10	1.66	250	6.6	14.47	1.15	4	-79.1	0.31	17.79

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
11:15	1.66	6.6	14.47	1.15	4	-79.1	0.31	17.79	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 17.79 TIME FINAL DEPTH TAKEN: 11:18

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

PARAMETERS REQUESTED FOR ANALYSIS:

☐ RCRA Metals 6010B short list
☐ Hexavalent Chromium 7195
☐ VOCs 8268 full list
☐ Perchlorate 6860
☑ Others Total and Dissolved Arsenic
☐ VOCs 8268 short list
☑ Explosives 8330 short list
☐ TDS 160.1
☐ PCBs 8082

IDW TOTAL: 1.66 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/20/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 32 F / Partly Cloudy / Calm

WELL NUMBER: MW-4

DEPTH TO WATER (ft): 14.31 WELL DIAMETER (inches): 4

TOTAL DEPTH (ft): DEPTH TO TOP OF YSI (ft):

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

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE! Gallons per Casing Volume: #VALUE!

Gallons per foot: 0.6528

Equipment Used: Dedicated Bladder Pump

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)
10:00	I	250	6.8	14.27	0.944	11	-4.6	2.6	14.32
10:05	0.33	250	6.7	14.69	0.955	4	-44.8	1.17	14.32
10:10	0.66	250	6.7	14.84	0.959	2	-50.6	1.01	14.32
10:15	0.99	250	6.7	14.86	0.959	2	-54.1	0.9	14.32
10:20	1.33	250	6.7	14.91	0.96	1	-53.1	0.86	14.32
10:25	1.66	250	6.7	14.94	0.96	1	-53.5	0.82	14.32

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
10:30	1.66	6.7	14.94	0.96	1	-53.5	0.82	14.32	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 14.32 TIME FINAL DEPTH TAKEN: 10:33

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

PARAMETERS REQUESTED FOR ANALYSIS:

☐ RCRA Metals 6010B short list

☐ Hexavalent Chromium 7195

☐ VOCs 8268 full list

☐ Perchlorate 6860

☑ Others Total and Dissolved Arsenic

☐ VOCs 8268 short list

☐ Explosives 8330 short list

☐ TDS 160.1

☐ PCBs 8082

IDW TOTAL: 1.66 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/20/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 41 F / Partly Cloudy / Calm

WELL NUMBER: MW-8A

DEPTH TO WATER (ft): 18.7 WELL DIAMETER (inches): 2

TOTAL DEPTH (ft): DEPTH TO TOP OF YSI (ft):

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

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE! Gallons per Casing Volume: #VALUE!

Gallons per foot: 0.1632

Equipment Used: Dedicated Bladder Pump

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)
13:05	I	250	6.8	14.86	1.2	97	-12.7	4.76	18.7
13:10	0.33	250	6.7	15.56	1.218	63	1.1	2.11	18.7
13:15	0.66	250	6.7	15.76	1.22	50	-11.8	1.01	18.7
13:20	0.99	250	6.7	15.62	1.225	40	-27.4	0.51	18.7
13:25	1.33	250	6.6	15.7	1.227	29	-35.1	0.42	18.7
13:30	1.66	250	6.6	15.73	1.231	21	-39	0.31	18.7
13:35	1.99	250	6.6	15.69	1.239	16	-46.8	0.2	18.7
13:40	2.33	250	6.6	15.66	1.239	12	-50.1	0.19	18.7
13:45	2.66	250	6.6	15.77	1.24	9	-50.7	0.18	18.7

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
13:50	2.66	6.6	15.77	1.206	9	-50.7	0.18	18.7	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 18.7 TIME FINAL DEPTH TAKEN: 13:53

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

PARAMETERS REQUESTED FOR ANALYSIS:

☐ RCRA Metals 6010B short list
☐ Hexavalent Chromium 7195
☐ VOCs 8268 full list
☐ Perchlorate 6860
☑ Others Total and Dissolved Arsenic
☐ VOCs 8268 short list
☑ Explosives 8330 short list
☐ TDS 160.1
☐ PCBs 8082

IDW TOTAL: 1.66 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/20/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 38 F / Partly Cloudy / Calm

WELL NUMBER: MW-10

DEPTH TO WATER (ft): 13.37
TOTAL DEPTH (ft):
DEPTH TO TOP OF PUMP (ft):

WELL DIAMETER (inches): 2
DEPTH TO TOP OF YSI (ft):
(for downhole DO measurement)

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE!
Gallons per foot: 0.1632
Gallons per Casing Volume: #VALUE!

Equipment Used: Dedicated Bladder Pump

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)
12:20	I	250	6.5	15.12	1.184	70	-1.2	3.08	13.39
12:25	0.33	250	6.5	15.41	1.212	24	-27.2	0.87	13.39
12:30	0.66	250	6.5	15.52	1.213	12	-39	0.34	13.39
12:35	0.99	250	6.6	15.46	1.21	10	-39	0.28	13.39
12:40	1.33	250	6.6	15.41	1.209	9	-39.4	0.26	13.39
12:45	1.66	250	6.6	15.38	1.206	7	-38.7	0.27	13.39

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
12:50	1.66	6.6	15.38	1.206	7	-38.7	0.27	13.39	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 13.39 TIME FINAL DEPTH TAKEN: 12:53

SAMPLE ID: MW-10/GW SAMPLE ID FOR QC: DUP-1/GW

PARAMETERS REQUESTED FOR ANALYSIS:
☐ RCRA Metals 6010B short list
☐ Hexavalent Chromium 7195
☐ VOCs 8268 full list
☐ Perchlorate 6860
☑ Others Total and Dissolved Arsenic
☐ VOCs 8268 short list
☑ Explosives 8330 short list
☐ TDS 160.1
☐ PCBs 8082

IDW TOTAL: 1.66 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/19/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 32 F / Partly Cloudy / Calm

WELL NUMBER: MW-13

DEPTH TO WATER (ft): 13.64
TOTAL DEPTH (ft):
DEPTH TO TOP OF PUMP (ft):

WELL DIAMETER (inches): 2
DEPTH TO TOP OF YSI (ft): 33
(for downhole DO measurement)

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE!
Gallons per Casing Volume: #VALUE!
Gallons per foot: 0.1632

Equipment Used: Dedicated Bladder Pump

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)
12:45	I	250	7.68	14.27	0.635	38	14.2	3.01	13.65
13:00	0.33	250	7.121	13.51	0.634	43	-76.8	2.92	13.66
13:05	0.66	250	6.987	13.67	0.637	65	-102.7	2.58	13.66
13:10	0.99	250	6.983	13.89	0.641	58	-129.6	2.04	13.67
13:15	1.33	250	6.98	14.07	0.642	36	-148.1	1.21	13.67
13:20	1.66	250	6.981	14.08	0.642	28	-150	0.96	13.67
13:25	1.99	250	6.98	14.21	0.642	26	-149.3	0.9	13.67
13:30	2.33	250	6.982	14.18	0.641	23	-142.3	0.86	13.67
13:35	2.66	250	6.981	14.17	0.64	19	-145.1	0.87	13.67
13:40	2.99	250	6.98	14.08	0.64	15	-142.8	0.84	13.67
13:45	3.33	250	6.981	14.07	0.636	16	-149.6	0.81	13.67
13:50	3.66	250	6.979	14.12	0.636	13	-147.5	0.8	13.67
13:55	3.99	250	6.979	14.08	0.635	9	-146.8	0.8	13.67

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
14:00	3.99	6.979	14.08	0.635	9	-146.8	0.8	13.67	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 13.67 TIME FINAL DEPTH TAKEN: 14:05

SAMPLE ID: MW-13/GW SAMPLE ID FOR QC:

PARAMETERS REQUESTED FOR ANALYSIS:

☐ VOCs 8268 full list ☐ VOCs 8268 short list ☐ TDS 160.1
☐ RCRA Metals 6010B short list ☐ Perchlorate 6860 ☐ Explosives 8330 short list ☐ PCBs 8082
☐ Hexavalent Chromium 7195 ☑ Others Total and Dissolved Arsenic

IDW TOTAL: 3.99 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/19/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 32 F / Partly Cloudy / Calm

WELL NUMBER: MW-14

DEPTH TO WATER (ft): 19.41

TOTAL DEPTH (ft):

DEPTH TO TOP OF PUMP (ft):

WELL DIAMETER (inches): 2

DEPTH TO TOP OF YSI (ft):

(for downhole DO measurement)

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE!

Gallons per foot: 0.1632

Gallons per Casing Volume: #VALUE!

Equipment Used: Dedicated Bladder Pump

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)
15:45	I	250	10.25	14.06	1.11	3	-195.1	3.46	19.41
15:50	0.33	250	7.106	14.26	1.182	4	12.7	0.27	19.48
15:55	0.66	250	6.802	14.78	1.186	4	15.3	0.25	19.57
16:00	0.99	250	6.804	14.85	1.185	4	17.1	0.24	19.65
16:05	1.33	250	6.804	14.74	1.185	4	18.6	0.23	19.71

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
16:10	1.33	6.804	14.74	1.185	4	18.6	0.23	19.71	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 19.73 TIME FINAL DEPTH TAKEN: 16:13

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

PARAMETERS REQUESTED FOR ANALYSIS:

☐ RCRA Metals 6010B short list

☐ Hexavalent Chromium 7195

☐ VOCs 8268 full list

☐ Perchlorate 6860

☑ Others Total and Dissolved Arsenic

☐ VOCs 8268 short list

☐ Explosives 8330 short list

☐ TDS 160.1

☐ PCBs 8082

IDW TOTAL: 1.33 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/19/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 32 F / Partly Cloudy / Calm

WELL NUMBER: MW-15

DEPTH TO WATER (ft): 18.85

TOTAL DEPTH (ft):

DEPTH TO TOP OF PUMP (ft):

WELL DIAMETER (inches): 2

DEPTH TO TOP OF YSI (ft):

(for downhole DO measurement)

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE!

Gallons per foot: 0.1632

Gallons per Casing Volume: #VALUE!

Equipment Used: Dedicated Bladder Pump

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)
16:25	I	250	6.8	19.58	0.758	6	3.6	1.25	18.86
16:30	0.33	250	6.872	21.87	0.674	4	-18.2	0.51	18.89
16:35	0.66	250	6.876	21.82	0.671	4	-47.1	0.37	18.88
16:40	0.99	250	6.877	21.78	0.68	3	-51.2	0.35	18.88
16:45	1.33	250	6.877	21.56	0.681	3	-53.1	0.34	18.89
16:50	1.66	250	6.878	21.6	0.681	3	-55.1	0.34	18.88

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
16:55	1.66	6.878	21.6	0.681	3	-55.1	0.34	18.89	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 18.89 TIME FINAL DEPTH TAKEN: 16:58

SAMPLE ID: MW-15/GW SAMPLE ID FOR QC: MS/MSD

PARAMETERS REQUESTED FOR ANALYSIS:

☐ RCRA Metals 6010B short list

☐ Hexavalent Chromium 7195

☐ VOCs 8268 full list

☐ Perchlorate 6860

☑ Others Total and Dissolved Arsenic

☐ VOCs 8268 short list

☐ Explosives 8330 short list

☐ TDS 160.1

☐ PCBs 8082

IDW TOTAL: 1.66 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

FIELD GROUNDWATER SAMPLING REPORT

DATE: 11/19/18 SITE: BPU - Nearman PID READING at WELL HEAD (ppm): NA

PROJECT NUMBER: 88777 WEATHER: 32 F / Partly Cloudy / Calm

WELL NUMBER: MW-16

DEPTH TO WATER (ft): 14.89

TOTAL DEPTH (ft):

DEPTH TO TOP OF PUMP (ft):

WELL DIAMETER (inches): 2

DEPTH TO TOP OF YSI (ft): -162.3

(for downhole DO measurement)

PURGING

CASING VOLUME CALCULATION:

Height of Water Column: #VALUE!

Gallons per foot: 0.1632

Gallons per Casing Volume: #VALUE!

Equipment Used: Nondedicated Bladder Pump

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)
14:05	I	250	7.018	13.78	1.108	18	-162.3	2.81	14.9
14:50	0.33	250	6.896	13.74	1.005	13	-62.3	0.81	14.91
14:55	0.66	250	6.37	13.76	1.003	9	-67	0.62	14.9
15:00	0.99	250	6.865	13.8	1.003	6	-71.5	0.5	14.9
15:05	1.33	250	6.863	13.76	1.002	5	-72.1	0.46	14.9
15:10	1.66	250	6.863	13.72	1.002	5	-77.2	0.45	14.9

Continued on additional page ☐ Yes ☑ No

SAMPLING Equipment Used: 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.
15:15	1.66	6.863	13.72	1.002	5	-77.2	0.45	14.9	

FERROUS IRON: mg/L

FINAL DEPTH TO WATER (ft TOC): 14.9 TIME FINAL DEPTH TAKEN: 15:18

SAMPLE ID: MW-16/GW SAMPLE ID FOR QC: Rinsate Blank (15:40)

PARAMETERS REQUESTED FOR ANALYSIS:

☐ RCRA Metals 6010B short list

☐ Hexavalent Chromium 7195

☐ VOCs 8268 full list

☐ Perchlorate 6860

☑ Others Total and Dissolved Arsenic

☐ VOCs 8268 short list

☐ Explosives 8330 short list

☐ TDS 160.1

☐ PCBs 8082

IDW TOTAL: 1.66 Flow Through Cell Model Number: YSI 556 MPS

	NAME	SIGNATURE	DATE
PREPARED:	Keith Schutte		11-27-18
REVIEWED:			

Thursday
3.8.18 88777 J. Hemanson

Task: Semi-annual GW monitoring at BA Pond

Weather: 30s-40s, partly cloudy, 5-10 mph W

0915 : Arrive on-site

0920 : Begin WL gauging

ID	WL	TD	Notes
MW-1B	22.65	39.01	Think tape was caught for TD
MW-7	25.72	49.58	
MW-6	27.70	42.75	
MW-12	24.13	31.20	
3-HC	27.06	-	
P1-HC	28.17	-	
C1-HC	28.35	-	
P2-HC	28.91	-	
TH-4	27.21	-	
P2-CW	35.95	-	
TH-3	34.36	-	
TH-2	25.28	95.98	
MO-River	20.82	-	
MW-11	29.50	30.54	
MW-9	28.31	62.00	
MW-8A	28.25	pump	
MW-10	22.65	pump	
MW-2A	24.88	pump	
MW-3	27.44	pump	
MW-4	24.34	pump	

1025 : Arrive at MW-8A to calibrate and set up

3.8.18 88777 J. Hemanson

pH: 4.0/4 7.0/7 10.0/10

Con: 1.409/1.409 Turb: 2.81/100 12.41/10.0

DO: 100.3% ORP: 237.5

1055: Begin purging MW-8A

1130: Collect MW-8A & Dup-1 for Sb, As, Ba, Be, Cd, Cr, Co, F+, Pb, Cr, Hg, Mo, Se, Th, Ra

1145: Arrive at MW-10 to set up

1150: Begin purging MW-10

1230 : Collect MW-10 for Sb, As, Ba, Be, Cd, Cr, Co, F+, Pb, Cr, Hg, Mo, Se, Th, Ra

1240: Arrive at MW-2A to set up

1245: Begin purging MW-2A

1325 : Collect MW-2A for Sb, As, Ba, Be, Cd, Cr, Co, F+, Pb, Cr, Hg, Mo, Se, Th, Ra

1335 : Arrive at MW-3

1340 : Begin purging MW-3

1415 : Collect MW-3, MW-3/MS & MW-3/MSD for Sb, As, Ba, Be, Cd, Cr, Co, F+, Pb, Cr, Hg, Mo, Se, Th, Ra

1605 : Arrive at

1610 : Begin purging MW-4

1645 : Collect MW-4 for Sb, As, Ba, Be, Cd, Cr, Co, F+, Pb, Cr, Hg, Mo, Se, Th, Ra

1655 : Clean up & check out with guard.

1700 : off-site to drop off samples at ESC

Late entry: 1425 out of CO2, check w/ [illegible] to see if they can buy a new one

3.8.18 B3777 J.Hermanson

1440: Off site to get more CO2

1540: on-site to continue sampling MW-3

3.9.18

4.26.18 J. Hermanson

Task: April HCW Monitoring

Weather: 50s, 5-10 mph w; partly clouds

Personnel: Jonathan Hermanson

0800: Arrive onsite and check in with guard

0805: Check out Key & get info from operator

Mo River Level: 729.0 Mo river temp: 50°F

HCW 1: 21.4 MGD HCW 2: 10 MGPD

Influent temp: 9.8 Baseline temp: 9.1°C

0820: Check in w/ Newman Guard

0825: Arrive at HCW & begin gauging wells

ID	WL	Time	Notes
3-HC	24.95	0827	
P1-HC	26.27	0830	
L1-HC	26.40	0832	
P2-HC	27.29	0834	
HCW-2	47.90	0838	Pump 5 on
Caisson reading	96.35		
TH-3	32.49	0852	
TH-2	22.62	0858	
Mo River	18.94	0854	
HCW-1	46.07	0849	pumps 1+3 on
Caisson reading	81.1		
TH-4	25.20	0842	
P2CW	34.29	0844	
MW-9	25.29	0905	

0915: Check out; Return Keys off-site

5-29-18 J. Hermanson

Task: May HCW Reading & Semi-annual Sampling

Weather: 80s-90s, 5-10 mph NE, partly cloudy

personnel: Jonathan Hermanson & Keith Schutte

0755: J. Hermanson on-site to tell security K. Schutte on his way to learn HCW protocol.

0825: K. Schutte stuck in construction, on-site, check in w/ guard & check out key

Mo River: Mo River Temp:

HCW1: HCW2

Influent Temp: Pro baseline temp:

: Check in w/ Newman guard

: Arrive @ HCW & begin gauging wells

ID	WL	Time	Notes
3-HC	25.55	0850	
P1-HC	28.07	0852	
L1-HC	28.41	0855	
P2-HC	30.28	0858	
HCW-2	53.15	0905	
Caisson reading	85.47	0905	
~~TH-4~~	~~25.16~~	~~0909~~ JH	
TH-3	25.26	0921	
TH-2	20.28	0925	
Mo River	18.72	0923	
HCW-1	34.46	0917	
Caisson reading	90.8	0915	
TH-4	25.16	0909	
P2CW	26.50	0912	

3.8.18 88777 J. Heimann

1440: off-site to get more CO2

1540: on-site to continue sampling MW-3

3.9.18

5-30-18 85 K. Schultz

1400 Set up @ MW-4

WL = 19.47 TD = —

Temperature 85° F, 7 mpH wind out of SW

PARTLY CLOUDY. Flow = 500 ml/min

Time	(L) VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1405	I	6.90	1005	14.81	2.16	-4.1	14.3	19.48
1410	2.5	7.21	1063	14.70	1.72	-12.6	7.6	19.48
1415	5.0	7.15	1065	14.86	1.67	-15.7	3.7	19.48
1420	7.5	7.10	1062	14.83	1.63	-17.1	2.6	19.48

1425 collect MW-4/GW ms/msd (Rd 226)

1455 Final Sample DTW = 19.48

1505 set up @ MW-3

WL = 22.76

TIME	(L) VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1520	I	7.42	1140	15.47	4.12	-26.1	3.3	22.78
1525	2.5	7.21	1146	15.38	3.56	-28.7	2.6	22.83
1530	5.0	7.26	1145	15.34	3.27	-22.3	2.3	22.85
1535	7.5	7.18	1150	15.26	3.29	-22.4	2.6	22.85

1540 collect MW-3/GW ms/msd metals/[illegible]

1600 Final Sample collection WL = 22.83

1610 Set up @ MW-2A WL = 20.21 / 19.96* 5-30-18

TIME	(L) VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1615	I	7.13	860	15.55	4.12	54.1	11.6	19.97
1620	2.5	6.86	923	15.47	2.85	21.6	8.43	19.97

—next page cont.

5-30-18 K. Schutte

MW-2A cont.

Time	(L) VOL	PH	COND	TEMP	DO	ORP	TURB	DTW
1625	5.0	6.79	821	15.34	2.21	17.5	5.6	19.98
1630	7.5	6.80	827	15.33	2.07	13.4	6.4	19.98
1635	10.0	6.78	829	15.36	1.88	10.6	5.2	19.98
1640	12.5	6.79	828	15.21	1.82	7.5	4.8	19.98
1645	15.0	6.79	830	15.26	1.79	3.1	4.4	19.98

1650 Collect MW-2A/GW

1658 Finish Sample WL = 19.98

1785 offsite

5-30-18

5-31-18 SCHUTTE

0635 Onsite, check in @ Guard Shack

CALIBRATE 451 - 4/7/10 DO = 100%

HACH Turbidity meter 20/100/800 ORP = 238.1

WEATHER: 79° F, MOSTLY CLOUDY, Chance of RAIN.

0650 Set up @ MW-10

FLOW = 500 ml WL = 18.07 5-31-18 = 17.81

TIME	VOL	PH	COND	TEMP	DO	ORP	TURB	DTW
0655	I	6.75	1175	13.62	2.12	27.6	278	17.83
0700	2.5	6.64	1215	13.71	0.26	2.3	75.9	17.83
0705	5.0	6.62	1241	13.65	0.25	-12.6	33.7	17.83
0710	7.5	6.61	1245	13.69	0.25	-13.4	22.9	17.83
0715	10.0	6.61	1248	13.58	0.24	-13.7	15.6	17.83
0720	12.5	6.61	1247	13.57	0.23	-13.6	10.9	17.83
0725	15.0	6.61	1248	13.58	0.22	-13.1	7.3	17.83
0730	17.5	6.60	1247	13.61	0.21	-13.3	4.9	17.83

0735 Collect MW-10 + DUP-1

0755 Final collection WL = 17.83

0800 Set up @ MW-8A WL = 23.20' 5-31-18 Flow = 500

TIME	VOL	PH	COND	TEMP	DO	ORP	TURB	DTW
0805	I	6.67	1395	13.96	1.75	16.1	OOR	23.20
0810	2.5	6.85	1405	13.92	0.92	-5.4	798	23.20
0815	5.0	6.83	1408	13.97	0.89	-16.3	54	23.20
0820	7.5	6.82	1411	13.95	0.87	-16.9	47	23.20
0825	10.0	6.82	1413	14.01	0.87	-17.1	43	23.20

5-31-18 K. Schwing

MW-8A cont

Time	Vol	pH	Cond	Temp	DO	ORP	Turb	DTW
0830	12.5	6.81	1420	14.03	0.87	-17.8	21	23.20
0835	15	6.80	1424	14.06	0.87	-18.0	12	23.20
0840	17.5	6.80	14.23	14.08	0.86	-18.1	8.4	23.20
0845	20	6.80	14.23	14.14	0.86	-18.9	4.7	23.20

0850 collect MW-8A/GW

0855 Finish collecting WL=23.20

0910 offsite to ESC + Kate Brown

5-31-18

6-4-18 K. Schwing

0700 onsite @ CCR BPO wells to resample

Weather: chance of rain, 70°F, mostly cloudy; calibrate YSI 556 MPS - 4/7/10, 100%, 237.1 (pH, DO, ORP)

0715 set up @ MW-8A, calibrate Turb meter 20/100/800

0815 collect MW-8A/GW + DUP-1/GW

0840 set up @ MW-10

0925 collect MW-10/GW

0940 set up @ MW-4

1005 collect MW-4/GW-1

1040 set up @ MW-3

1110 collect MW-3/GW-1

1125 set up @ MW-2A

1155 collect MW-2A/GW

1220 offsite to ESC to drop off sample

6-4-18

9/4/2018

C. HOGLUND
K. Baker

Nearman Creek EC/HPT Survey

Tuesday September 4, 2018

Weather: AM: Cloudy-overcast, 70's-80's, Gusty SW
PM: Mostly Cloudy-overcast, 80's,

Personnel: Chris Hoglund & Dax Baker

Task: EC/HPT Direct Sensing borings

0820 Load Truck

0847 Depart BMcD

0940 Arrive on-site, meet Keith Brown w/ KCBPU, check in @ contractor gate.

0958 Plains Env. on-site

1035 Complete SOW & safety orientations
Plains setting up at MW-2A for HPT/EC, call it ~~SB-#~~ SB-1.

1112 MW-2A WL: 16.14' bTOC

1201 Start HPT/EC @ SB-1, ~8' south of MW-2A. Keith (KCBPU) off-site.

1214 Perform Hydrostatic Test @ 20.60' BGS

1224 Perform Hydrostatic Test @ 43.85' BGS

1242 Perform Hydrostatic Test @ 101' bgs

1302 Perform Hydrostatic Test @ 146.35' BGS

1310 At 150' BGS, string last 20' rod

1321 Continue HPT/EC Push @ 150'

1327 Refusal = 159.85' bgs - Hard

1400 Trip out rods - HPT/EC cable stuck inside last 10' section.

C. Hoglund
K. Baker

9/4/18

Nearman Creek EC/HPT Survey

1430 Got cable out of drill rods, had to cut wires on cable. Keith (BPU) on-site.

1500 Plains repairing cut wires to cable, Keith (BPU) off-site.

1552 Fix wiring for HPT/EC cable, bentonite chip SB-1 hole used ~1/2 bag.

1555 Pack up & mobilize rig

1625 off-site

Dax Bk

9-4-18

9/5/18

K. Baker

Nearman Creek EC/HPT Survey

Wednesday September 5th, 2018

Weather: AM: Rainy 75°, wind SW 5-15 mph

PM: Rainy 70°-80°s winds calm 0-5 mph SW

Personnel: Dax Baker (BMCD)

Jason Auernheimer (Plains Environmental Service Inc)

Task: EC/HPT direct sensing borings

0700: On-site & sign in at contractor entrance

0715: Heavy rain delay

0720: Safety meeting & PTA w/ Plains enviro.

0730: Rain showers slow set-up geoprobe EC/HPT electronics

0740: Set-up at MW-11 locations

0745: MW-11 water level: 18.8' ~~bgs~~ below casing opening

0758: Plains set-up canopy for EC/HPT logging electronics for location SB-4

0800: Begin EC/HPT survey ~~for~~ at SB-4

SB-4 approx 8 ft SW of MW-11

0825: Perform Hydrostatic test @ 23' bgs

0840: Perform Hydrostatic test @ 76' bgs

0900: Perform Hydrostatic test @ 131' bgs

0920: Geoprobe stop to add more drill stem. @151' bgs

0930: ~~Start~~ continue DB SB-4 again @ 151' bgs, added 20' of rods

0945: Perform Hydrostatic test @ 171.65' bgs

0950: Refusal @ 171.65' bgs - hard

1000: Trip-out rods - found damaged rods at bottom ~20'

1030: End of SB4 EC/HPT Refilled hole w/ 1/2 bag bentonite

9/5/18 Nearman Creek EC/HPT Survey

D Baker

1035: Plains to un-string rods to access damage rod sections & re-string new rods

1050: 3 rods bent

1100: off-site for lunch

1200: D. Baker back on-site

1205: Plains Environmental on-site

1210: Mobilize Geoprobe to SB-5 location

1230: Set-up at SB-5 location

1300: Begin EC/HPT survey @ SB-5 location

1315: Perform Hydrostatic test @ ~~[illegible]~~ DB 23.75' bgs

1325: Perform Hydrostatic test @ 76.4' bgs

1335: Perform Hydrostatic test @ 84.65' bgs

1345: Trip-out due to error in readings, possible bad transducer @ 100' bgs

1420: Bad transducer, replaced, re-calibrated

1430: Continue SB-5

1445: Perform Hydrostatic test @ 101.55' bgs

1500: Perform Hydrostatic test @ 151.95' bgs

1505: ~~Refusal~~ DB @ 151.95' bgs end of hole @ SB-5

1509: Begin to trip-out SB-5 rods

1540: SB-5 EC/HPT survey complete / Refill hole w/ 1/2 bag bentonite

1541: Mobilize Geoprobe & refill HPT water tank

1600: Set-up at MW-8A / for SB-3 located ~10' NE of MW-8A

1625: Begin EC/HPT ~~survey~~ @ SB-3

1635: Perform Hydrostatic test @ 21.1' bgs - overflow pressure

9/5/18 Newman Creek EC/HPT Survey

1640: Trip out to check HPT sensor function

1650: Post-pone SB-3 EC/HPT till tomorrow b/c of
bad sensor/connection

1700: mobilize geoprobe back to staging area for repairs

1750: D.Baker + Plains environmental offsite for day.

9/5/18

9/6/18 Newman Creek EC/HPT Survey

Thursday ~~Sept~~ September 9th, 2018

Weather: Overcast, foggy low 70's wind: calm (AM)
(PM): Overcast low 80's, wind: calm SW 0-5 mph

Personnel: D.Baker (BMcD)
Jason A, Henry (Plains Enviro)

Task: EC/HPT direct sensing borings

0700: D.Baker on-site + checked in w/ security

0715: Plains environmental on-site / Perform daily PTA

0720: Mobilize geoprobe + re-string rods with repaired
E-line.

0940: Repairs complete + set up at MW-8A / SB-3
location

0945: MW8A water level: 18.23' below casing opening

0950: Continue SB-3 EC/HPT survey

1000: Perform Hydrostatic test @ 26.65' bgs

1015: Perform Hydrostatic test @ 57.45' bgs

1040: Perform Hydrostatic test @ 96.7' bgs

1100: Perform Hydrostatic test @ 151.3' bgs
SB-3 TD: 151.3' bgs

1105: Begin trip-out rods @ SB-3

1130: Complete trip-out @ SB-3

1135: Fill boring w/ ~1/2 bag bentonite plugs
SB-3 Complete

1140: D.Baker + Plains Environmental off-site for lunch

1210: D.Baker back on-site

1230: Plains Environmental back on-site

9/6/18 Nearman Creek EC/HPT Survey

1235: Mobilize geoprobe to MW-10 / SB-2 location

1245: Set-up at SB-2 EC/HPT location

1250: MW-10: Water level - 12.80' below casing opening

1305: Begin EC/HPT survey @ SB-2 location

1315: Perform Hydrostatic test @ 26.05' bgs

1325: Perform Hydrostatic test @ 96.05' bgs

1350: Perform Hydrostatic test @ 106.0' bgs

1405: Perform Hydrostatic test @ 149.0' bgs
Refusal @ 149'.0' bgs - hard TD: 149.0' bgs

1410: Begin trip-out for SB-2 EC/HPT survey

1415: cease trip-out due to geoprobe foot sinking in soft mud, contact Keith (BPU) to get rail-road ties to stabilize geoprobe.

1420: Plains environmental to yard to obtain rail road ties.

1440: continue trip-out @ SB-2

1500: SB-2 trip-out complete

1502: SB-2 bore-hole filled w/~1/2 bag bentonite plugs

1505: SB-2 EC/HPT survey complete

1506: Mobilize geoprobe + move to EC/HPT SB-7 location

1515: Set-up at EC/HPT SB-7 location

1520: Begin SB-7 EC/HPT survey

1535: Perform Hydrostatic test @ 26.05' bgs

1600: Perform Hydrostatic test @ 91.05' bgs

1620: Perform Hydrostatic test @ 140.25' bgs

9/6/18 Nearman Creek EC/HPT Survey

1625: Refusal @ 140.25' bgs - hard TD: 140.25' bgs

1630: Begin trip-out for SB-7 EC/HPT survey

1645: SB-7 trip-out complete

1655: SB-7 Borehole filled w/~1/2 bag bentonite plugs

1700: SB-7 EC/HPT survey complete

1705: organize + mobilize geoprobe to EC/HPT location SB-6 to start tommorow (9/7/18)

1725: D.Baker off-site / Plains enviro. off-site

1800: Arrive at WHQ office (BMCD) to obtain GPS backpack unit + tablet

9/6/18

D. Baker

9/7/18 Neuman Creek EC/HPT Survey

Friday September 7th 2018

Weather: (AM): Overcast/raining wind SW 0-10mph

(PM):

Personnel: D. Baker (BMcD)

Jason A., Henry (Plains Enviro)

Task: EC/HPT direct sensing borings

0700: D. Baker + Plains environmental on-site

0705: Sign-in at contractors security entrance

0710: Daily safety briefing + PTA

0715: Mobilize geoprobe + electronic equipment @ SB-6 EC/HPT location

0720: Set-up canopy b/c of rain for logging equipment

0730: Set-up @ SB-6 EC/HPT location

0735: Boot-up mobile GPS + Wifi hotspot

0746: Begin EC/HPT survey @ SB-6

0800: Perform Hydrostatic test @ 31' bgs

0830: Perform Hydrostatic test @ 102.5' bgs

0850: Perform Hydrostatic test @ 151.0' bgs

0855: Plains environmental out of rods

SB-6 TD: 151.0' bgs

0900: Begin-trip-out @ SB-6

0930: SB-6 Trip-out complete

0935: SB-6 borehole filled w/ ~1/2 bag bentonite plugs

0940: SB-6 EC/HPT survey complete

D. Baker

9/7/18 Neuman Creek EC/HPT Survey

0946: Mobilize geoprobe to Box trailer for transport to SB-8 + SB-9 locations.

1000: Geoprobe loaded into Box Truck for transport

1005: Plains Environmental off-site to get haul truck + check-out of hotel

1105: Plains Environmental Back on-site

1130: Geoprobe loaded + hauled to SB-8 location

1135: Set-up @ SB-8

1145: HPT calibration off

1150: HPT calibration fixed 1210: Hydrostatic test @ ~22' bgs

1200: Begin SB-8 EC/HPT Survey

1230: Perform hydrostatic test @ ~130' bgs

1310: Perform Hydrostatic test @ 151.05' bgs

1320: Begin Trip-out @ SB-8

1350: Trip-out complete SB-8 / SB-8 TD: 151.05' bgs

1355: Fill borehole w/ ~1/2 bag bentonite plugs

1400: SB-8 EC/HPT survey complete

1405: Mobilize Geoprobe + move to SB-9 location

1415: Set-up at SB-9

1420: Calibrate HPT sensor

1425: Begin SB-9 EC/HPT survey

1430: Post-pone SB-9 EC/HPT due to bad reading Jason. A to inspect E-line

1440: Re-calibrate EC/HPT sensor to check repairs

1445: Recalibration unsuccessful, inspection of probe, probe threads are worn, need replace

D. Baker

9/7/18 Nearman Creek EC/HPT Survey

1510: Continue SB-9 EC/HPT survey

1520: Hydrostatic test @ 28.6' bgs

1535: Perform Hydrostatic test @ 116.8' bgs

1600: Refusal @ 138.85' bgs hard

1605: Perform Hydrostatic test @ 138.85' bgs

1610: Begin trip-out SB-9

1635: Trip-out complete

1640: fill borehole w/ 1/2 bag bentonite plugs

1645: SB-9 EC/HPT survey complete
TD: 138.85' bgs

1650: Mobilize geoprobe back to trailer & clean equipment / pack-up for weekend

1700: D. Baker + Plains environmental offsite

DB 9/7/18

D. Baker

9/10/18 Nearman Creek EC/HPT Survey

Monday September 10th 2018

Weather (AM): Sunny, 70's-80's SW wind 5 mph

Personnel: D. Baker (BMcD)
Jason A., Henry W. (Plains Environmental)

Task: EC/HPT direct sensing borings

0800: D. Baker at WHQ (BMcD) to get truck + equipment for day

0950: D. Baker + Plains environmental on-site

1010: Arrive at SB-10 location near KC police firing range. Spoke with Ross (firing range manager)

1020: Plains environmental unload geoprobe + string rods for probe.

1040: Set-up at SB-10

1050: Begin SB-10 EC/HPT survey

1110: Perform Hydrostatic test @ 29.0' bgs

DB 9/10/18 1150: Perform Hydrostatic test @ 95.2' bgs

1155: Refusal @ 95.2' bgs - hard

1205: Begin trip-out for SB-10

1220: SB-10 trip-out complete, last rod has E-cable bind and will not come loose

1225: Cable bind fixed + all rods back operational

1230: SB-10 EC/HPT survey complete / borehole filled w/ 1/2 bag bentonite plugs
TD: 95.2' bgs

1240: Plains Environmental off-site for lunch

9/10/18 Nearman Creek EC/HPT Survey

1315: Plains Environmental back-on-site

1320: Mobilize geoprobe to SB-11 location

1335: Set-up at SB-11

1340: Begin SB-11 EC/HPT survey

1355: Perform Hydrostatic test @ 30.15' bgs

1430: Perform Hydrostatic test @ 105.95' bgs
Refusal @ 105.95' bgs

1440: Begin-trip-out

1445: Plains environmental discovers broken rod + cut
E-line @ 30.0' bgs

1450: Jason A. ordered ~~[illegible]~~ 100 feet of rods
and new EC/HPT probe

1515: SB-11 abandoned + plugged w/ 1/4 bag bentonite
plugs.

1650: D. Baker + Plains Environmental off-site

9/9/18

9/11/18 Nearman Creek EC/HPT survey

Tuesday September 11th 2018

Weather: (AM): Sunny 70's wind <5 mph SW
(PM): Sunny 85° SW wind 5-10 mph

Personnel: D. Baker (BMCD)
Jason A. + Henry W. (Plains Environmental)

Task: EC/HPT direct sensing survey

0730: D. Baker + Plains Enviro on-site

0735: daily safety PTA

0740: Plains Enviro string new rods + probe

0820: Mobilize geoprobe to SB-12 location

0850: Set-up at SB-12

0855: Calibrate EC/HPT sensors

0900: Begin SB-12 EC/HPT survey

0923: Perform Hydrostatic test @ 20.85' bgs

09 : Perform Hydrostatic test @ 71.8' bgs

1010: Perform hydrostatic test @ 129.45' bgs
Refusal @ 129.45' bgs ~ hard

1015: Begin SB-12 trip-out

1050: Tripout complet @ SB-12

1055: Fill borehole w/ 1/2 bag bentonite plugs

1100: SB-12 EC/HPT survey complete
TD: 129.45' bgs

1115: Mobilize Geoprobe to SB-13 location

1125: Plains Environmental offsite for lunch

1200: Plains Environmental back on-site

1205: Mobilize support truck to SB-13

D. Baker

9/11/18 Nearman Creek EC/HPT Survey

1210: Set-up at SB-13

1215: Calibrate EC/HPT sensor

1220: Begin SB-13 EC/HPT survey

1235: Perform Hydrostatic test @

1311: Perform Hydrostatic test @ 142.5' bgs

Refusal @ 142.5' bgs

1320: Begin trip-out for SB-13

1350: Complete SB-13 trip-out

1355: Fill borehole w/ 1/2 bag bentonite plugs

TD: 142.5' bgs

1400: Mobilize Geoprobe to SB-14 location

1410: Set-up @ SB-14

1415: Calibrate EC/HPT sensor

1420: Begin SB-14 EC/HPT survey

1435: Perform Hydrostatic test @ 34.6' bgs

1500: Perform Hydrostatic test @ 130.4' bgs

Refusal @ 130.4' bgs

1510: Begin SB-14 trip-out

1545: SB-14 Trip-out complete

1550: fill borehole w/ 1/2 bag bentonite plugs

TD: 130.4' bgs

1600: Mobilize Geoprope back to haul trailer for loadup

1615: Load Geoprobe + move haul truck/trailer to KCBPU yard for overnight storage

1645: Sign-out PTA

1700: D. Baker & Plains Environmental off-site..

D. Baker

9/12/18 Nearman Creek EC/HPT Survey

Wednesday September 12th 2018

Weather: Sunny 70° calm winds (AM)

(PM) Sunny 85° wind 5-10mph SW

Personnel: D. Baker (BMCD)

Jason A. + Henry W. (Plains Environmental)

Task: Direct Sensing EC/HPT survey

0700: D. Baker + Plains Environmental on-site

0710: Move Geoprobe via haul truck from yard storage to SB-15 boring location

0715: Un-load Geoprobe + set-up equipment for EC/HPT log

0725: Daily safety briefing + PTA

0740: Mobilize Geoprobe to SB-15 location

0750: set-up at SB-15

0800: Calibrate EC/HPT sensor

0810: Begin SB-15 EC/HPT survey

0820: Perform Hydrostatic test @ 26.1' bgs

0845: Perform Hydrostatic test @ 101.85' bgs

0900: Perform Hydrostatic test @ 132.25' bgs

Refusal @ 132.25' bgs - hard

0905: Begin trip-out for SB-15

0930: SB-15 trip-out complete

0935: fill borehole w/~1/2 bag bentonite plugs

TD: 132.25' bgs

0945: Mobilize geoprobe ~~to~~ haul truck to change EC/HPT equipment for hollow rod sampling

9/12/18 Newman Creek EC/HPT Survey

1000: Mobilize Geoprobe + haul truck to SB-9 for field QC of SB-9 EC/HPT direct sensing log

1015: Set-up at SB-9A

Location 3 feet NW of SB-9 EC/HPT

1025: Begin SB-9A direct push sample

1150: Break for lunch @ 40.0' bgs

D. Baker + Plains Environmental off-site

1250: D. Baker + Plains Environmental back on-site

1310: Continue SB-9A boring

1705: Post-pone SB-9A boring until tommorow.

Depth: 80 ft bgs

1735: D. Baker + Plains Environmental off-site

9/13/18 Newman Creek EC/HPT Survey

Thursday Septemper 13th 2018

Weather: Sunny 70° wind: calm (AM)

(PM) Sunny 80° wind: 5-10mph SW

Personnel: D. Baker (BMCD)

Jason A., Harry W. (Plains Environmental)

Task: Field QC of EC/HPT log via direct push hand log

0700: D. Baker + Plains Environmental on-site

0715: Daily safety brief + PTA

0720: Set-up to continue SB-9A

0735: Continue SB-9A borehole / hand log

1035: SB-9A TD: 100ft, 76ft recovered material

1040: fill borehole w/ ~1 bag bentonite plugs

1100: Sign-out PTA

1105: Copy EC/HPT files over onto thumbdrive

1115: Clean + organize equipment

1120: load Geoprobe onto haul truck

1150: D. Baker + Plains environmental offsite

1220: Clean fleet truck at carwash $8

1300: Arrive at WHQ (BMCD) to unload and turn fleet vehicle in.

9/13/18

9.27.18 J. Heimanson

Task: September HCW gauging

Weather: 60s, 5mph SW, clear sky

Personnel: Jonathan Heimanson

1000: Arrive on-site + check in

HCW 1: 7.6 HCW 2: 24.7

pump 1 pumps 6+7

MO River level: 734.8' MO River temp: 66°F

Influent: 23°C Baseline: 22.5°C

1015: Check in w/ guard

1020: Meet w/ Keith Brown

1030: Begin Gauging wells

ID	WL	Time	Notes
P-3	20.07	1032	
P-1	22.37	1036	
C-1	22.83	1040	
P-2	24.35	1044	
HCW-2	47.45	1046	
Caisson Reading	93.05		
TH-4	19.25	1150	
P2-IW	19.38	1153	
HCW-1	27.20	1100	
Caisson Reading	96.3		
TH-3	18.37	1110	
MO River	13.00	1113	
TH-2	14.81	1116	
MW-9	17.90	1122	

1140 Return keys + offsite 9.27.18

10-1-18 88777 J. Heimanson

Task: BA Pond GW monitoring

Weather: 70s, 5-20 mph S, partly cloudy - overcast

Personnel: Jonathan Heimanson

0805: Arrive onsite check in w/ guard

0810: check boreholes to ensure fill is holding

0815: Begin gauging Monitoring wells

ID	WL	TD	PL	Notes
MW-8	17.12	35.20	-	Brown bubbles near top
MW-10	11.92	29.62	-	-
MW-15	15.33	32.70	-	-
MW-14	15.65	33.27	-	-
MW-2A	14.32	31.67	-	-
MW-3	17.26	34.01	-	lock missing
MW-4	14.03	32.00	-	-
MW-13	12.25	33.48	-	-

0915: End water levels

0920: Put together + install MW-13 pump, calibrate field equipment

pH: 4.0/4 6.97/7 10.07/10

turb: 0.90/0.0 10.88/10

Con: 1.409/1.409

DO: 100.0%

ORP: 237.5

1000: Begin purging MW-13

1050: Collect MW-13 for Metals, Radon, TDS, Chloride + Fluoride

1110: Talk to Keith Brown

10.1.18 88777 J. Hermanson

1120: Arrive @ MW-14 to install pump & recalibrate pH. pH callibration unable to be successful. YSI reading 4.0 pH at 7.00. will continue w/ pH stick meter

1135: Begin purging MW-14

1205: Collect MW-14 for Metals, Chloride, Fluoride, TDS, + Radon

1225: Arrive @ MW-15 to install pump

1235: Begin purging MW-14

1300: Collect MW-15 for Metals, Chloride, Fluoride, TDS, + Radon

1320: Arrive @ MW-8 to set up

1330: Begin purging MW-8, water orange @ start of purging

1415: Collect MW-8A, MW-8A/MS, + MW-8A/MSD for Metals, Chloride, Fluoride, TDS, + Radon.

1435: Arrive @ MW-10 to set up

1440: Begin purging MW-10

1515: Collect MW-10 + Dup-1 for Metals, Chloride, Fluoride, TDS, Radon

1525: Set up @ MW-2A

1530: Begin purging MW-2A

1605: Collect MW-2A for Metals, Chloride, Fluoride, TDS, Radon

1610: Clean up

1615: Check out w/ Newmont guard & off-site

10.1.18

10.2.18 88777 J. Hermanson

Task: BA Pond Groundwater Monitoring

Weather: 60s, 5-10 mph W, overcast

Personnel: Jonathan Hermanson

0755: Arrive on-site & check in w/ Newmont guard

0805: Arrive @ MW-3 to set up & callibrate equipment

0810: PID not turning on, changing batteries does not ~~fix~~, call field environmental for solution

0845: Offsite to pick up new PID

0950: Onsite & @ MW-3 to set up & callibrate field equipment.

pH: 4.0/4 7.0/7 10.0/10

turb: 0.73/0 10.8/10

con: 1.409/1.409

ORP: 237.5/237.5

DO: 100.0%

1010: Begin purging MW-3

1035: Collect MW-3 for Metals, Radium, Chloride, Fluoride, + TDS

1045: Set up @ MW-4

1055: Begin purging MW-4

1120: Collect MW-4 for Metals, Radium, Chloride, Fluoride, & TDS

1130: Clean up & pack coolers for lab

1140: Check out w/ guard & offsite for lab

10.2.18

10.3.18 89777 J. Hermanson

Task: BA pond GW sampling

Weather: 70s, 5-20 mph S, partly cloudy

Personnel: Jonathan Hermanson

0705: Arrive onsite + check in w/ guard

0715: Arrive @ MW-8A + begin calibration

[illegible] pH: 4.014 7.017 10.010

turb: 0.8410 10.82/10

DO: 100.0%

Con: 1.409/1.409

ORP: 237.5

0730: End calibration

0735: Begin purging MW-8A

0810: Collect MW-8A ~~fl~~ MW-8A/MS & MW-8A MSD for Metals, Chloride, Fluoride, TDS, & Radium

0830: Arrive @ MW-10 to set up

0835: Begin purging MW-10

0915: Collect MW-10 + Dup-1 for Metals, Chloride, Fluoride, TDS, & Radium

0925: Set up @ MW-2A

0930: Begin purging MW-2A

0950: Collect MW-2A for Metals, Chloride, Fluoride, TDS, & Radium

1000: Clean up

1005: Check out w/ guard, off-site for lab

10.3.18

9-25-18 KCBPU Bolling

1200 Alpha Omega onsite, placing covers on open boreholes

1300 All boreholes covered & protected
Alpha Omega offsite

1310 K Bolling offsite

1350 Arrive at KC office

K Bolling 9-25-18

MONDAY, OCTOBER 29, 2018 88777 L. TURNER

WEATHER: CLEAR TO PARTLY CLOUDY 50-70°F WIND 5-15 SW.

TASK: DIRECT-PUSH GW + SOIL INVESTIGATION.

PERSONNEL: LEWIS TURNER

0700 LOAD TRUCK AND MEET W/CHRIS H. HE GOT A WL METER AND pH/COND. PRINT PAPERWORK

0830 TRUCK LOADED, GET ICE.

0855 DEPART OFFICE TO SITE. PULLED OVER FOR PHONE CALLS.

0945 EPS CALLED, PAT/BLAKE: THEY HAD TRUCK ISSUES THIS AM HAD TO RETURN TO SHOP TO SWAP EQUIPMENT TO DIFFERENT TRUCK, THEY ARE FUELING AND LEAVING SHORTLY ETA ~1pm

0945 UTILITY MGE CALLED, GIVE KEITH'S #.

1005 AT NEARMAN POWER STATION, SIGN IN AT GAURD.

1015 CALLED KEITH BROWN, HE IS AT QUINDERO. WILL MEET IN 30 MIN.

1025 TALK TO GAS UTILITY, THEY HAVE TO BE PRESENT FOR DPGW-6. NOTIFY THEM OF EPS ARRIVAL ~1pm. THEY WILL RETURN.

1047 LOOK AT DPGW 6, 1, AND 2

1112 TALK TO SHERIFF RANGE.

1135 LOOK AT DPGW 7 AND 8.

1205 LOOK AT DPGW 3

1220 DPGW 2, 3, 6, 7, AND 8 WILL NEED COMPLETED BEFORE RAIN TOMORROW DUE TO ACCESS.

1220 LUNCH.

1250 BACK FROM LUNCH

10/29/18 88777 L. TURNER

1251 CALIBRATE pH 4.0/4.0 7.0/7.0 10.1/10.0 COND 1.410/1.409 OAKTON STICK METERS.

1252 EPS TEXTED THEY WILL NOT BE ONSITE UNTIL 1345-2pm. AT DPGW-6 SOUTHSTAR PIPELINE AT LOCATION, THEY ARE OFF WORK AT 3pm. MENTIONED 33' EASEMENT FROM CENTER OF PIPE. IF WE GO 11' SW OF WELL THEN WE WOULD BE OUT OF THE ZONE AND THEY WOULD NOT HAVE TO BE PRESENT.

1310 NOTIFY CHRIS H. ABOUT PIPELINE FOOTAGE / CREW REQUIREMENT.

1402 BLASE W/EPS ONSITE, SIGN IN AT GATE.

1408 NOTIFIED SOUTHSTAR PIPELINE THAT THE DISTANCE AWAY DISCUSSED W/SITE PERSONNEL WOULD WORK FOR OUR LOCATION AND THEY WILL NOT HAVE TO BE PRESENT. CALLED KEITH.

1420 DRIVE IN TO DPGW-2

1428 OFFLOAD RIG, SET UP AT LOCATION.

1454 BEGIN PROBING AT DPGW-2

1515 FINISH PROBING AT 25' ~8' OF SAND HEAVED INTO OUTER DUAL TUBE RODS AFTER SAMPLE REMOVAL UNABLE TO SAMPLE BELOW. PULL RODS. OFFSET FOR WATER LOCATION.

1518 DRIVE GW POINT W/4' DROP SCREEN TO 24'.

1526 OPEN SCREEN AND PULL UP TO OPEN SCREEN. PURGE VOLUME.
WL=6.9' BGS. pH =6.8 Temp:18.3 COND 1.310

1526 COLLECT DPGW-2 / SS01 1-2' ARSENIC.

1530 COLLECT DPGW-2 / SS02 5-6' ARSENIC

1600 COLLECT DPGW-2 / GW01 20-24' FIELD FILTER ARSENIC

10/29/18 89777 L. TURNER

1600 EXTRACT RODS. ABANDON W/PDS BENTONITE CHIPS/HYDRATE.

1610 LOAD GEOPROBE, HAS ENOUGH RODS TO DO SEVERAL BEFORE DECON.

1620 GO TO DPGW-8

1628 AT DPGW-8 SETUP PROBE RIG. CENTER OF ROAD.

1630 BEGIN PROBING. DPGW-8

DPGW-DUP/SS01

1635 COLLECT DPGW-8 /SS01 1-2' Arsenic Dup. ↑

1640 COLLECT DPGW-8 /SS02 10-11' Arsenic

1650 AT 20' SAND HEAVED TO 14' BGS TRIED TO CLEAR W/SAMPLE ACETATE SLEEVE. DID NOT WORK. PULL ALL RODS AND PLACE STEEL TIP TO GO BACK DOWN TO 20'. KEITH OFFSITE.

1709 BACK DOWN TO 20 PULLED CENTER W/TIP OUT. APPROX 7' OF MATERIAL ENTERED RODS. UNABLE TO SAMPLE BELOW 20'. PULL RODS AND PREPARE TO DP FOR WATER.

1716 DRIVE GW SAMPLE SCREEN TO 20' BGS.

1728 AT 20' OPEN 4' DROP SCREEN AND PULL UP TO OPEN.
WL= 12.8' BGS pH: 6.7 Temp: 18.9 Cond: 1.370

1730 FILTER SAMPLE. PURGED SEVERAL TUBING VOLUMES.

1735 COLLECT DPGW-8 /GW01 16-20' BGS FIELD FILTER ARSENIC.

1736 PULL RODS AND ABANDON W/ PDS BENTONITE /HYDRATE.

1745 MOVE RIG TO DPGW-7 CENTER OF ROAD.

1751 BEGIN PROBING. DPGW-7

1752 COLLECT DPGW-7 /SS01 1-2' ARSENIC.

1758 COLLECT DPGW-7/SS02 9-10' ARSENIC.

1810 AT 25' ~ 8' OF SAND HEAVE UNABLE TO SAMPLE LOWER.

10/29/18 88777 L.TURNER

1811 PULL RODS AND OFFSET TO GW SAMPLE.

1813 ADVANCE RODS AND DROP SCREEN AT OFFSET LOCATION TO 25'

1817 AT 25' OPEN SCREEN AND LIFT 4' TO SAMPLE. 21-25'

WL=11.32 pH=6.9 TEMP=17.8 COND=1.120

1825 FILTER SAMPLE PURGED SEVERAL TUBING VOLUMES.

1835 COLLECT DPGW-7/GW01 21-25' FIELD FILTERED ARSENIC.

1839 PULL RODS AND ABANDON 2 BORINGS W/ BENTONITE/HYDRATE.

1857 DROP TRAILER W/ GEOPROBE NEAR

1905 LOCK GATE. EPS OFFSITE RANGE.

1950 AT HOME, TRUCK IN GARAGE.

10/29/18

TUESDAY, OCTOBER 30, 2018 88777 L.TURNER

WEATHER: OVERCAST/RAIN 50-70°F WIND 5-15 SW

TASK: DIRECT PUSH GW/SOIL INV.

PERSONNEL: LEWIS TURNER

0605 DEPART TO SITE

0650 AT SITE, WORK ON PAPERWORK. CAL pH 4.0/4.0 7.0/7.0 10/10.0 COND 1.409/1.4

0730 SIGN IN AT EAST GATE. GO CHECK IN AT RANGE, OK TO WORK.

0758 EPS AT SITE. GET TRAILER

0815 SET UP AT DPGW-1

0818 START PROBING DPGW-1 OFFSET 1' LOW RECOVERY (2)

0831 COLLECT DPGW-1/SS01 1-2' ARSENIC.

0835 COLLECT DPGW-1/SS02 8-9' ARSENIC.

0850 AT 20' ~ 6' OF SAND HEAVE, ATTEMPT TO CLEAN OUT W/ SLEEVE. GOT ONE OUT NOW 8' OF HEAVE IN RODS. SPOKE TO BRIAN H. UNABLE TO SAMPLE DEEPER

0900 PULL OUT RODS. ABANDON W/ BENTONITE.

0905 ADVANCE GW RODS AND 4' DROP SCREEN TO 26' (22-26')

0910 AT 26' OPEN SCREEN AND LIFT RODS TO DROP.

WL=10.32 pH=8.0 TEMP: 17.1 COND: 0.850

0915 PURGE SEVERAL TUBING VOLUMES THEN FIELD FILTER

0925 COLLECT DPGW-1 / GW01 22-26' FIELD FILTER ARSENIC.

0925 COLLECT DPGW-DUP /GW01 22-26 FIELD FILTER ARSENIC

0930 PULL RODS AND ABANDON W/ BENTONITE/HYDRATE

0948 LOAD RIG AND GO TO DPGW-3

0956 SET UP AT DPGW-3, DECON ALL RODS/SCREENS (4)

1013 BEGIN PROBING DPGW-3

1015 COLLECT DPGW-3/SS01 1-2' ARSENIC

1019 COLLECT DPGW-3/SS02 7.5-8.5' ARSENIC

1019 COLLECT DPGW-DUP/SS02 7.5-8.5 ARSENIC

1028 AT 20' AND 7.5' OF SAND HEAVED INTO RODS. TRY TO CLEAN IT OUT 9' IN RODS NOW. UNABLE TO CLEAR STOP SAMPLING. REMOVE ALL RODS.

1034 BEGIN DRIVING SCREEN/RODS AT OFFSET LOCATION FOR GROUNDWATER

1039 AT 26' OPEN SCREEN AND RETRACT RODS 4' TO OPEN SAMPLE INTERVAL 22-26' BLS. PURGE TUBING VOLUMES,
WL = 9.51 pH = 7.4 TEMP: 18.6 COND = 1.200

1050 COLLECT DPGW-3/GW01 22-26' FIELD FILTER ARSENIC.

1055 PULL RODS AND ABANDON BOTH BORINGS w/ BENTONITE AND HYDRATE.

1110 GO TO DPGW-6 SET UP.

1140 BEGIN PROBING AT DPGW-6 SPOKE TO CHRIS H WATER

1142 COLLECT DPGW-6/SS01 1-2' ARSENIC

1146 COLLECT DPGW-6/SS02 15-16 ARSENIC.

1200 AT 35' EXTRACT RODS AND ABANDON w/ BENTONITE.

1204 DRIVE RODS AND SCREEN TO 24'

1220 AT 24' OPEN SCREEN AND LIFT RODS 4' TO DROP. HAVE TO WAIT FOR WATER.

1236 WL = 18.18 pH = 7.4 TEMP = 18.1 COND:

1240 PURGE TUBING VOLUMES AND FIELD FILTER.

1245 COLLECT DPGW-6/GW01 20-24' FIELD FILTER ARSENIC.

1300 LOAD RIG ABANDON BORINGS w/ BENTONITE

1315 SETUP AT DPGW-5.

1318 BEGIN PROBING AT DPGW-5.

1319 COLLECT DPGW-5/SS01 1-2' ARSENIC

1324 COLLECT DPGW-5/SS02 9-10'

1324 COLLECT DPGW-5/SS02 MS/MSD 9-10' ARSENIC

1340 AT 25' - HEAVING SAND 7' UNABLE TO CLEAR. PULL RODS AND OFFSET FOR GROUNDWATER.

1345 DRIVE RODS AND SCREEN TO 28' BLS.

1350 AT 28 OPEN SCREEN AND PULL UP 4' TO OPEN.
WL = 11.46 pH = 7.2 TEMP = 17.3 COND = 1.330

1355 PURGE TUBING VOLUME AND COLLECT FIELD FILTERED.

1400 COLLECT DPGW-5/GW01 24-28' FIELD FILTERED ARSENIC

1405 PULL RODS AND ABANDON BORINGS. RAINING

1410 GO TO DPGW-4

1425 BEGIN PROBING DPGW-4

1426 COLLECT DPGW-4/SS01 1-2' ARSENIC

1430 COLLECT DPGW-4/SS02 10-11 ARSENIC

1445 AT 25' HEAVING SAND 5' UNABLE TO CLEAR FROM BARREL. STOP SAMPLING. EXTRACT RODS AND ABANDON BORING.

1450 DRIVE GROUNDWATER SAMPLER 4' DROP SCREEN TO 28'

1455 OPEN SCREEN LIFT 4' TO OPEN SCREEN
WL = 12.74 pH = 7.4 TEMP = 17.2 COND = 1.290

1457 PURGE TUBING VOLUMES FIELD FILTER SAMPLE

10/30/13 88777 L. TURNER

1515 COLLECT DPGW-4 / GW01 24-28 ARSENIC FIELD FILTER

1515 COLLECT DPGW-4 / GL01 MS / MSD 24-28' " "

1515 PULL RODS ABANDON BORING EPS DECON.

1523 LOAD RIG / DECON.

1545 EPS OFFSITE SIGN OUT GO TO LAB.

1605 AT PACE ESC DROPOFF. THEY WILL PACK AND SHIP.

1608 COCS SIGNED PACE TAKES CUSTODY.

1610 DEPART TO OFFICE

1638 AT KC OFFICE, UNLOAD TRUCK.

10/30/13

11-19-18 K Schutze

0840 leave office for field work

1045 onsite, meet w/ Keith Brown (1100)

Weather: 32°F, partly cloudy, calm

1115 Set up for fluid levels

Well ID	DTW	TD	Diameter	MEAS	Time
MW-15	18.41	Pump	2"	33.18'	1118
MW-14	20.15'	Pump	2"	33.25'	1122
MW-2A	15.35'	Pump	2"		1131
MW-3*	17.63'	Pump	4"		1134

*MW-3 does not have pad-lock on well

MW-4	14.17	Pump	4"		1140

Keith Brown stops by to give me extra lock,

MW-10	13.27	Pump	2"		1150
MW-8A	18.58	Pump	2"		1202
MW-16	14.89		4"		1210
MW-13	13.89	Pump	2"	33.13	1215

1225 Calibrate YSI multimeter:

~~[illegible]~~ DO = 100% ORP: pH: 4.0/7.0/10.0

(1.409) COND / TURB = 20/21 100/98 800/791

MW-13

Time	Flow	(L) Vol	PH	COND	TEMP	DO	ORP	TURB	DTW
1245	250	I	7.680	0.635	14.27	3.01	14.2	38	13.65
1300	250	1.25	7.121	0.634	13.51	2.97	-76.9	43	13.66
1305	250	2.50	6.987	0.637	13.67	2.58	-102.7	65	13.66
1310	250	3.75	6.983	0.641	13.89	2.04	-129.6	58	13.67
1315	250	5.0	6.980	0.642	14.07	1.21	-148.1	36	13.67

11-19-18 SCHUTZE

MW-13 CONT.

Time	Vol + Flow	pH	COND	TEMP	DO	ORP	TURB	DTW
1320	250/6.25	6.981	0.642	14.08	0.96	-150.0	28	13.67
1325	250/7.5	6.980	0.642	14.21	0.90	-149.3	26	13.67
1330	250/9.0	6.982	0.641	14.10	0.86	-142.3	23	13.67
1335	250/10.5	6.981	0.640	14.17	0.87	-145.1	19	13.67
1340	250/12.0	6.980	0.640	14.08	0.84	-142.8	15	13.67
1345	250/13.5	6.981	0.636	14.07	0.81	-149.6	16	13.67
1350	250/15	6.979	0.636	14.12	0.80	-147.5	13	13.67
1355	250/16.5	6.979	0.635	14.08	0.80	-146.8	9.4	13.67

1400 collect MW-13/GW-1 for dissolved + unfiltered As.

DTW following sampling = 13.67

1415 Set up @ MW-16 (Non-dedicated pump)

Time	Flow	Vol	pH	COND	TEMP	DO	ORP	TURB	DTW
1445	250	I	7.018	1.008	13.78	2.81	-162.3	18	14.90
1450	250	1.25	6.876	1.005	13.74	0.81	-62.3	13	14.91
1455	250	2.5	6.870	1.003	13.76	0.62	-67.6	9	14.90
1500	250	3.75	6.861	1.003	13.80	0.50	-71.5	6	14.90
1505	250	5.0	6.863	1.002	13.76	0.46	-72.1	5	14.90
1510	250	6.25	6.863	1.002	13.72	0.45	-77.2	5	14.90

1515 collect MW-16/GW for dissolved + total As

DTW @ following sampling = 14.90

1530 Decon non-dedicated pump

1540 collect rinsate blank

11-19-18 SCHUTTE

Set up @ MW-14 DTW = 19.41

TIME	FLOW	VOL	PH	COND	TEMP	DO	ORP	TURB	DTW
1545	200	I	10.25	1.110	14.06	3.46	-190.1	3	19.41
1550	200	1.25	7.106	~~7.106~~ 1.187	14.76	0.27	12.7	4	19.48
1555	250	2.50	6.802	1.186	14.78	0.25	15.3	4	19.57
1600	250	3.75	6.804	1.185	14.85	0.24	17.1	4	19.65
1605	250	5.0	6.804	1.185	14.74	0.23	18.6	4	19.71

1610 Collect MW-14/GW For As (Dissolved + [illegible]) WL 19.73

1620 set up @ MW-15 DTW = 18.85

Time	Flow	Vol	pH	COND	TEMP	DO	ORP	TURB	DTW
1625	250	I	6.800	0.768	19.58	1.25	3.6	6	[illegible]
1630	250	1.25	6.872	0.674	21.87	0.51	-18.2	4	18.89
1635	250	2.5	6.876	0.671	21.82	0.37	-47.1	4	18.88
1640	250	3.75	6.877	0.680	21.78	0.35	-51.2	3	18.88
1645	250	5.0	6.877	0.681	21.56	0.34	-53.1	3	18.89
1650	250	6.25	6.878	0.681	21.60	0.34	-55.1	3	18.88

1655 collect MW-15/GW + MS/MSD (WL = 18.89)

1720 offsite

11-19-18

11-20-18 K. Schutte

0815 Arrive @ Matheson Gas to refill CO_2 tank

0900 Pull up more ice

0915 Arrive on-site

Weather: 29°F, clear.

0930 Calibrate YSI

pH = 4.07 / 7.0 / 10.01 *pH DRIFTING

DO = 100% COND = 1.409 ORP = 232.5

TURB = 20/18 100/103 800/807

Set up @ MW-4

MW-4 WL = 14.31

Time	Flow	VOL	*pH	COND	TEMP	DO	ORP	TURB	DTW
1000	250	I	6.8	0.944	14.27	2.60	-4.6	11	14.32
1005	250	1.25	6.7	0.958	14.69	1.17	-44.8	4	14.32
1010	250	2.5	6.7	0.959	14.84	1.01	-50.6	2	14.32
1015	250	3.75	6.7	0.959	14.86	0.90	-54.1	2	14.32
1020	250	5	6.7	0.960	14.91	0.86	-53.1	1	14.32
1025	250	6.0	6.7	0.960	14.94	0.82	-53.5	1	14.32

1030 Collect MW-4/GW For As (Tot + Dissolved)

Final DTW = 14.32

1038 Arrive @ MW-3

Lock has been cut. Fix hinge on well so that new lock will fit

11-20-18 K. Schutte

MW-3 DTW = 17.75

TIME	FLOW	VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1045	250	I	6.7	1.029	13.12	3.76	41.8	12	17.76
1050	250	1.25	6.6	1.126	14.07	1.75	-38.3	8	17.79
1055	250	2.5	6.6	1.148	14.44	0.75	-71.4	5	17.80
1100	250	3.75	6.6	1.147	14.39	0.34	-75.1	4	17.78
1105	250	5.0	6.6	1.149	14.50	0.32	-78.0	4	17.78
1110	250	6.25	6.6	1.150	14.47	0.31	-79.1	4	17.79

1115 collect MW-3/GW-1 For As (Tot + Dissolved)

DTW = 17.79

1130 Set up @ MW-2A DTW = 15.41'

TIME	FLOW	VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1135	250	I	7.1	0.890	14.47	4.38	119.4	44	15.43'
1140	250	1.25	6.6	0.904	14.78	1.37	56.1	27	15.43
1145	250	2.5	6.6	0.906	14.77	0.83	21.6	12	15.43
1150	250	3.75	6.6	0.908	14.70	0.47	-24.7	9	15.43
1155	250	5.0	6.7	0.909	14.79	0.45	-27.5	7	15.43
1200	250	6.25	6.7	0.908	14.81	0.44	-28.7	6	15.43

1205 collect MW-2A/GW-1 For As (Diss + Total)

Final DTW = 15.43

1215 Set up @ MW-10 DTW = 13.37

TIME	FLOW	VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1220	250	I	6.5	1.184	15.12	3.08	-1.2	70	13.39
1225	250	1.25	6.5	1.212	15.41	0.87	-27.2	24	13.39
1230	250	2.5	6.5	1.213	15.57	0.39	-39.0	12	13.39

11-20-18 K. Schutte

MW-10 cont.

TIME	FLOW	VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1235	250	3.75	6.6	1.210	15.46	0.28	-39.6	10	13.39
1240	250	5	6.6	1.209	15.41	0.26	-39.4	9	13.39
1245	250	6.25	6.6	1.206	15.38	0.27	-38.7	7	13.39

1250 collect MW-10/GW-1 + DUP105/GW-1

DTW = 13.39

1300 Set up @ MW-8A DTW = 18.70

TIME	FLOW	VOL	pH	COND	TEMP	DO	ORP	TURB	DTW
1305	250	I	6.8	1.200	14.86	4.76	-12.7	97	18.70
1310	250	1.25	6.7	1.219	15.56	2.11	1.1	63	18.70
1315	250	2.5	6.7	1.220	15.76	1.01	-11.8	50	18.70
1320	250	3.75	6.7	1.225	15.62	0.51	-27.4	40	18.70
1325	250	5.0	6.6	1.227	15.70	0.42	-35.1	29	18.70
1330	250	6.25	6.6	1.231	15.73	0.31	-39.0	21	18.70
1335	250	7.5	6.6	1.239	15.69	0.20	-46.8	16	18.70
1340	200	8.75	6.6	1.239	15.66	0.19	-50.1	12	18.70
1345	250	10	6.6	1.240	15.77	0.18	-50.7	9	18.70

1350 collect MW-8A/GW-1 For As (Tot + Diss)

DTW = 18.70

1400 Pack up and clean up

1410 OFF SITE FOR PACE DROP-OFF

11-20-18

Drilling Log

Project Name KCBPU Nearman Creek	Project Number 88777	Boring Number MW-15
Ground Elevation	Location Kansas City KS	Page 1 of 2
Air Monitoring Equipment lel O2		Total Footage 30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	2"/8¼	30	—	—	

Drilling Company RAZEK	Driller(s) Tony Poulin Greg Good
Drilling Rig Geoprobe 7822DT	Type of Sampler Macrocore
Date 9-20-18 To 9-20-18	Field Observer(s) Kevin Bollin

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	Silt, 10YR 4/3, dry									
	Limestone seam									
	Silt 10YR 4/3									
1	Limestone gravel									
	Silt, 10YR 4/3, damp, soft			4/5						
2										
3	Sand, very fine to coarse, 10YR 4/3 damp loose									
	Silt, 10YR 4/3, damp, soft									
4	SAND, 10YR 5/3, damp loose Silt to medium sandy, trace gravel									
5					1640					
6	Silt, 10YR 4/1, damp, medium stiff non plastic, trace roots			4/5						
7										
8										
9	SAND, fine sand, 10YR 6/3 damp, loose,									
10					1643					
11										
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number MW-15
Project Name KCBPU
Page 2 of 2
Project Number 88777
Date 9-20-18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SAND, 10YR 4/3, fine grain, damp, loose									
15					1649					
16				3.5/5.0						
17										
18	wet,									
19	fine to medium grained									
20					1655					
21				2.0/5.0						
22										
23										
24										
25					1708					
26				1.6/50						
27										
28										
29	fine to coarse w gravels									
30										
	EOB 30' bgs									
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

010515 Form WCD-KC-2-2

Drilling Log

Project Name KC BPU	Project Number 88777	Boring Number MW-14
Ground Elevation	Location Kansas City KS	Page 1 of 2
Air Monitoring Equipment 4-Gas		Total Footage 30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	8.25	30	—	—	—

Drilling Company RAZEK	Driller(s) Tony Paltey Greg Goode
Drilling Rig Geoprobe 7822DT	Type of Sampler Macrocore
Date 9-20-18 To 9-20-18	Field Observer(s) Kevin Bolling

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1 2	SILT, dark grayish brown 10YR 4/2, damp, soft			3/5	1414					
3 4	Silt, some clay 10YR 3/1 soft, low, plastish, damp,									
	~~SAND, very fine grained~~									
5	SILT, Brown 10YR 5/3 moist, soft				1420					
6	CLAY, very dark grayish brown 10YR 3/2, damp, medium stiff medium plastic			4/5						
7	SAND/Silty sand, fine grained, 10YR 6/3, damp									
8	SILT, 10YR 4/2, moist, soft									
9	SAND, 10YR 6/3, medium grained, damp, loose									
10 11 12	SILT, 10YR 4/2, moist, soft w/clay stiff, med plastic			5/5	1424					
13 14	SAND, medium grained 10YR 6/3, damp, loose, poorly graded									

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS McDONNELL

Drilling Log Continuation

	Boring Number MW-14
Project Name KCBPU	Page 2 of 2
Project Number 88777	Date 9-2-15

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SAND, 10YR 6/3 damp, medium grain, poorly graded, loose									
15										
16				3/5						
17										
18	wet at 18.5									
19										
20					1430					
21'				2/5						
22	~~medium~~ fine to coarse, well graded trace gravel									
23										
24	SAND, light yellowish brown 10YR 6/4, fine to medium grained, wet loose, poorly graded									
25										
26				2.5/5						
27										
28										
29										
30	EOB 30' bgs				1445					
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

010515 Form WCD-KC-2-2

Drilling Log

Project Name: KCBPU
Project Number: 88177
Boring Number: MW-13
Ground Elevation:
Location: Kansas City KS
Page: 1 of 2
Air Monitoring Equipment: 4-gas
Total Footage: 30

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	8.25	30	—	—	—

Drilling Company: KARELL
Driller(s): Tony Poulter Greg Gade
Drilling Rig: Geoprobe 7822DT
Type of Sampler: Macro core
Date: 9-20-18 To 9-20-18
Field Observer(s): Kevin Collins

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	Gravel/silt, 10yr 4/2 dry									
1	Silty, lean clay 10YR 4/3, damp, soft.			3/5						
2										
3										
4	10YR 5/3									
5	moist				0921					
	SAND, v. fine to fine grain, 10YR 5/3 damp, loose poorly sort									
6				2/5						
7	Silt, 10yr 4/2, dry									
	SAND, very fine to fine grain 10YR 5/3, damp, loose poorly grad									
8										
9										
10					0924					
11				3/5						
12	~~Silty [illegible] 2/1, moist soft plast~~									
	SAND, dark gray, 10YR 4/1, fine grain, wet									
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number MW-13
Project Name KCBPU	Page 2 of 2
Project Number 88777	Date 9-26-18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	SAND, 10[illegible] 10YR [illegible]/ [illegible], wet									
15	SAND, 10YR 5/3, fine grained 100%, wet				0914					
16				2/5						
17										
18										
19	SAND, ~~to~~ yellowish brown 10YR 5/6, wet bore, fine to medium grained									
20					0933					
21										
22				1/5						
23										
24	SAND, dark gray 10YR 4/1, well graded, fine to ~~coarse~~ med, wet loose fine to coarse grained									
25										
26	trace fine gravels			2/5						
27										
28										
29										
30					0924					
31	EOB 30' 16,23									
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

010515 Form WCD-KC-2-2

Drilling Log

Project Name Nearman Creek
Project Number 88777
Boring Number DPGW-1
Ground Elevation
Location
Page 1 of 2
Air Monitoring Equipment NA
Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25"	20	NA	3	NA

Drilling Company EPS
Driller(s) Blase Martin
Drilling Rig 7822DT
Type of Sampler Acetate Sleeve
Date 10/30/18
To 10/30/18
Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	Asphalt gravel 0.4' SILT, some clay, very dark grayish brown (10YR 3/2) damp, medium to low plasticity, medium consistency.		NA		NA		NA			START 0818 Dual-Tube
1		ML				DPGW-1 SS01 1-2'				Offset x2 low recovery
2				2/5						
3										
4										0830
5										
6	SAND, trace silt, pale brown (10YR 6/3) Fine grain, loose moist, poorly graded.	SP								
7	SILT, some clay, very dark grey GLEY1 (3N) wet, medium plasticity, soft consistency.	ML								
8						DPGW-1 SS02 8-9'				
9	SILTY SAND very dark grey Gley1 (3N) wet, trace plasticity, soft	SP								0835
10										▽ moisture
11	SAND. brown (10YR 4/3) Fine grain, loose, wet, poorly graded	SP		4/5						
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number DPGW-1

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, brown (10YR 4/3) fine grain, loose, wet, poorly graded.	SP	NA		NA			NA		
15										0845
16										
17				5/5						
18										
19	SAND, brown (10YR 4/3) loose, fine to medium grain, wet, poorly graded	SP								
20										0850 Stop
	Bottom of Boring - SAND HEAVE.									
						DPGW-1 GW01 22-26' Dup				Offset Boring for GW

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-2
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-push	3.25	25	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822 DT	Type of Sampler Acetate Sleeve
Date 10/29/18 To 10/29/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	SILT, trace clay, very dark grayish brown (10YR 3/2), damp, trace plasticity to non plastic, medium to soft consistency.	ML	NA		NA			NA		START 1454 Dual-Tube
1				3.5/5		DPGW-2 SS01 1-2'				
2	trace iron color									
3	SAND, trace silt, yellowish brown (10YR 5/6) fine grain, loose, damp poorly graded.	SP								
4										1455
5	SILT, some sand, dark gray (10YR 4/1) damp, non plastic, soft consistency.	ML				DPGW-2 SS02 5-6'				
6				3.5/5						▼
7	SAND, trace silt, pale brown (10YR 6/3) Fine grain, loose, damp to moist to wet, poorly graded.	SP								moisture
8										
9										1457
10										
11				3.8/5						
12										
13	becomes very dark gray (Gley 1 3/N)									
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number DPGW-2

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, dark grayish brown (10YR 4/2)	SP	NA		NA			NA		
15	Fine to medium grain, loose, wet									1500
16										
17				4/5						
18										
19										
20	trace shale fragments									1510
21						DPGW-2 GW01 20-24'				Offsite Boring For GW
22				5/5						
23										
24										
25										1515 STOP
	Bottom of Boring - SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

Drilling Log

Project Name Neorman Creek	Project Number 88777	Boring Number DPGW-3
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	20	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate Sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	CLAY with silt, very dark grayish brown (10YR3/2) Damp, medium plasticity, stiff to medium.	CL	NA		NA					START 1013
1	SILT, trace clay brown (10YR4/3), damp non plastic, soft consistency	ML		3/5		DPGW-3 SS01 1-2'				Dual-Tube
2	SAND, trace silt, brown (10YR4/3) fine grain, loose, damp, poorly graded.	SP								
3										
4	1 mm dark seam									1015
5										
6				3.5/5						
7										
8						DPGW-3 SS02 7.5-8.5' Dup				
9										▼ 1018
10	Becomes wet									moisture
11				4/5						
12										
13	SAND, trace silt fine to medium grain brown (10YR4/3) loose, wet, poorly graded	SP								
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-3
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, fine to coarse, fine gravel traces. brown (10YR 4/3). loose, wet, wellgraded	SP	NA		NA			NA		1020
15										
16										
17				5/5						
18	Dark area black (10YR 2/1) 0.24'									
19										
20										1028 STOP
	Bottom of Boring. SAND HEAVE.									
						DPGW-3 GW01 22-26'				Offset Boring For GW

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

010515 Form WCD-KC-2-2

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-4
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25"	25	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SILT with clay, very dark grayish brown (10YR 3/2) damp, medium plasticity, soft.	ML	NA		NA			NA		START 1425 Dual Tube
1				2/5		DPGW-4 SS01 1-2'				
2										
3	2" sand seam.									
4	SILT very dark grayish brown (10YR 3/2) damp. non plastic, soft.	ML								1426
5										
6				2/5						
7	SAND, trace silt pale brown (10YR 6/3) fine grain loose, damp. poorly graded.	SP								
8										
9										1428
10						DPGW-4 SS02 10-11'				
11	SAND, trace silt, dark grayish brown (10YR 4/2) Fine grain, trace medium loose, damp. poorly graded becomes wet	SP								
12				3/5						▼ moisture
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number DPGW-4
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, dark grayish brown (10YR 4/2) fine grain trace medium loose, wet, poorly graded	SP	NA		NA			NA		
15										1430
16										
17				4/5						
18										
19										
20										1438
21										
22				5/5						
23										
24						DPGW-4 GW01 24-28' MS/MSD				Boring offset for GW 1445 STOP
25										
	Bottom of Boring - SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log

Project Name: Nearman Creek
Project Number: 88777
Boring Number: DPGW-5
Ground Elevation:
Location:
Page: 1 of 2
Air Monitoring Equipment: NA
Total Footage: 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	25	NA	3	NA

Drilling Company: EPS
Driller(s): Blase Martin.
Drilling Rig: 7822DT
Type of Sampler: Acetate Sleeve
Date: 10/30/18
To: 10/30/18
Field Observer(s): Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	SILT with clay very dark grayish brown (10YR 3/2) damp, medium plasticity, soft.	ML	NA		NA					START 1318 DUAL-TUBE
1						DPGW-5 SS01 1-2'				
2	SILT, very dark grayish brown (10YR 3/2) damp to moist. trace plasticity, soft.			2.5/5						
3		ML								
4										1319
5										
6										
7				3/5						
8										
9	SAND, trace silt. pale brown (10YR 6/3) brown (10YR 4/3), finegrain, loose, wet poorly graded	SP				DPGW-5 SS02 9-10'				1320
10						ms/msD				
11				3/5						▼ moisture
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-5
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, pale brown (10YR6/3) brown (10YR4/3) fine grain, loose, wet, poorly graded.	SP	NA		NA			NA		
15										1324
16										
17				4/5						
18										
19	SAND, very dark gray (Gley 1 3/N) fine to coarse grain, loose, WET, moderately graded.	SP								
20										1327
21				5/5						
22	Fine grain									
23										
24	more gravel.					DPGW-5 GW01 24-28'				Offset Boring For GW 1340 STOP
25										
	Bottom of Boring - Heaving SAND									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-6
Ground Elevation	Location	Page 1 of 3
Air Monitoring Equipment NA		Total Footage 35

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	35	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	CLAY with silt, very dark grayish brown (10YR 3/2), damp, medium to trace plasticity. medium consistency	CL	NA		NA			NA		START 1140
1						DPGW-6 SS01 1-2'				
2	SILT, trace clay very dark grayish brown (10YR 3/2) damp. trace plasticity. medium consistency.	ML		3/5						
3										
4										
5										1142
6	SILT, trace clay, dark gray (10YR 4/1) damp. non plastic, medium consistency.	ML								
7				5/5						
8										
9	SILT with clay, brown (10YR 4/3) damp. medium plasticity, medium consistency	ML								
10										1143
11										
12	SILT with clay, brown (10YR 4/2) and very dark grayish brown (10YR 3/2) medium plasticity. damp, medium consistency.	ML		3.5/5						
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-6
Project Name Nearman Creek	Page 2 of 3
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SILT, with clay, brown (10YR4/2) and very dark grayish brown (10YR3/2) damp medium plasticity, medium consistency.	ML	NA		NA			NA		1144
15						DPGW-6 SS02 15-16'				
16				5/5						
17	SILT with very fine sand, dark grayish brown (10YR4/2) moist to wet, nonplastic, soft consistency.									moisture ▽
18		ML								
19										1146
20	SAND with silt, fine grain, dark grayish brown (10YR4/2) wet, loose, poorly graded.	SP				← DPGW-6 GW01 20-24'				Offset Boring For GW.
21										
22				5/5						
23										
24										1148
25										
26										
27				5/5						
28										
29										1155
30	SILT with clay and fine sand, very dark greenish gray (Gley 1 3/1), wet, medium to high plasticity. soft consistency	ML								
31				5/5						
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-6
Project Name Nearman Creek	Page 3 of 3
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
32	SILT, with clay and fine sand, very dark greenish gray (Gley 1 3/1), wet, medium to high plasticity, soft consistency	ML	NA		NA			NA		
33				5/5						
34										
35										1200 STOP
	Bottom of Boring.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL.

Drilling Log

Project Name Nearman Creek
Project Number 88777
Boring Number DPGW-7
Ground Elevation
Location
Page 1 of 2
Air Monitoring Equipment NA
Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	25	NA	3	NA

Drilling Company EPS
Driller(s) Blase Martin
Drilling Rig 7822DT
Type of Sampler acetate sleeve
Date 10/29/18
To 10/29/18
Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	SILT, trace clay, very dark grayish brown (10YR 3/2), damp, trace plasticity, soft consistency.	ML	NA		NA		NA			START 1751
1				2/5		DPGW-7/ SS01 1-2'				Dual-Tube
2	SAND, trace silt, pale brown (10YR 4/1) Fine grain, loose, damp, poorly graded.	SP								
3										
4										1752
5										
6										
7				3/5						
8	SAND, trace silt, dark grayish brown (10 YR 4/2) Finegrain, trace medium. loose, ~~wet~~ damp LT, poorly graded	SP				DPGW-7 SS02 9-10'				1758
9										
10										
11	becomes wet.			4/5						▽ moisture
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number DPGW-7

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, dark grayish brown (10YR 4/2) fine grain, trace medium loose, damp to wet, poorly graded	SP	NA		NA			NA		
15										1801
16				5/5						
17										
18										
19										1805
20	SAND, very dark gray (10YR 3/1), fine grain, loose, wet, poorly graded. Some organic material.	SP								
21										Offset boring For GW.
22				5/5		DPGW-7 GW01 21-25				
23										
24	SAND, dark grayish brown (10YR 4/2) fine to coarse sand, fine gravel, loose, wet, well graded.	SP								
25										1810 STOP
	BOTTOM OF BORING. SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

010515 Form WCD-KC-2-2

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-8
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	20	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate sleeve
Date 10/29/18 To 10/29/18	Field Observer(s) Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	SILT, trace clay, very dark grayish brown (10YR 3/2), damp. trace plasticity, medium consistency.	ML	NA		NA			NA		START 1630 Dual-Tube
1				2.5/5		DPGW-8 SS01 1-2' Dup				
2	SAND, trace silt, pale brown (10YR 4/1) Fine grain, loose, damp, poorly graded.	SP								
3										
4										1633
5										
6										
7				3/5						
8										
9										1635
10						DPGW-8 SS02 10-11'				
11	SAND, trace silt, dark grayish brown (10YR 4/2) fine grain trace medium, loose, wet, poorly graded.	SP								
12				3.5/5						Moisture ▽
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

Boring Number DPGW-8

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, dark grayish brown (10YR 4/2) Fine grain, trace medium, loose, wet, poorly graded.	SP	NA		NA			NA		
15										1640
16				5/5		DPGW-8 GW01 16-20'				offset boring for GW.
17										
18										
19										
20										1650 STOP
	Bottom of Boring. SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log

Project Name KC BPU Nearman Creek	Project Number 88777	Boring Number MW-16
Ground Elevation	Location KCK	Page 1 of 2
Air Monitoring Equipment		Total Footage

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct Push HSA	8"				

Drilling Company RAZEK	Driller(s) Tony Poulter, Greg Good
Drilling Rig Geoprobe 7822DT	Type of Sampler Macro core
Date 11-15-18 To 11-15-18	Field Observer(s) Kevin Bolling

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	CLAY, 10YR 3/3, medium soft, moist plastic,			25/5						
1										
2	SILT, 10YR 5/3, damp, soft									
3										
4										
5				0941	0941					
6				3.5/4						
7	SAND, 10YR 6/3, very fine sand, some silt, damp, loose									
8										
9										
10				0943	0943					
11	wet at 12'			4/5	4/5					
12	CLAY, some silt, 10YR 4/1, soft moist, medium plastic									
13	SAND fine sand, some silt, 10YR 4/1 moist, loose									
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

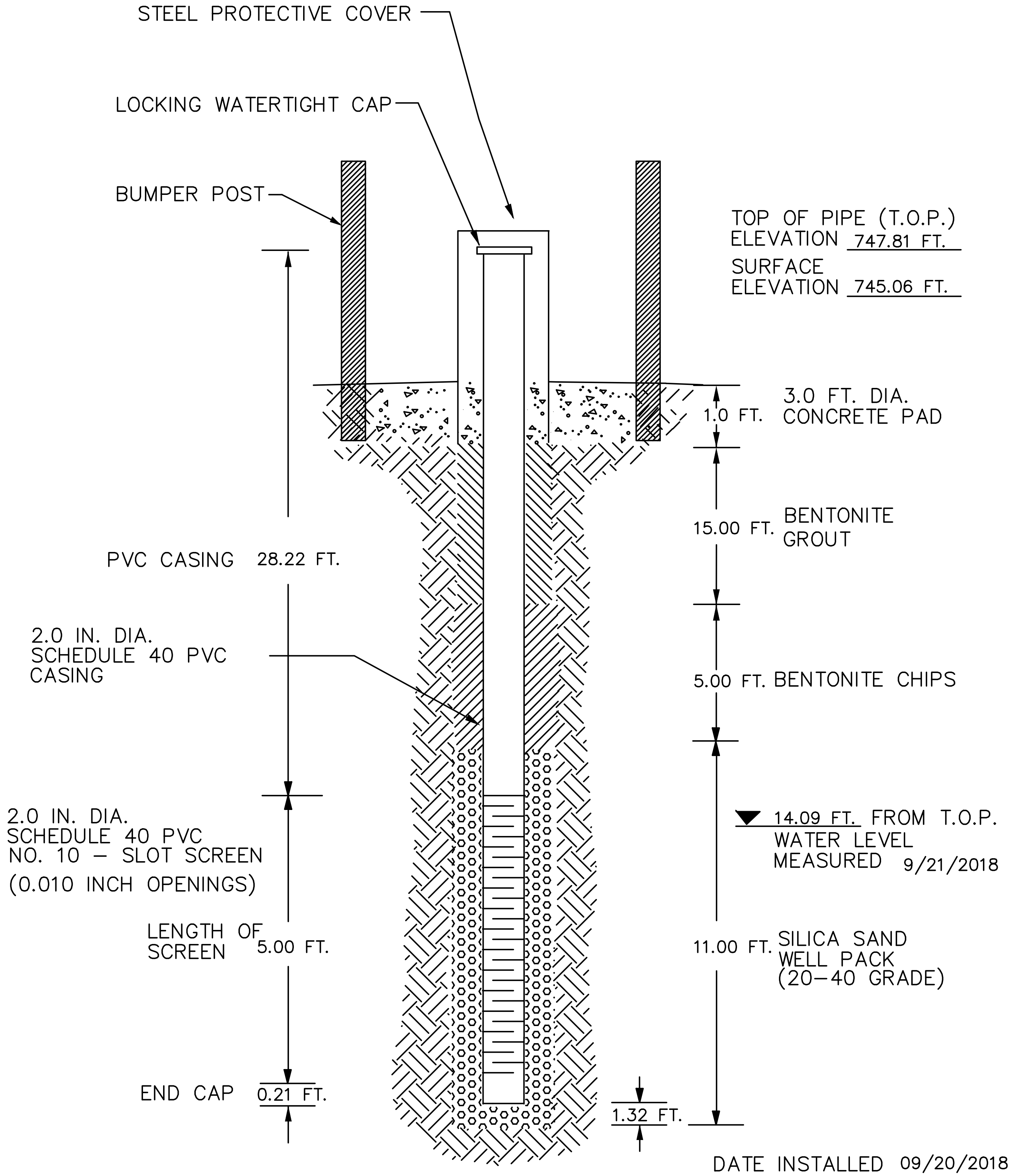
Drilling Log Continuation

	Boring Number MW-16
Project Name KCBPU Nearman Creek	Page 2 of 2
Project Number 88777	Date 11-15-98

Depth (feet)	Description	Class	Blow Count	Recov.	Run/Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SAND, fine grained, some silt, 10YR 4/, moist, loose									
15					0946					
16				4/5						
17	SILT, trace fine sand, wet, soft, w									
18										
19	SAND, 10YR 4/1, well graded fine to coarse, gravels, wet									
20										
21	SAND fine to medium grained, 10YR 4/, wet, loose, ~ trace wood, trace charcoal.									
22				3/5						
23										
24										
25										
26										
27				3/5						
28										
29					0957					
30	EOB 30' bgs									
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell SINCE 1898



DATE INSTALLED 09/20/2018

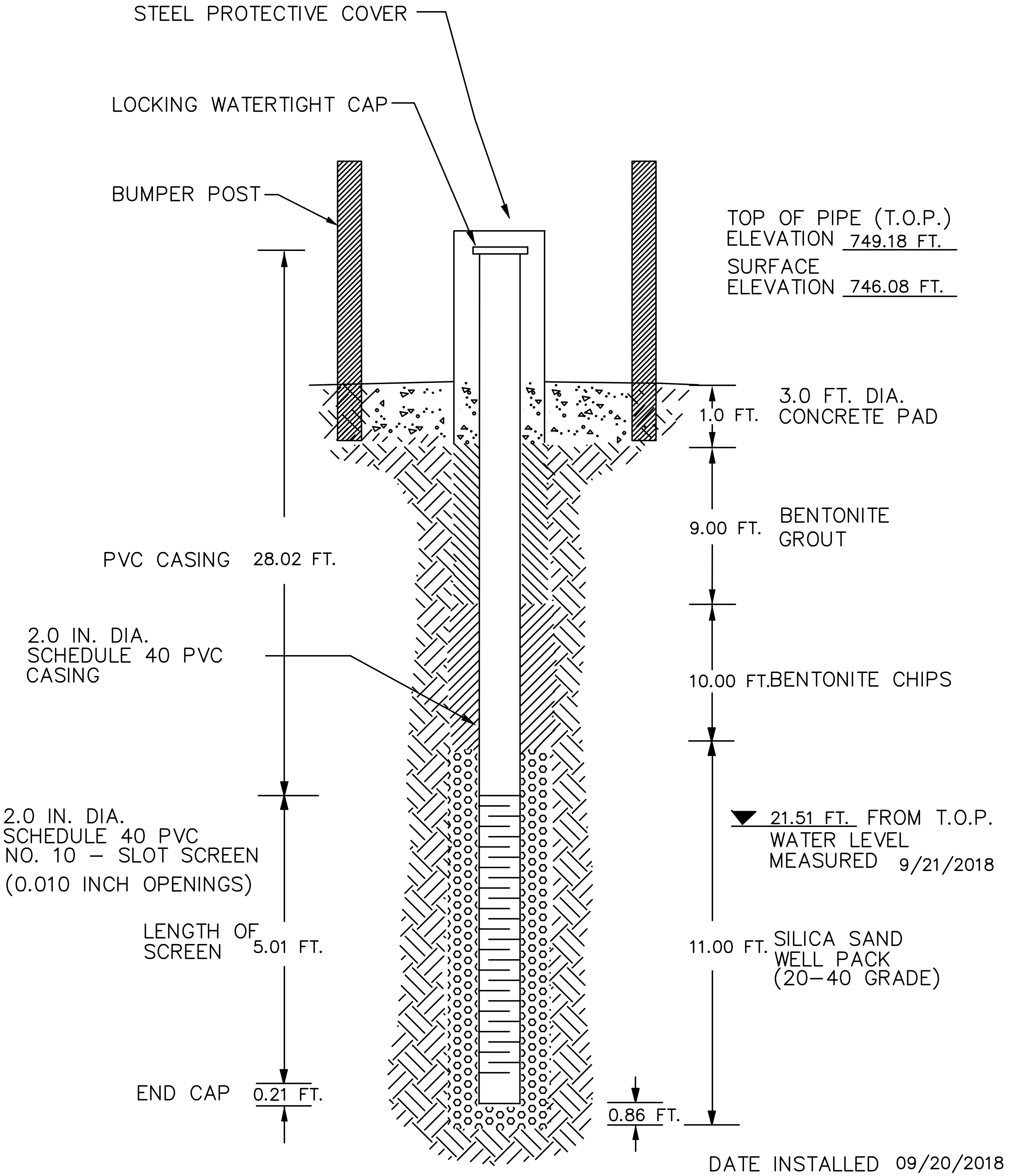
NOT TO SCALE

BOTTOM OF
WELL 33.43 FT.
BELOW TOC

BOTTOM OF
WELL 30.68
BELOW GRADE

BURNS McDONNELL

MONITORING WELL
MW-13
CONSTRUCTION RECORD



DATE INSTALLED 09/20/2018

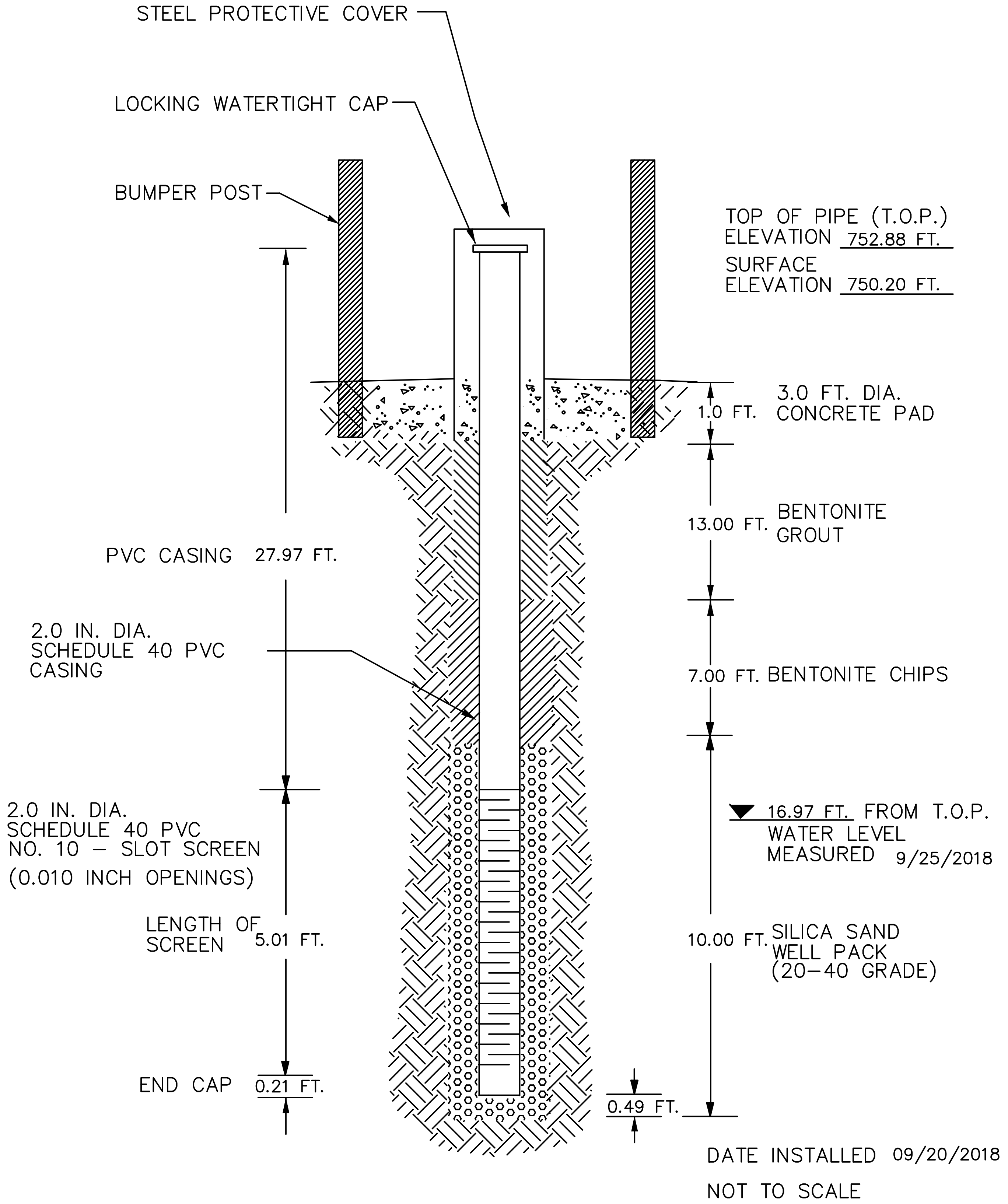
NOT TO SCALE

BOTTOM OF
WELL 33.24 FT.
BELOW TOC

BOTTOM OF
WELL 30.14
BELOW GRADE

BURNS
McDONNELL

MONITORING WELL
MW-14
CONSTRUCTION RECORD



DATE INSTALLED 09/20/2018

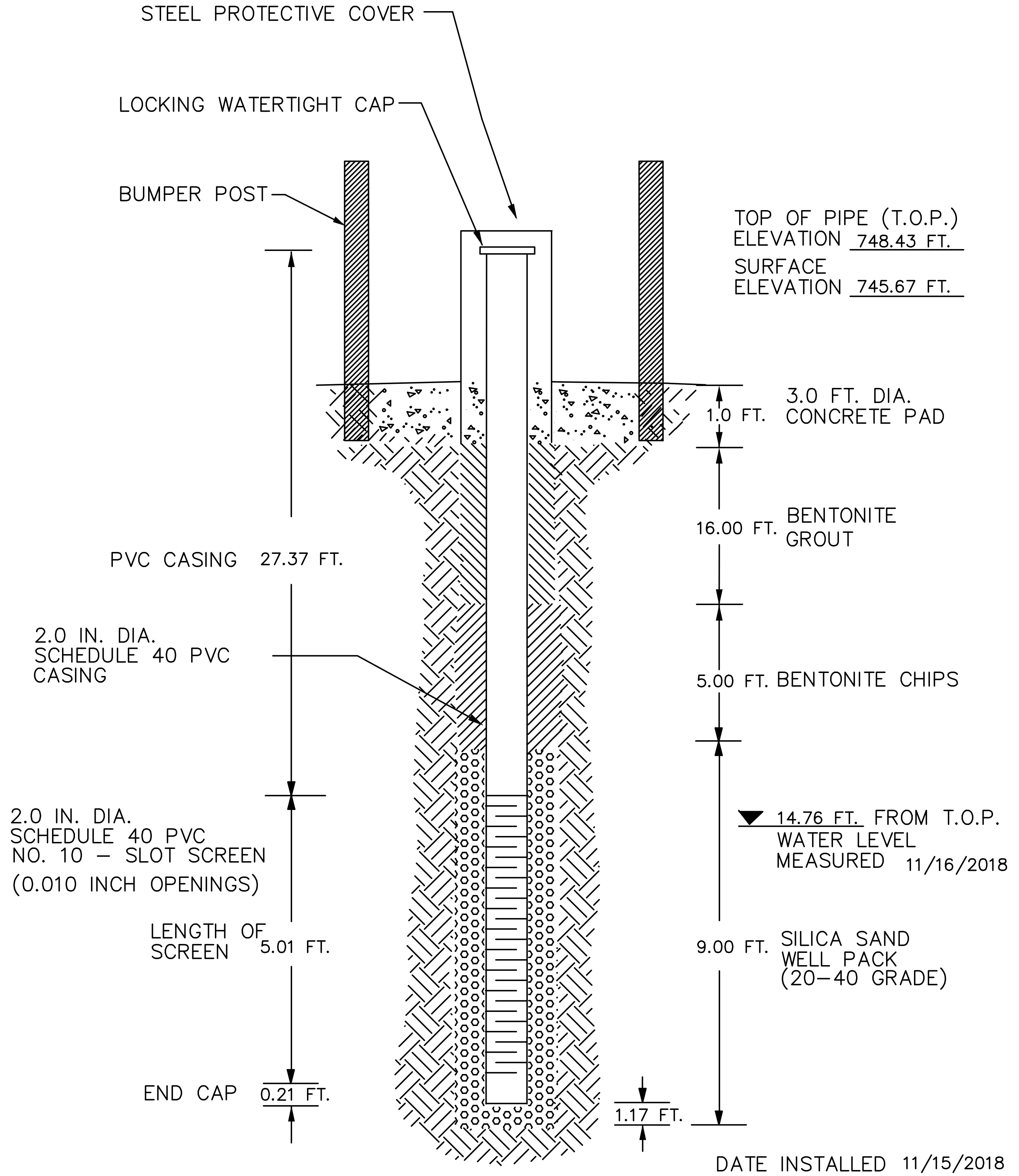
NOT TO SCALE

BOTTOM OF
WELL 33.19 FT.
BELOW TOC

BOTTOM OF
WELL 30.51 FT.
BELOW GRADE

BURNS McDONNELL

MONITORING WELL
MW-15
CONSTRUCTION RECORD



DATE INSTALLED 11/15/2018

NOT TO SCALE

BOTTOM OF
WELL 32.59 FT.
BELOW TOC

BOTTOM OF
WELL 29.83 FT.
BELOW GRADE

BURNS McDONNELL

MONITORING WELL
MW-16
CONSTRUCTION RECORD

Well Development Form

Page 1 of 2

Project Name: KCBPU Nearman Creek	**Project Number:**	**SW File Number:**	**Well Name:** MW-13

Project Information

Facility Name: Nearman Creek

Location: N E

Location in Decimal Degrees: LatDD: LongDD:

Elevation of Piezometer

Ground Surface Elevation (GS):

Top of Casing Elevation (TOC):

Measuring Point Elevation (MP):

Well Information

Date Drilled: 9-20-18

Borehole Depth: 32 feet from

Casing Depth: 30.5 feet from

Depth to Top of Screen: 25.5 feet from

Depth to Bottom of Screen: 30.5 feet from

Filter Top Depth: 21 feet from

Filter Bottom Depth: 32 feet from

Length of Casing Screened: 5' feet

Type of Formation Screened: Sand

Well Volume Calculation

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

intial height of water column (ft) = total depth (ft) - intial depth to water (ft)

Development Method

Equipment:

Surge	✓	Bail	
Airlift		Pump	12 Volt

Drilling Methods:

Observations During Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed Gallons	Fluid Removed Total	Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Tubidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
9-21-18	1242	14.09	33.33		~~5~~0	16.7	7.9	790	00r	turbid Brown
	1245				5 10	16.4	7.4	780	562	turbid Brown
	1249				10 15	16.3	6.9	280	93	Cloudy
	1252				15 20	16.5	6.6	780	00r	turbid brown
	1256				20	15.5	6.8	780	128	
	1259				25	15.9	6.8	780	256	
	1302				30	15.8	6.8	790	45	
	1304				35	15.7	6.8	790	146	
	1306				40	15.7	6.6	790	312	
	1308				45	15.7	6.8	800	225	
	1311				50	15.8	6.9	800	313	
	1313				65	15.9	6.9	790	98	

*from TOC unles otherwise noted in Remarks

Well Development Form (Continuation)

Page 2 of 2

Project Name:

Project Number:

Piezometer Number: MW-13

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. (µS/cm)	Fluid Appearance and Remarks Turbidity (NTU) (turbidity, color, odor, etc.)
9-21-18	1314				60	15.8	6.9	790	102
	1316				65	15.6	6.9	800	25
	1319				70	15.7	6.9	800	6
	1320	Development		complete					

*from TOC unles otherwise noted in Remarks

Well Development Form

Page 1 of 1

Project Name: KCBPU	**Project Number:**	**SW File Number:**	**Well Name:** MW-14

Project Information			**Elevation of Piezometer**
Facility Name: Norman Creek			Ground Surface Elevation (GS):
Location:	N	E	Top of Casing Elevation (TOC):
Location in Decimal Degrees:	LatDD:	LongDD:	Measuring Point Elevation (MP):

Well Information		
Date Drilled:	9-20-18	
Borehole Depth:	31	feet from
Casing Depth:	30	feet from
Depth to Top of Screen:	25	feet from
Depth to Bottom of Screen:	30	feet from
Filter Top Depth:	20	feet from
Filter Bottom Depth:	31	feet from
Length of Casing Screened:	5	feet
Type of Formation Screened:	Sand	

Well Volume Calculation

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

intial height of water column (ft) = total depth (ft) - intial depth to water (ft)

Development Method

Equipment:				Drilling Methods:
Surge	✓	Bail		
Airlift		Pump	12-volt	

Observations During Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed Gallons	 Total	Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Tubidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
9-21-18	1540	21.51	33.24		I	17.9	7.0	1200	oor	Turbid brown
	1542				5	17.1	7.0	1210	oor	
	1545				10	16.8	6.9	1210	oor	
	1547				15	16.7	6.9	1220	oor	
	1550				20	16.5	6.8	1230	oor	
	1552				25	16.0	6.8	1220	oor	
	1555				30	15.5	6.7	1230	891	turbid brown
	1557				35	15.5	6.7	1220	258	cloudy brown
	1600				40	15.6	6.7	1210	58	
	1602				45	15.6	6.7	1220	182	
	1605				50	16.2	6.7	1210	33	clear
	1607				55	15.9	6.7	1220	19	clear
	1610				60	16.1	6.6	1210	16	clear

*from TOC unles otherwise noted in Remarks

Well Development Form (Continuation)

Page ___ of ___

Project Name:

Project Number:

Piezometer Number:

Observations During Well Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (µS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total				

*from TOC unles otherwise noted in Remarks

MW-15

Well Development Form

Page 1 of 2

Project Name: KCBPO	**Project Number:**	**SW File Number:**	**Well Name:** MW-15

Project Information		
Facility Name: Nearman Creek		
Location:	N	E
Location in Decimal Degrees:	LatDD:	LongDD:

Elevation of Piezometer
Ground Surface Elevation (GS):
Top of Casing Elevation (TOC):
Measuring Point Elevation (MP):

Well Information		
Date Drilled:	9-20-18 / 9-21-18	
Borehole Depth:	31	feet from
Casing Depth:	30	feet from
Depth to Top of Screen:	25	feet from
Depth to Bottom of Screen:	30	feet from
Filter Top Depth:	21	feet from
Filter Bottom Depth:	31	feet from
Length of Casing Screened:	5	feet
Type of Formation Screened:	Sand	

Well Volume Calculation

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

intial height of water column (ft) = total depth (ft) - intial depth to water (ft)

Development Method				
Equipment:				Drilling Methods:
Surge	X	Bail		
Airlift		Pump	12-volt	

Observations During Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed Gallons	Fluid Removed Total	Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Tubidity (NTU)	Fluid Appearance and Remarks (color, odor, etc.)
9-25-18	0933	16.97	32.58		I	28.7	8.5	800	OOR	
	0935				5	22.6	7.9	810	OOR	
	0938				10	22.6	7.8	800	OOR	
	0940				15	22.6	7.8	800	854	
	0943				20	22.6	7.5	800	OOR	
	0945				25	22.6	7.4	800	762	
	0948				30	22.6	7.3	850	156	
	0950				35	22.5	7.3	800	92.1	
	0953				40	22.5	7.3	800	75.2	
	0955				45	22.5	7.3	790	136	
	0958				50	22.4	7.3	790	84.1	
	1000				55	22.5	7.3	780	58.4	

*from TOC unles otherwise noted in Remarks

Well Development Form (Continuation)

Page 2 of 2

Project Name:

Project Number:

Piezometer Number: MW-15

Observations During Well Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (µS/cm)	Turbidity	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total					
9-25-18	1003				60	22.5	7.3	790	46.5	
	1005				65	22.5	7.3	800	36.2	
	1008				70	22.5	7.4	780	23.1	
	1011				75	22.5	7.4	790	12.4	

*from TOC unles otherwise noted in Remarks

Well Development Form

Page 1 of 1

Project Name: KC BPU Nearman Creek	**Project Number:** 85777	**SW File Number:**	**Well Name:** MW-16

Project Information	**Elevation of Piezometer**
Facility Name:	Ground Surface Elevation (GS):
Location: N E	Top of Casing Elevation (TOC):
Location in Decimal Degrees: LatDD: LongDD:	Measuring Point Elevation (MP):

Well Information

Date Drilled: 11-15-18

Borehole Depth: 30 feet from

Casing Depth: 30 feet from

Depth to Top of Screen: 25 feet from

Depth to Bottom of Screen: 30 feet from

Filter Top Depth: 22 feet from

Filter Bottom Depth: 31 feet from

Length of Casing Screened: 5 feet

Type of Formation Screened: Sand

Well Volume Calculation

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

intial height of water column (ft) = total depth (ft) - intial depth to water (ft)

Development Method

Equipment:				Drilling Methods:
Surge	X	Bail		
Airlift		Pump	12 volt	

Observations During Development

		Depth to	Total	Fluid Removed		Temp.	pH	S.C.	Tubidity	Fluid Appearance and Remarks
Date	Time	Water* (ft)	Depth* (ft)	Gallons	Total	(degrees F)	(units)	(mS/cm)	(NTU)	(color, odor, etc.)
11-16-18	0840	14.76	32.51	8	0	16.2	10.5	1313	608	Turbid, Brown
	0844			8	8	15.1	8.1	1320	652	turbid brown
	0848			8	16	14.6	7.4	1315	418	turbid brown
	0853			8	24	14.5	7.3	1315	361	turbid brown
	0856			8	32	14.5	7.2	1315	187	Cloudy
	0900			8	40	14.4	7.1	1315	126	Cloudy
	0904			8	48	14.4	7.1	1315	94	clear
	0908			8	56	14.4	7.1	1315	82	clear
	0912			8	64	14.4	7.1	1315	61	clear
	0916			8	72	14.4	7.1	1310	44	clear
	0920			8	80	14.5	7.1	1315	23	clear

*from TOC unles otherwise noted in Remarks

Well Development Form (Continuation)

Page ___ of ___

Project Name:

Project Number:

Piezometer Number:

Observations During Well Development

Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (µS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total				

*from TOC unles otherwise noted in Remarks

Drilling Log

Project Name Nearman Creek
Project Number 88777
Boring Number DPGW-1
Ground Elevation
Location
Page 1 of 2
Air Monitoring Equipment NA
Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25"	20	NA	3	NA

Drilling Company EPS
Driller(s) Blase Martin
Drilling Rig 7822DT
Type of Sampler Acetate Sleeve
Date 10/30/18
To 10/30/18
Field Observer(s) Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	Asphalt gravel 0.4' SILT, some clay, very dark grayish brown (10YR 3/2) damp, medium to low plasticity, medium consistency.		NA		NA			NA		START 0818 Dual-Tube
1		ML				DPGW-1 SS01 1-2'				Offset x2 low recovery
2				2/5						
3										
4										0830
5										
6	SAND, trace silt, pale brown (10YR 6/3) Fine grain, loose moist, poorly grade).	SP								
7	SILT, some clay, very dark grey GLEY1 (3N) wet, medium plasticity, soft consistency.	ML								
8						DPGW-1 SS02 8-9'				
9	SILTY SAND very dark grey Gley1 (3N) wet, trace plasticity, soft	SP								0835
10										▽ moisture
11	SAND. brown (10YR 4/3) Fine grain, loose, wet, poorly grade)	SP		4/5						
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number DPGW-1

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, brown (10YR 4/3) fine grain, loose, wet, poorly graded.	SP	NA		NA			NA		
15										0845
16										
17				5/5						
18										
19	SAND, brown (10YR 4/3) loose, fine to medium grain, wet, poorly graded	SP								
20										0850 STOP
	Bottom of Boring - SAND HEAVE.									
						DPGW-1 GW01 22-26' Dup				offset Boring for GW

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

Drilling Log

Project Name Nearman Creek
Project Number 88777
Boring Number DPGW-2
Ground Elevation
Location
Page 1 of 2
Air Monitoring Equipment NA
Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-push	3.25	25	NA	3	NA

Drilling Company EPS
Driller(s) Blase Martin
Drilling Rig 7822DT
Type of Sampler Acetate Sleeve
Date 10/29/18 To 10/29/18
Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SILT, trace clay, very dark grayish brown (10YR 3/2), damp, trace plasticity to non plastic, medium to soft consistency.	ML	NA		NA			NA		START 1454 Dual-Tube
1				3.5/5		DPGW-2 SS01 1-2'				
2	trace iron color									
3	SAND, trace silt, yellowish brown (10YR 5/6) fine grain, loose, damp poorly graded.	SP								
4										1455
5	SILT, some sand, dark gray (10YR 4/1) damp, non plastic, soft consistency.	ML				DPGW-2 SS02 5-6'				
6				3.5/5						▼
7	SAND, trace silt, pale brown (10YR 6/3) Fine grain, loose, damp to moist to wet, poorly graded.	SP								moisture
8										
9										1457
10										
11				3.8/5						
12										
13	becomes very dark gray (Gley 1 3/N)									
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-2
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
14	SAND, dark grayish brown (10YR 4/2) Fine to medium grain, loose, wet	SP	NA		NA			NA		
15										1500
16										
17				4/5						
18										
19										
20	trace shale fragments									1510
21						DPGW-2 GW01 20-24'				Offsite Boring For GW
22				5/5						
23										
24										
25										1515 STOP
	Bottom of Boring - SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log

Project Name Neorman Creek
Project Number 88777
Boring Number DPGW-3
Ground Elevation
Location
Page 1 of 2
Air Monitoring Equipment NA
Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	20	NA	3	NA

Drilling Company EPS
Driller(s) Blase Martin
Drilling Rig 7822DT
Type of Sampler Acetate Sleeve
Date 10/30/18
To 10/30/18
Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	CLAY with silt, very dark grayish brown (10YR3/2) damp, medium plasticity, stiff to medium.	CL	NA		NA					START 1013
										Dual-Tube
1	SILT, trace clay brown (10YR4/3), damp non plastic, soft consistency	ML				DPGW-3 SS01 1-2'				
				3/5						
2	SAND, trace silt, brown (10YR4/3) fine grain, loose, damp, poorly graded.	SP								
3										
4	1 mm dark seam									1015
5										
6										
7				3.5/5						
8						DPGW-3 SS02 7.5-8.5' Dup				
9										▼ 1018
10	Becomes wet									moisture
11				4/5						
12										
13	SAND, trace silt fine to medium grain brown (10YR4/3) loose, wet, poorly graded	SP								
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-3
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, trace silt, fine to coarse, fine gravel traces. brown (10YR 4/3). loose, wet, wellgraded	SP	NA		NA			NA		
15										1020
16										
17				5/5						
18	Dark area black (10YR 2/1) 0.24'									
19										
20										1028 STOP
	Bottom of Boring. SAND HEAVE.									
						DPGW-3 GW01 22-26'				Offset Boring For GW

BZ=Breathing Zone BH=Bore Hole S=Sample

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Drilling Log

Project Name Nearman Creek

Project Number 88777

Boring Number DPGW-4

Ground Elevation

Location

Page 1 of 2

Air Monitoring Equipment NA

Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-push	3.25"	25	NA	3	NA

Drilling Company EPS

Driller(s) Blase Martin

Drilling Rig 7822DT

Type of Sampler Acetate sleeve

Date 10/30/18

To 10/30/18

Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	SILT with clay, very dark grayish brown (10YR 3/2) damp, medium plasticity, soft.	ML	NA		NA			NA		START 1425 Dual Tube
1				2/5		DPGW-4 SS01 1-2'				
2										
3	2" sand seam.									
4	SILT very dark grayish brown (10YR 3/2) damp. nonplastic, soft.	ML								1426
5										
6				2/5						
7	SAND, trace silt pale brown (10YR 6/3) fine grain loose, damp. poorly graded.	SP								
8										
9										1428
10						DPGW-4 SS02 10-11'				
11	SAND, trace silt, dark grayish brown (10YR 4/2) fine grain, trace medium loose, damp. poorly graded becomes wet	SP		3/5						▼ moisture
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number DPGW-4
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
14	SAND, trace silt, dark grayish brown (10YR 4/2) Fine grain trace medium loose, wet, poorly graded	SP	NA		NA			NA		
15										1430
16										
17				4/5						
18										
19										
20										1438
21										
22				5/5						
23										
24						DPGW-4 GW01 24-28' MS/MSD				Boring offset for GW 1445 STOP
25										
	Bottom of Boring - SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-5
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	25	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin.
Drilling Rig 7822DT	Type of Sampler Acetate Sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	SILT with clay very dark grayish brown (10YR 3/2) damp, medium plasticity, soft.	ML	NA		NA					START 1318 DUAL-TUBE
1						DPGW-5 SS01 1-2'				
2	SILT, very dark grayish brown (10YR 3/2) damp to moist. trace plasticity, soft.			2.5/5						
3		ML								
4										1319
5										
6										
7				3/5						
8										
9	SAND, trace silt. pale brown (10YR 6/3) brown (10YR 4/3), Finegrain, loose, wet poorly graded	SP				DPGW-5 SS02 9-10'				1320
10						MS/MSD				
11				3/5						▼ moisture
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number DPGW-5

Project Name Nearman Creek

Page 2 of 2

Project Number 88777

Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, pale brown (10YR6/3) brown (10YR4/3) fine grain, loose, wet, poorly graded.	SP	NA		NA			NA		
15										1324
16										
17				4/5						
18										
19	SAND, very dark gray (Gley 1 3/N) fine to coarse grain, loose, WET, moderately graded.	SP								
20										1327
21										
22	Fine grain			5/5						
23										
24	more gravel.					DPGW-5 GW01 24-28'				Offset Boring For GW 1340 STOP
25										
	Bottom of Boring - Heaving SAND									

BZ=Breathing Zone BH=Bore Hole S=Sample

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010515 Form WCD-KC-2-2

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-6
Ground Elevation	Location	Page 1 of 3
Air Monitoring Equipment NA		Total Footage 35

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	35	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate sleeve
Date 10/30/18 To 10/30/18	Field Observer(s) Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	CLAY with silt, very dark grayish brown (10YR 3/2), damp, medium to trace plasticity. medium consistency	CL	NA		NA			NA		START 1140
1						DPGW-6 SS01 1-2'				
2	SILT, trace clay very dark grayish brown (10YR 3/2) damp. trace plasticity. medium consistency.	ML		3/5						
3										
4										
5										1142
6	SILT, trace clay, dark gray (10YR 4/1) damp. non plastic, medium consistency.	ML								
7				5/5						
8										
9	SILT with clay, brown (10YR 4/3) damp. medium plasticity, medium consistency	ML								
10										1143
11	SILT with clay, brown (10YR 4/2) and very dark grayish brown (10YR 3/2) medium plasticity. damp, medium consistency.	ML		3.5/5						
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number DPGW-6
Project Name Nearman Creek	Page 2 of 3
Project Number 88777	Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SILT, with clay, brown (10YR 4/3) and very dark grayish brown (10YR 3/2) damp medium plasticity, medium consistency.	ML	NA		NA			NA		1144
15						DPGW-6 SS02 15-16'				
16				5/5						
17	SILT with very fine sand, dark grayish brown (10YR 4/2) moist to wet, nonplastic, soft consistency.	ML								moisture ▽
18										
19										1146
20	SAND with silt, fine grain, dark grayish brown (10YR 4/2) wet, loose, poorly graded.	SP				←	DPGW-6 GW01 20-24'			Offset Boring For GW.
21										
22				5/5						
23										
24										1148
25										
26										
27				5/5						
28										
29										1155
30	SILT with clay and fine sand, very dark greenish gray (Gley 1 3/1), wet, medium to high plasticity. Soft consistency	ML		5/5						
31										
32										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Boring Number DPGW-6

Project Name Nearman Creek

Page 3 of 3

Project Number 88777

Date 10/30/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
32	SILT, with clay and fine sand, very dark greenish gray (Gley 1 3/1), wet, medium to high plasticity. soft consistency	ML	NA		NA			NA		
33				5/5						
34										
35										1200 STOP
	Bottom of Boring.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

010515 Form WCD-KC-2-2

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-7
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 25

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	25	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler acetate sleeve
Date 10/29/18 To 10/29/18	Field Observer(s) Lewis Turner LT

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	SILT, trace clay, very dark grayish brown (10YR 3/2), damp, trace plasticity, soft consistency.	ML	NA		NA			NA		START 1751
1						DPGW-7/ SS01 1-2'				Dual-Tube
				2/5						
2	SAND, trace silt, pale brown (10YR 4/1) fine grain, loose, damp, poorly graded.	SP								
3										
4										1752
5										
6										
7				3/5						
8	SAND, trace silt, dark grayish brown (10 YR 4/2) Fine grain, trace medium. loose, ~~wet~~ damp LT, poorly graded	SP				DPGW-7 SS02 9-10'				
9										1758
10										
11	becomes wet.			4/5						▽ moisture
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

051601 Form WCD-2-1

BURNS & McDONNELL

Drilling Log Continuation

	Boring Number DPGW-7
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
14	SAND, trace silt, dark grayish brown (10YR 4/2) fine grain, trace medium loose, damp to wet, poorly graded	SP	NA		NA			NA		
15										1801
16				5/5						
17										
18										
19										1805
20	SAND, very dark gray (10YR 3/1), fine grain, loose, wet, poorly graded. Some organic material.	SP								
21						DPGW-7 GW01 21-25				Offset boring for GW.
22				5/5						
23										
24	SAND, dark grayish brown (10YR 4/2) fine to coarse sand, fine gravel, loose, wet, well graded.	SP								1810 STOP
25	BOTTOM OF BORING. SAND HEAVE.									

Drilling Log

Project Name Nearman Creek	Project Number 88777	Boring Number DPGW-8
Ground Elevation	Location	Page 1 of 2
Air Monitoring Equipment NA		Total Footage 20

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	3.25	20	NA	3	NA

Drilling Company EPS	Driller(s) Blase Martin
Drilling Rig 7822DT	Type of Sampler Acetate sleeve
Date 10/29/18 To 10/29/18	Field Observer(s) Lewis Turner

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
	SILT, trace clay, very dark grayish brown (10YR3/2), damp. trace plasticity, medium consistency.	ML	NA		NA		NA			START 1630 Dual-Tube
1				2.5/5		DPGW-8 SS01 1-2' Dup				
2	SAND, trace silt, pale brown (10YR4/1) Fine grain, loose, damp, poorly graded.	SP								
3										
4										1633
5										
6										
7				3/5						
8										
9										1635
10	SAND, trace silt, dark grayish brown (10YR4/2) fine grain trace medium, loose, wet, poorly graded.	SP				DPGW-8 SS02 10-11'				
11				3.5/5						moisture ▼
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

	Boring Number DPGW-8
Project Name Nearman Creek	Page 2 of 2
Project Number 88777	Date 10/29/18

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
14	SAND, trace silt, dark grayish brown (10YR 4/2) Fine grain, trace medium, loose, wet, poorly graded.	SP	NA		NA			NA		
15										1640
16						DPGW-8 GW01 16-20'				offset boring for GW.
17				5/5						
18										
19										
20										1650 STOP
	Bottom of Boring. SAND HEAVE.									

BZ=Breathing Zone BH=Bore Hole S=Sample

BURNS McDONNELL

APPENDIX C – ANALYTICAL REPORTS AND DATA VALIDATION

ANALYTICAL REPORT

March 30, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L976513
Samples Received:	03/10/2018
Project Number:	62801 BPU Nearman
Description:	groundwater
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By: Linda Cashman

Linda Cashman

Technical Service Representative

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.esclabsciences.com

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SAMPLE SUMMARY

MW-2A L976513-01 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 13:25	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1086807	1	03/20/18 11:18	03/23/18 13:35	JMR
Radiochemistry by Method Calculation	WG1083701	1	03/15/18 09:28	03/23/18 13:35	JMR
Radiochemistry by Method SM7500Ra B M	WG1083701	1	03/15/18 09:28	03/21/18 14:26	RGT

MW-3 L976513-02 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 14:15	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1086807	1	03/20/18 11:18	03/23/18 13:35	JMR
Radiochemistry by Method Calculation	WG1083701	1	03/15/18 09:28	03/23/18 13:35	JMR
Radiochemistry by Method SM7500Ra B M	WG1083701	1	03/15/18 09:28	03/21/18 14:26	RGT

MW-4 L976513-03 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 16:45	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1086807	1	03/20/18 11:18	03/23/18 13:35	JMR
Radiochemistry by Method Calculation	WG1083701	1	03/15/18 09:28	03/23/18 13:35	JMR
Radiochemistry by Method SM7500Ra B M	WG1083701	1	03/15/18 09:28	03/21/18 14:26	RGT

MW-8A L976513-04 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 11:30	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1086807	1	03/20/18 11:18	03/23/18 13:35	JMR
Radiochemistry by Method Calculation	WG1083701	1	03/15/18 09:28	03/23/18 13:35	JMR
Radiochemistry by Method SM7500Ra B M	WG1083701	1	03/15/18 09:28	03/21/18 14:26	RGT

MW-10 L976513-05 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 12:30	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1086807	1	03/20/18 11:18	03/28/18 11:40	JMR
Radiochemistry by Method Calculation	WG1083701	1	03/15/18 09:28	03/28/18 11:40	JMR
Radiochemistry by Method SM7500Ra B M	WG1083701	1	03/15/18 09:28	03/21/18 14:26	RGT

DUP 1 L976513-06 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 00:00	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1086807	1	03/20/18 11:18	03/28/18 11:40	JMR
Radiochemistry by Method Calculation	WG1083701	1	03/15/18 09:28	03/28/18 11:40	JMR
Radiochemistry by Method SM7500Ra B M	WG1083701	1	03/15/18 09:28	03/21/18 14:26	RGT

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

Linda Cashman

Linda Cashman
Technical Service Representative

Radiochemistry by Method 904

Analyte	Result pCi/L	Qualifier	Uncertainty + / -	MDA pCi/L	Analysis Date date / time	Batch
RADIUM-228	0.544		0.430	0.289	03/23/2018 13:35	WG1086807

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.864		0.646	0.457	03/23/2018 13:35	WG1083701

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.320		0.216	0.168	03/21/2018 14:26	WG1083701

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/L		+ / -	pCi/L	date / time	
RADIUM-228	0.797		0.531	0.332	03/23/2018 13:35	WG1086807

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.06		0.764	0.597	03/23/2018 13:35	WG1083701

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.264		0.233	0.265	03/21/2018 14:26	WG1083701

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/L		+ / -	pCi/L	date / time	
RADIUM-228	-0.0883		0.443	0.31	03/23/2018 13:35	WG1086807

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.168		0.651	0.603	03/23/2018 13:35	WG1083701

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.168		0.208	0.293	03/21/2018 14:26	WG1083701

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/L		+ / -	pCi/L	date / time	
RADIUM-228	0.527		0.518	0.399	03/23/2018 13:35	WG1086807

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.628		0.726	0.733	03/23/2018 13:35	WG1083701

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.101		0.208	0.334	03/21/2018 14:26	WG1083701

Radiochemistry by Method 904

Analyte	Result pCi/L	Qualifier	Uncertainty + / -	MDA pCi/L	Analysis Date date / time	Batch
RADIUM-228	0.0276		0.321	0.516	03/28/2018 11:40	WG1086807

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.102		0.481	0.781	03/28/2018 11:40	WG1083701

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.0745		0.160	0.265	03/21/2018 14:26	WG1083701

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/L		+ / -	pCi/L	date / time	
RADIUM-228	-0.0658		0.381	0.58	03/28/2018 11:40	WG1086807

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.308		0.604	0.792	03/28/2018 11:40	WG1083701

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.308		0.223	0.212	03/21/2018 14:26	WG1083701

Method Blank (MB)

(MB) R3297387-1 03/23/18 13:35

Analyte	MB Result pCi/L	MB Qualifier	MB MDA pCi/L
Radium-228	-0.220		0.247

L977057-01 Original Sample (OS) • Duplicate (DUP)

(OS) L977057-01 03/28/18 11:40 • (DUP) R3297387-5 03/23/18 13:35

Analyte	Original Result pCi/L	DUP Result pCi/L	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit pCi/L
Radium-228	-0.0849	-0.195	1	0.000	0.194		20	3

Laboratory Control Sample (LCS)

(LCS) R3297387-2 03/23/18 13:35

Analyte	Spike Amount pCi/L	LCS Result pCi/L	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	4.68	93.5	80.0-120	

L976513-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L976513-02 03/23/18 13:35 • (MS) R3297387-3 03/23/18 13:35 • (MSD) R3297387-4 03/23/18 13:35

Analyte	Spike Amount pCi/L	Original Result pCi/L	MS Result pCi/L	MSD Result pCi/L	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	7.14	0.797	6.41	7.63	78.7	95.7	1	70.0-130			17.3		20

WG1083701

Radiochemistry by Method SM7500Ra B M

L976513-01,02,03,04,05,06

Method Blank (MB)

(MB) R3295787-1 03/21/18 14:26

	MB Result	MB Qualifier	MB MDA
Analyte	pCi/l		pCi/l
Radium-226	0.0466		0.0558

L976513-02 Original Sample (OS) • Duplicate (DUP)

(OS) L976513-02 03/21/18 14:26 • (DUP) R3295787-5 03/21/18 14:26

	Original Result	DUP Result	Dilution	DUP RPD	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
Analyte	pCi/l	pCi/l		%			%	pCi/l
Radium-226	0.264	0.461	1	54.4	0.561		20	3

Laboratory Control Sample (LCS)

(LCS) R3295787-2 03/21/18 14:26

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	pCi/l	pCi/l	%	%	
Radium-226	5.02	5.06	101	80.0-120	

L976513-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L976513-02 03/21/18 14:26 • (MS) R3295787-3 03/21/18 14:26 • (MSD) R3295787-4 03/21/18 14:26

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	MS RER	RPD Limits
Analyte	pCi/l	pCi/l	pCi/l	pCi/l	%	%		%			%		%
Radium-226	20.1	0.264	19.7	20.1	96.8	98.4	1	75.0-125			1.61		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

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
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
	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.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
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 [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

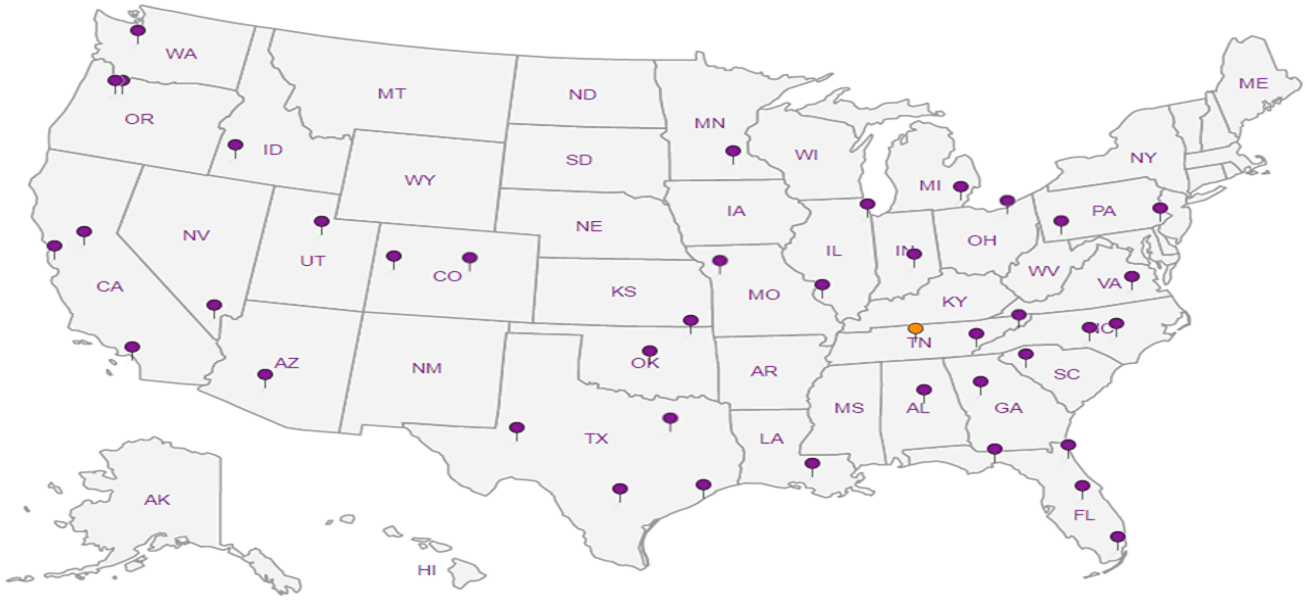
Third Party Federal Accreditations

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

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater 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:
Ingrid Setzler
300 N 65th Street
Kansas City, KS 66102

Pres Chk: L2

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC
LAB SCIENCES
a subsidiary of PaceAnalytical

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: **groundwater**

City/State Collected:

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

Client Project # **62801 BPU Nearman**

Lab Project # **KCKAN02-MW NEARMAN**

L# L976513

F178

Acctnum: **KCKAN02**
Template: **T133397**
Prelogin: **P643090**
TSR: **650 - Linda Cashman**
PB: 3/2/18 mw
Shipped Via: **FedEX Ground**

Collected by (print): Jonathan Hermanson

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	1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
MW-2A	Grab	GW	—	3.8.18	1325	3	X		-01
MW-3	Grab	GW	—	3.8.18	1415	3	X		02
MW-4	Grab	GW	—	3.8.18	1645	3	X		03
MW-8A	Grab	GW	—	3.8.18	1130	3	X		04
MW-10	Grab	GW	—	3.8.18	1230	3	X		05
DUP 1	Grab	GW	—	3.8.18	—	3	X		06
		GW				3	X		
MATRIX SPIKE	Grab	GW	—	3.8.18	1415	3	X		02
MATRIX SPIKE DUP	Grab	GW	—	3.8.18	1415	3	X		02

* 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 # 6051 2426 6924; 6957; 6946

Relinquished by : (Signature)
Date: 3.8.18
Time: 1715

Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:

Received by: (Signature)

Temp: 2.7 °C 50
Bottles Received: 24

Relinquished by : (Signature)
Date:
Time:

Received for lab by: (Signature)

Date: 3/10/18
Time: 0842

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

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

ANALYTICAL REPORT

March 20, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L976517
Samples Received:	03/10/2018
Project Number:	BPU Nearman Ck CCR
Description:	groundwater
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By: Linda Cashman

Linda Cashman
Technical Service Representative

TABLE OF CONTENTS

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

MW-2A L976517-01 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 13:25	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1083269	1	03/11/18 12:55	03/11/18 12:55	DR
Mercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:02	ABL
Metals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:19	TRB
Metals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:15	LAT

MW-3 L976517-02 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 14:15	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1083269	1	03/11/18 13:35	03/11/18 13:35	DR
Mercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 08:55	ABL
Metals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 22:35	TRB
Metals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 20:59	LAT
Metals (ICPMS) by Method 6020	WG1085060	1	03/16/18 07:58	03/16/18 15:46	LAT

MW-4 L976517-03 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 16:45	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1083269	1	03/11/18 14:29	03/11/18 14:29	DR
Mercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:04	ABL
Metals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:21	TRB
Metals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:19	LAT

MW-8A L976517-04 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 11:30	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1083269	1	03/11/18 14:42	03/11/18 14:42	DR
Mercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:11	ABL
Metals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:29	TRB
Metals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:23	LAT
Metals (ICPMS) by Method 6020	WG1085060	1	03/16/18 07:58	03/16/18 16:19	LAT

MW-10 L976517-05 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 12:30	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1083269	1	03/11/18 14:55	03/11/18 14:55	DR
Mercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:13	ABL
Metals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:32	TRB
Metals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:37	LAT

DUP-1 L976517-06 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	03/08/18 00:00	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1083269	1	03/11/18 15:09	03/11/18 15:09	DR
Mercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:16	ABL
Metals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:34	TRB
Metals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:40	LAT

	Collected by	Collected date/time	Received date/time
DUP-1 L976517-06 GW	Jonathan H.	03/08/18 00:00	03/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1085060	1	03/16/18 07:58	03/16/18 16:24	LAT

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

Linda Cashman

Linda Cashman
Technical Service Representative

MW-2A
Collected date/time: 03/08/18 13:25

SAMPLE RESULTS - 01

L976517

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Fluoride	0.166		0.100	1	03/11/2018 12:55	WG1083269

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/13/2018 09:02	WG1083197

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.184		0.00500	1	03/12/2018 23:19	WG1083089
Beryllium	ND		0.00200	1	03/12/2018 23:19	WG1083089
Cadmium	ND		0.00200	1	03/12/2018 23:19	WG1083089
Chromium	ND		0.0100	1	03/12/2018 23:19	WG1083089
Cobalt	ND		0.0100	1	03/12/2018 23:19	WG1083089
Lithium	0.0372		0.0150	1	03/12/2018 23:19	WG1083089
Molybdenum	ND		0.00500	1	03/12/2018 23:19	WG1083089
Selenium	ND		0.0100	1	03/12/2018 23:19	WG1083089

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	03/14/2018 21:15	WG1083098
Arsenic	0.00428		0.00200	1	03/14/2018 21:15	WG1083098
Lead	ND		0.00200	1	03/14/2018 21:15	WG1083098
Thallium	ND		0.00200	1	03/14/2018 21:15	WG1083098

MW-3

Collected date/time: 03/08/18 14:15

SAMPLE RESULTS - 02

L976517

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

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Fluoride	0.134		0.100	1	03/11/2018 13:35	WG1083269

Mercury by Method 7470A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	03/13/2018 08:55	WG1083197

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Barium	0.164		0.00500	1	03/12/2018 22:35	WG1083089
Beryllium	ND		0.00200	1	03/12/2018 22:35	WG1083089
Cadmium	ND		0.00200	1	03/12/2018 22:35	WG1083089
Chromium	ND		0.0100	1	03/12/2018 22:35	WG1083089
Cobalt	ND		0.0100	1	03/12/2018 22:35	WG1083089
Lithium	0.0608		0.0150	1	03/12/2018 22:35	WG1083089
Molybdenum	ND		0.00500	1	03/12/2018 22:35	WG1083089
Selenium	ND		0.0100	1	03/12/2018 22:35	WG1083089

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	03/14/2018 20:59	WG1083098
Arsenic	0.00219		0.00200	1	03/14/2018 20:59	WG1083098
Lead	ND		0.00200	1	03/16/2018 15:46	WG1085060
Thallium	ND		0.00200	1	03/14/2018 20:59	WG1083098

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Fluoride	0.132		0.100	1	03/11/2018 14:29	WG1083269

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/13/2018 09:04	WG1083197

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.135		0.00500	1	03/12/2018 23:21	WG1083089
Beryllium	ND		0.00200	1	03/12/2018 23:21	WG1083089
Cadmium	ND		0.00200	1	03/12/2018 23:21	WG1083089
Chromium	ND		0.0100	1	03/12/2018 23:21	WG1083089
Cobalt	ND		0.0100	1	03/12/2018 23:21	WG1083089
Lithium	0.0458		0.0150	1	03/12/2018 23:21	WG1083089
Molybdenum	ND		0.00500	1	03/12/2018 23:21	WG1083089
Selenium	ND		0.0100	1	03/12/2018 23:21	WG1083089

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	03/14/2018 21:19	WG1083098
Arsenic	ND		0.00200	1	03/14/2018 21:19	WG1083098
Lead	ND		0.00200	1	03/14/2018 21:19	WG1083098
Thallium	ND		0.00200	1	03/14/2018 21:19	WG1083098

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Fluoride	0.348		0.100	1	03/11/2018 14:42	WG1083269

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/13/2018 09:11	WG1083197

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.0657		0.00500	1	03/12/2018 23:29	WG1083089
Beryllium	ND		0.00200	1	03/12/2018 23:29	WG1083089
Cadmium	ND		0.00200	1	03/12/2018 23:29	WG1083089
Chromium	ND		0.0100	1	03/12/2018 23:29	WG1083089
Cobalt	ND		0.0100	1	03/12/2018 23:29	WG1083089
Lithium	0.0290		0.0150	1	03/12/2018 23:29	WG1083089
Molybdenum	0.00833		0.00500	1	03/12/2018 23:29	WG1083089
Selenium	ND		0.0100	1	03/12/2018 23:29	WG1083089

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	03/14/2018 21:23	WG1083098
Arsenic	0.0206		0.00200	1	03/14/2018 21:23	WG1083098
Lead	ND		0.00200	1	03/16/2018 16:19	WG1085060
Thallium	ND		0.00200	1	03/14/2018 21:23	WG1083098

MW-10
Collected date/time: 03/08/18 12:30

SAMPLE RESULTS - 05

L976517

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Fluoride	0.164		0.100	1	03/11/2018 14:55	WG1083269

Mercury by Method 7470A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	03/13/2018 09:13	WG1083197

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Barium	0.0993		0.00500	1	03/12/2018 23:32	WG1083089
Beryllium	ND		0.00200	1	03/12/2018 23:32	WG1083089
Cadmium	ND		0.00200	1	03/12/2018 23:32	WG1083089
Chromium	ND		0.0100	1	03/12/2018 23:32	WG1083089
Cobalt	ND		0.0100	1	03/12/2018 23:32	WG1083089
Lithium	0.0418		0.0150	1	03/12/2018 23:32	WG1083089
Molybdenum	ND		0.00500	1	03/12/2018 23:32	WG1083089
Selenium	ND		0.0100	1	03/12/2018 23:32	WG1083089

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	03/14/2018 21:37	WG1083098
Arsenic	0.0158		0.00200	1	03/14/2018 21:37	WG1083098
Lead	ND		0.00200	1	03/14/2018 21:37	WG1083098
Thallium	ND		0.00200	1	03/14/2018 21:37	WG1083098

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Fluoride	0.347		0.100	1	03/11/2018 15:09	WG1083269

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/13/2018 09:16	WG1083197

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.0650		0.00500	1	03/12/2018 23:34	WG1083089
Beryllium	ND		0.00200	1	03/12/2018 23:34	WG1083089
Cadmium	ND		0.00200	1	03/12/2018 23:34	WG1083089
Chromium	ND		0.0100	1	03/12/2018 23:34	WG1083089
Cobalt	ND		0.0100	1	03/12/2018 23:34	WG1083089
Lithium	0.0281		0.0150	1	03/12/2018 23:34	WG1083089
Molybdenum	0.00816		0.00500	1	03/12/2018 23:34	WG1083089
Selenium	ND		0.0100	1	03/12/2018 23:34	WG1083089

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	03/14/2018 21:40	WG1083098
Arsenic	0.0210		0.00200	1	03/14/2018 21:40	WG1083098
Lead	ND		0.00200	1	03/16/2018 16:24	WG1085060
Thallium	ND		0.00200	1	03/14/2018 21:40	WG1083098

Method Blank (MB)

(MB) R3292556-1 03/11/18 10:27

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Fluoride	U		0.00990	0.100

L976517-02 Original Sample (OS) • Duplicate (DUP)

(OS) L976517-02 03/11/18 13:35 • (DUP) R3292556-4 03/11/18 13:48

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Fluoride	0.134	0.152	1	12.7		15

L976547-02 Original Sample (OS) • Duplicate (DUP)

(OS) L976547-02 03/11/18 16:56 • (DUP) R3292556-7 03/11/18 17:10

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Fluoride	0.242	0.234	1	3.20		15

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

(LCS) R3292556-2 03/11/18 10:41 • (LCSD) R3292556-3 03/11/18 10:54

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Fluoride	8.00	8.05	8.07	101	101	80.0-120			0.227	15

L976517-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L976517-02 03/11/18 13:35 • (MS) R3292556-5 03/11/18 14:02 • (MSD) R3292556-6 03/11/18 14:15

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Fluoride	5.00	0.134	5.15	5.51	100	107	1	80.0-120			6.66	15

L976547-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L976547-02 03/11/18 16:56 • (MS) R3292556-8 03/11/18 17:23

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Fluoride	5.00	0.242	5.76	110	1	80.0-120	

Method Blank (MB)

(MB) R3292726-1 03/13/18 08:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.0000490	0.000200

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

(LCS) R3292726-2 03/13/18 08:51 • (LCSD) R3292726-3 03/13/18 08:53

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 %
Mercury	0.00300	0.00302	0.00309	101	103	80.0-120			2.09	20

L976517-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L976517-02 03/13/18 08:55 • (MS) R3292726-4 03/13/18 08:58 • (MSD) R3292726-5 03/13/18 09:00

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 %
Mercury	0.00300	ND	0.00309	0.00317	103	106	1	75.0-125			2.53	20

Method Blank (MB)

(MB) R3292612-1 03/12/18 22:27

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Beryllium	U		0.000700	0.00200
Cadmium	U		0.000700	0.00200
Chromium	U		0.00140	0.0100
Cobalt	U		0.00230	0.0100
Lithium	U		0.00530	0.0150
Molybdenum	U		0.00160	0.00500
Selenium	U		0.00740	0.0100

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

(LCS) R3292612-2 03/12/18 22:30 • (LCSD) R3292612-3 03/12/18 22:32

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	%	%	%			%	%
Barium	1.00	1.05	1.04	105	104	80.0-120			0.448	20
Beryllium	1.00	1.06	1.06	106	106	80.0-120			0.410	20
Cadmium	1.00	1.01	1.01	101	101	80.0-120			0.570	20
Chromium	1.00	1.01	1.01	101	101	80.0-120			0.609	20
Cobalt	1.00	1.06	1.05	106	105	80.0-120			0.880	20
Lithium	1.00	1.06	1.06	106	106	80.0-120			0.334	20
Molybdenum	1.00	1.03	1.02	103	102	80.0-120			0.498	20
Selenium	1.00	0.994	0.986	99.4	98.6	80.0-120			0.813	20

L976517-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L976517-02 03/12/18 22:35 • (MS) R3292612-5 03/12/18 22:40 • (MSD) R3292612-6 03/12/18 22:42

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	0.164	1.18	1.20	102	104	1	75.0-125			1.58	20
Beryllium	1.00	ND	1.04	1.06	104	106	1	75.0-125			2.01	20
Cadmium	1.00	ND	1.03	1.05	103	105	1	75.0-125			1.49	20
Chromium	1.00	ND	1.00	1.02	100	102	1	75.0-125			1.66	20
Cobalt	1.00	ND	1.07	1.09	107	109	1	75.0-125			1.73	20
Lithium	1.00	0.0608	1.11	1.13	105	107	1	75.0-125			1.80	20
Molybdenum	1.00	ND	1.03	1.05	103	105	1	75.0-125			2.18	20
Selenium	1.00	ND	1.03	1.04	103	104	1	75.0-125			1.22	20

Method Blank (MB)

(MB) R3293327-1 03/14/18 20:48

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Lead	0.00379		0.000240	0.00200
Thallium	U		0.000190	0.00200

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

(LCS) R3293327-2 03/14/18 20:52 • (LCSD) R3293327-3 03/14/18 20:55

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 %
Antimony	0.0500	0.0483	0.0487	96.5	97.4	80.0-120			0.869	20
Arsenic	0.0500	0.0483	0.0495	96.6	99.0	80.0-120			2.40	20
Lead	0.0500	0.0496	0.0535	99.2	107	80.0-120			7.60	20
Thallium	0.0500	0.0502	0.0504	100	101	80.0-120			0.319	20

L976517-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L976517-02 03/14/18 20:59 • (MS) R3293327-5 03/14/18 21:07 • (MSD) R3293327-6 03/14/18 21:11

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	0.0508	0.0498	102	99.7	1	75.0-125			1.89	20
Arsenic	0.0500	0.00219	0.0507	0.0506	97.0	96.8	1	75.0-125			0.196	20
Thallium	0.0500	ND	0.0508	0.0502	101	99.8	1	75.0-125			1.14	20

Method Blank (MB)

(MB) R3293982-1 03/16/18 15:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Lead	U		0.000240	0.00200

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

(LCS) R3293982-2 03/16/18 15:36 • (LCSD) R3293982-3 03/16/18 15:41

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 %
Lead	0.0500	0.0493	0.0497	98.7	99.3	80.0-120			0.641	20

L976517-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L976517-02 03/16/18 15:46 • (MS) R3293982-5 03/16/18 15:55 • (MSD) R3293982-6 03/16/18 16:00

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 %
Lead	0.0500	ND	0.0494	0.0497	98.8	99.3	1	75.0-125			0.548	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
	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.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

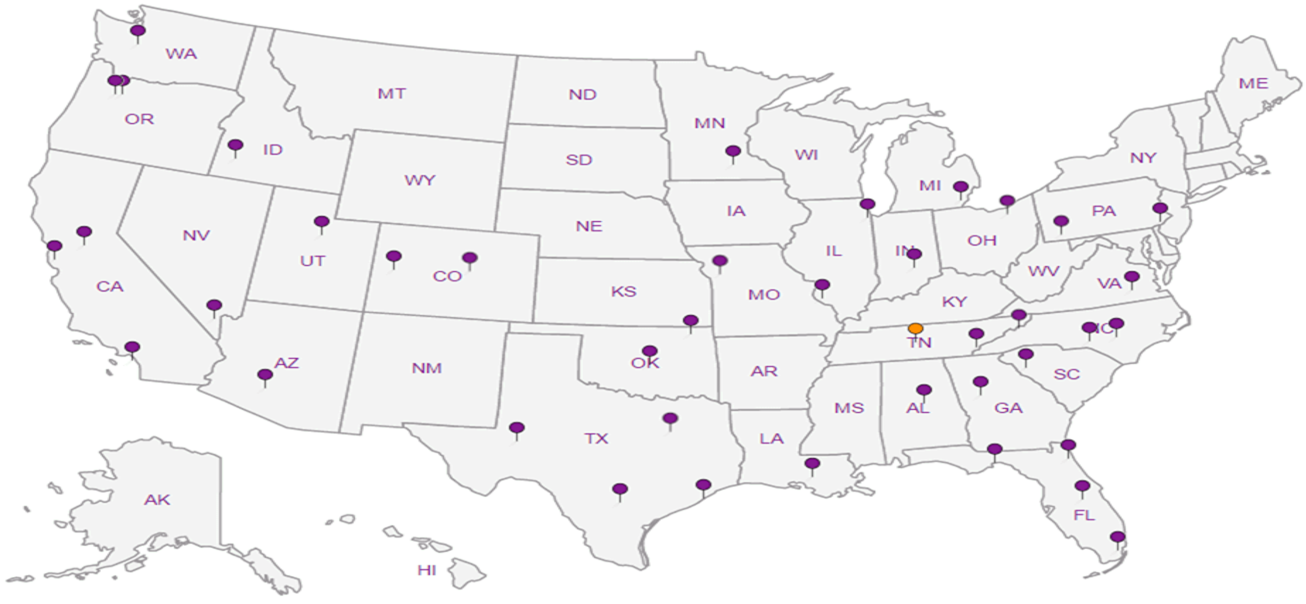
Third Party Federal Accreditations

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

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

Our Locations

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:
Attn: Ellen Bouse
300 N 65th St
Kansas City, KS 66102

Pres Chk

Report to: Ingrid Setzler

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

Project Description: groundwater

City/State Collected:

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

Client Project #: BPU Nearman Ck CCR

Lab Project #: KCKAN02-MW NEARMAN C

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 ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
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L# L976517

F174

Acctnum: KCKAN02
Template: T111656
Prelogin: P643105
TSR: 650 - Linda Cashman
PB: 3/5/18 mg
Shipped Via: FedEX Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Fluoride 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3 o	Remarks	Sample # (lab only)
MW-2A	Grab	GW	—	3.8.18	1325	2	X	X		-01
MW-3	Grab	GW	—	3.8.18	1415	2	X	X		02
MW-4	Grab	GW	—	3.8.18	1645	2	X	X		03
MW-8A	Grab	GW	—	3.8.18	1130	2	X	X		04
MW-10	Grab	GW	—	3.8.18	1230	2	X	X		05
DUP-1	Grab	GW	—	3.8.18	—	2	X	X		06
		GW				2	X	X		
MATRIX SPIKE	Grab	GW	—	3.8.18	1415	2	X	X		02
MATRIX SPIKE DUP	Grab	GW	—	3.8.18	1415	2	X	X		02

* 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 # 6051 2426 6924 ; 6957 ; 6946

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) Jonathan Hermanson
Date: 3.8.18
Time: 1715
Received by: (Signature)
Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)
Temp: 2.7+0= °C
Bottles Received: 16

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature) 83V
Date: 3/9/18
Time: 084V

Hold:

Condition: NCF / [✓ OK]

ANALYTICAL REPORT

June 27, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L998977
Samples Received:	06/05/2018
Project Number:	62801 BPU Nearman
Description:	groundwater
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By: Linda Cashman

Linda Cashman

Technical Service Representative

12065 Lebanon Rd   Mount Juliet, TN 37122   615-758-5858   800-767-5859   www.esclabsciences.com

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

MW-2A L998977-01 Non-Potable Water

Collected by	Collected date/time	Received date/time
KS	06/04/18 11:55	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1120441	1	06/06/18 12:14	06/19/18 10:00	RRE
Radiochemistry by Method Calculation	WG1119517	1	06/06/18 09:06	06/19/18 10:00	RRE
Radiochemistry by Method SM7500Ra B M	WG1119517	1	06/06/18 09:06	06/07/18 17:36	RGT

MW-3 L998977-02 Non-Potable Water

Collected by	Collected date/time	Received date/time
KS	06/04/18 11:10	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1120441	1	06/06/18 12:14	06/19/18 10:00	RRE
Radiochemistry by Method Calculation	WG1119517	1	06/06/18 09:06	06/19/18 10:00	RRE
Radiochemistry by Method SM7500Ra B M	WG1119517	1	06/06/18 09:06	06/07/18 17:36	RGT

MW-4 L998977-03 Non-Potable Water

Collected by	Collected date/time	Received date/time
KS	06/04/18 10:05	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1120441	1	06/06/18 12:14	06/19/18 16:29	RRE
Radiochemistry by Method Calculation	WG1119517	1	06/06/18 09:06	06/19/18 16:29	RRE
Radiochemistry by Method SM7500Ra B M	WG1119517	1	06/06/18 09:06	06/07/18 17:36	RGT

MW-8A L998977-04 Non-Potable Water

Collected by	Collected date/time	Received date/time
KS	06/04/18 08:15	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1120441	1	06/06/18 12:14	06/19/18 10:00	RRE
Radiochemistry by Method Calculation	WG1119517	1	06/06/18 09:06	06/19/18 10:00	RRE
Radiochemistry by Method SM7500Ra B M	WG1119517	1	06/06/18 09:06	06/07/18 17:36	RGT

MW-10 L998977-05 Non-Potable Water

Collected by	Collected date/time	Received date/time
KS	06/04/18 09:25	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1120441	1	06/06/18 12:14	06/19/18 10:00	RRE
Radiochemistry by Method Calculation	WG1119517	1	06/06/18 09:06	06/19/18 10:00	RRE
Radiochemistry by Method SM7500Ra B M	WG1119517	1	06/06/18 09:06	06/07/18 17:36	RGT

DUP 1 L998977-06 Non-Potable Water

Collected by	Collected date/time	Received date/time
KS	06/04/18 00:00	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1120441	1	06/06/18 12:14	06/19/18 10:00	RRE
Radiochemistry by Method Calculation	WG1119517	1	06/06/18 09:06	06/19/18 10:00	RRE
Radiochemistry by Method SM7500Ra B M	WG1119517	1	06/06/18 09:06	06/07/18 17:36	RGT

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

Linda Cashman

Linda Cashman
Technical Service Representative

Radiochemistry by Method 904

Analyte	Result pCi/L	Qualifier	Uncertainty + / -	MDA pCi/L	Analysis Date date / time	Batch
RADIUM-228	-0.0648		0.877	1.49	06/19/2018 10:00	WG1120441

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.0919		0.992	1.64	06/19/2018 10:00	WG1119517

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.0919		0.115	0.151	06/07/2018 17:36	WG1119517

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

Radiochemistry by Method 904

Analyte	Result pCi/L	Qualifier	Uncertainty + / -	MDA pCi/L	Analysis Date date / time	Batch
RADIUM-228	-0.172		0.612	1.33	06/19/2018 10:00	WG1120441

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.169		0.819	1.62	06/19/2018 10:00	WG1119517

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.169		0.207	0.29	06/07/2018 17:36	WG1119517

Radiochemistry by Method 904

Analyte	Result pCi/L	Qualifier	Uncertainty + / -	MDA pCi/L	Analysis Date date / time	Batch
RADIUM-228	-1.26		0.845	0.564	06/19/2018 16:29	WG1120441

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.149		1.06	0.876	06/19/2018 16:29	WG1119517

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.149		0.218	0.312	06/07/2018 17:36	WG1119517

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/L		+ / -	pCi/L	date / time	
RADIUM-228	1.17		0.805	1.38	06/19/2018 10:00	WG1120441

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.32		0.977	1.61	06/19/2018 10:00	WG1119517

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.153		0.172	0.227	06/07/2018 17:36	WG1119517

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/L		+ / -	pCi/L	date / time	
RADIUM-228	-0.603		0.785	0.997	06/19/2018 10:00	WG1120441

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.224		0.973	1.18	06/19/2018 10:00	WG1119517

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.224		0.188	0.178	06/07/2018 17:36	WG1119517

Radiochemistry by Method 904

Analyte	Result pCi/L	Qualifier	Uncertainty + / -	MDA pCi/L	Analysis Date date / time	Batch
RADIUM-228	-2.28		1.05	1.29	06/19/2018 10:00	WG1120441

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.211		1.25	1.54	06/19/2018 10:00	WG1119517

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.211		0.204	0.253	06/07/2018 17:36	WG1119517

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

Method Blank (MB)

(MB) R3320557-5 06/22/18 11:20

	MB Result	MB Qualifier	MB MDA
Analyte	pCi/L		pCi/L
Radium-228	-0.730		1.68

L992369-01 Original Sample (OS) • Duplicate (DUP)

(OS) L992369-01 06/13/18 11:29 • (DUP) R3320557-4 06/13/18 11:29

	Original Result	DUP Result	Dilution	DUP RPD	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
Analyte	pCi/L	pCi/L		%			%	pCi/L
Radium-228	-0.825	1.52	1	200	1.52		20	3

Laboratory Control Sample (LCS)

(LCS) R3320557-1 06/13/18 11:29

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	pCi/L	pCi/L	%	%	
Radium-228	5.00	5.62	112	80.0-120	

L998977-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L998977-03 06/19/18 16:29 • (MS) R3320557-2 06/13/18 11:29 • (MSD) R3320557-3 06/13/18 11:29

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	MS RER	RPD Limits
Analyte	pCi/L	pCi/L	pCi/L	pCi/L	%	%		%			%		%
Radium-228	20.0	-1.26	15.6	14.7	77.9	73.7	1	70.0-130			5.54		20

Method Blank (MB)

(MB) R3316559-1 06/07/18 17:36

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	-0.00692		0.0539

L998977-04 Original Sample (OS) • Duplicate (DUP)

(OS) L998977-04 06/07/18 17:36 • (DUP) R3316559-4 06/07/18 17:36

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit pCi/l
Radium-226	0.153	0.0705	1	74.1	0.356		20	3

Laboratory Control Sample (LCS)

(LCS) R3316559-2 06/07/18 17:36

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	5.03	100	80.0-120	

L998977-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L998977-03 06/07/18 17:36 • (MS) R3316559-3 06/07/18 17:36

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Radium-226	20.1	0.149	17.9	88.4	1	75.0-125	

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

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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
	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.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
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 [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

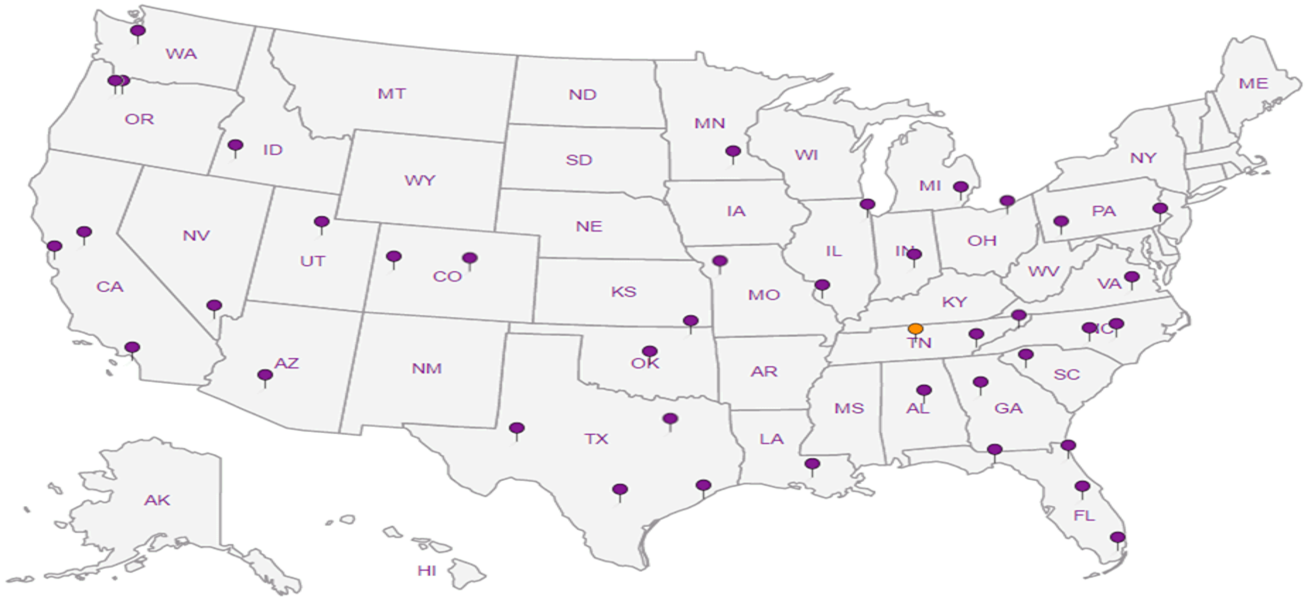
Third Party Federal Accreditations

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

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater 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:
Ingrid Setzler
300 N 65th Street
Kansas City, KS 66102

Pres Chk: l2

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC

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

Report to: Ingrid Setzler

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

Project Description: groundwater

City/State Collected: Kansas City, KS

Phone: 913-573-9806
Fax:

Client Project # 62801 BPU Nearman

Lab Project # KCKAN02-MW NEARMAN

L# 998971

I189

Acctnum: KCKAN02
Template: T133397
Prelogin: P657386
TSR: 650 - Linda Cashman
PB:
Shipped Via: FedEX Ground

Collected by (print): Kath Schutte

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

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

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Tota Rad,RA226,RA228 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
MW-2A	G	GW		6-4	1155	3	X		01
MW-3		NPW		6-4	1110	3	X		02
MW-4		GW		6-4	1005	3	X		03
MW-8A	G	GW		6-4	0815	3	X		04
MW-10		GW		6-4	0925	3	X		05
DUP 1		GW		6-4	—	3	X		06
		GW				3	X		
MATRIX SPIKE		GW		6-4	1005	3	X		03
MATRIX SPIKE DUP		GW		6-4	1005	3	X		03

* 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 X FedEx __ Courier __ ______

Tracking # 4361 6933 8098

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: 6-4-18	Time: 1250	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.4.3 °C Bottles Received: 24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 6/5/18 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

ANALYTICAL REPORT

June 15, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L999032
Samples Received:	06/05/2018
Project Number:	BPU Nearman Ck CCR
Description:	groundwater
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By: Linda Cashman

Linda Cashman
Technical Service Representative

TABLE OF CONTENTS

MW-2A L999032-01 GW

Collected by	Collected date/time	Received date/time
KS	06/04/18 11:55	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1121021	1	06/08/18 12:03	06/08/18 12:58	AJS
Wet Chemistry by Method 9040C	WG1120442	1	06/06/18 09:05	06/06/18 09:05	EEM
Wet Chemistry by Method 9056A	WG1120813	1	06/06/18 23:56	06/06/18 23:56	MAJ
Metals (ICP) by Method 6010B	WG1120164	1	06/05/18 23:21	06/06/18 21:03	TRB
Metals (ICPMS) by Method 6020	WG1120165	1	06/06/18 13:48	06/06/18 15:57	JPD

MW-3 L999032-02 GW

Collected by	Collected date/time	Received date/time
KS	06/04/18 11:10	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1121021	1	06/08/18 12:03	06/08/18 12:58	AJS
Wet Chemistry by Method 9040C	WG1120442	1	06/06/18 09:05	06/06/18 09:05	EEM
Wet Chemistry by Method 9056A	WG1120813	1	06/07/18 00:11	06/07/18 00:11	MAJ
Wet Chemistry by Method 9056A	WG1120813	5	06/07/18 08:58	06/07/18 08:58	MAJ
Metals (ICP) by Method 6010B	WG1120164	1	06/05/18 23:21	06/06/18 21:05	TRB
Metals (ICPMS) by Method 6020	WG1120165	1	06/06/18 13:48	06/06/18 16:15	JPD

MW-4 L999032-03 GW

Collected by	Collected date/time	Received date/time
KS	06/04/18 10:05	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1121021	1	06/08/18 12:03	06/08/18 12:58	AJS
Wet Chemistry by Method 9040C	WG1120442	1	06/06/18 09:05	06/06/18 09:05	EEM
Wet Chemistry by Method 9056A	WG1120813	1	06/07/18 00:27	06/07/18 00:27	MAJ
Wet Chemistry by Method 9056A	WG1121333	5	06/07/18 17:10	06/07/18 17:10	MAJ
Metals (ICP) by Method 6010B	WG1120164	1	06/05/18 23:21	06/06/18 20:34	TRB
Metals (ICPMS) by Method 6020	WG1120165	1	06/06/18 13:48	06/06/18 15:30	JPD

MW-8A L999032-04 GW

Collected by	Collected date/time	Received date/time
KS	06/04/18 08:15	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1121022	1	06/08/18 13:59	06/08/18 15:04	AJS
Wet Chemistry by Method 9040C	WG1120442	1	06/06/18 09:05	06/06/18 09:05	EEM
Wet Chemistry by Method 9056A	WG1120813	1	06/07/18 01:59	06/07/18 01:59	MAJ
Wet Chemistry by Method 9056A	WG1120813	5	06/07/18 09:13	06/07/18 09:13	MAJ
Metals (ICP) by Method 6010B	WG1120164	1	06/05/18 23:21	06/06/18 21:08	TRB
Metals (ICPMS) by Method 6020	WG1120165	1	06/06/18 13:48	06/06/18 16:20	JPD

MW-10 L999032-05 GW

Collected by	Collected date/time	Received date/time
KS	06/04/18 09:25	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1121022	1	06/08/18 13:59	06/08/18 15:04	AJS
Wet Chemistry by Method 9040C	WG1120442	1	06/06/18 09:05	06/06/18 09:05	EEM
Wet Chemistry by Method 9056A	WG1120813	1	06/07/18 02:15	06/07/18 02:15	MAJ
Wet Chemistry by Method 9056A	WG1120813	5	06/07/18 09:28	06/07/18 09:28	MAJ
Metals (ICP) by Method 6010B	WG1120164	1	06/05/18 23:21	06/06/18 21:10	TRB
Metals (ICPMS) by Method 6020	WG1120165	1	06/06/18 13:48	06/06/18 16:24	JPD

	Collected by	Collected date/time	Received date/time
DUP-1 L999032-06 GW	KS	06/04/18 00:00	06/05/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1121022	1	06/08/18 13:59	06/08/18 15:04	AJS
Wet Chemistry by Method 9040C	WG1120442	1	06/06/18 09:05	06/06/18 09:05	EEM
Wet Chemistry by Method 9056A	WG1120813	1	06/07/18 02:30	06/07/18 02:30	MAJ
Wet Chemistry by Method 9056A	WG1120813	5	06/07/18 09:44	06/07/18 09:44	MAJ
Metals (ICP) by Method 6010B	WG1120164	1	06/05/18 23:21	06/06/18 21:13	TRB
Metals (ICPMS) by Method 6020	WG1120165	1	06/06/18 13:48	06/06/18 16:29	JPD

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

Linda Cashman

Linda Cashman
Technical Service Representative

MW-2A
Collected date/time: 06/04/18 11:55

SAMPLE RESULTS - 01

L999032

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

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	537		10.0	1	06/08/2018 12:58	WG1121021

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.05	T8	1	06/06/2018 09:05	WG1120442

Sample Narrative:

L999032-01 WG1120442: 7.05 at 12.1C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	4.34		1.00	1	06/06/2018 23:56	WG1120813
Fluoride	0.274	B	0.100	1	06/06/2018 23:56	WG1120813
Sulfate	53.8		5.00	1	06/06/2018 23:56	WG1120813

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.147		0.00500	1	06/06/2018 21:03	WG1120164
Boron	ND		0.200	1	06/06/2018 21:03	WG1120164
Calcium	156		1.00	1	06/06/2018 21:03	WG1120164
Lithium	0.0352		0.0150	1	06/06/2018 21:03	WG1120164
Molybdenum	ND		0.00500	1	06/06/2018 21:03	WG1120164

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	06/06/2018 15:57	WG1120165

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	788		10.0	1	06/08/2018 12:58	WG1121021

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.94	T8	1	06/06/2018 09:05	WG1120442

Sample Narrative:

L999032-02 WG1120442: 6.94 at 11.6C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	5.74		1.00	1	06/07/2018 00:11	WG1120813
Fluoride	0.173	B	0.100	1	06/07/2018 00:11	WG1120813
Sulfate	137		25.0	5	06/07/2018 08:58	WG1120813

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.159		0.00500	1	06/06/2018 21:05	WG1120164
Boron	0.212		0.200	1	06/06/2018 21:05	WG1120164
Calcium	215		1.00	1	06/06/2018 21:05	WG1120164
Lithium	0.0606		0.0150	1	06/06/2018 21:05	WG1120164
Molybdenum	ND		0.00500	1	06/06/2018 21:05	WG1120164

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	06/06/2018 16:15	WG1120165

Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Dissolved Solids	741		10.0	1	06/08/2018 12:58	WG1121021

Wet Chemistry by Method 9040C

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	su			date / time	
pH	6.93	T8	1	06/06/2018 09:05	WG1120442

Sample Narrative:

L999032-03 WG1120442: 6.93 at 8.3C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Chloride	3.59		1.00	1	06/07/2018 00:27	WG1120813
Fluoride	0.156	B P1	0.100	1	06/07/2018 00:27	WG1120813
Sulfate	116		25.0	5	06/07/2018 17:10	WG1121333

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Barium	0.134		0.00500	1	06/06/2018 20:34	WG1120164
Boron	ND		0.200	1	06/06/2018 20:34	WG1120164
Calcium	214	O1 V	1.00	1	06/06/2018 20:34	WG1120164
Lithium	0.0510		0.0150	1	06/06/2018 20:34	WG1120164
Molybdenum	ND		0.00500	1	06/06/2018 20:34	WG1120164

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	06/06/2018 15:30	WG1120165

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

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	853		10.0	1	06/08/2018 15:04	WG1121022

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.97	T8	1	06/06/2018 09:05	WG1120442

Sample Narrative:

L999032-04 WG1120442: 6.97 at 8.5C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	25.7		1.00	1	06/07/2018 01:59	WG1120813
Fluoride	0.453	B	0.100	1	06/07/2018 01:59	WG1120813
Sulfate	353		25.0	5	06/07/2018 09:13	WG1120813

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.0559		0.00500	1	06/06/2018 21:08	WG1120164
Boron	2.44		0.200	1	06/06/2018 21:08	WG1120164
Calcium	129		1.00	1	06/06/2018 21:08	WG1120164
Lithium	0.0262		0.0150	1	06/06/2018 21:08	WG1120164
Molybdenum	0.00865		0.00500	1	06/06/2018 21:08	WG1120164

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0204		0.00200	1	06/06/2018 16:20	WG1120165

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	748		10.0	1	06/08/2018 15:04	WG1121022

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.94	T8	1	06/06/2018 09:05	WG1120442

Sample Narrative:

L999032-05 WG1120442: 6.94 at 8.8C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	19.6		1.00	1	06/07/2018 02:15	WG1120813
Fluoride	0.235	B	0.100	1	06/07/2018 02:15	WG1120813
Sulfate	214		25.0	5	06/07/2018 09:28	WG1120813

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.107		0.00500	1	06/06/2018 21:10	WG1120164
Boron	1.50		0.200	1	06/06/2018 21:10	WG1120164
Calcium	168		1.00	1	06/06/2018 21:10	WG1120164
Lithium	0.0445		0.0150	1	06/06/2018 21:10	WG1120164
Molybdenum	ND		0.00500	1	06/06/2018 21:10	WG1120164

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0126		0.00200	1	06/06/2018 16:24	WG1120165

DUP-1
Collected date/time: 06/04/18 00:00

SAMPLE RESULTS - 06

L999032

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	881		10.0	1	06/08/2018 15:04	WG1121022

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.98	T8	1	06/06/2018 09:05	WG1120442

Sample Narrative:

L999032-06 WG1120442: 6.98 at 9.5C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	25.5		1.00	1	06/07/2018 02:30	WG1120813
Fluoride	0.441	B	0.100	1	06/07/2018 02:30	WG1120813
Sulfate	360		25.0	5	06/07/2018 09:44	WG1120813

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.0548		0.00500	1	06/06/2018 21:13	WG1120164
Boron	2.47		0.200	1	06/06/2018 21:13	WG1120164
Calcium	129		1.00	1	06/06/2018 21:13	WG1120164
Lithium	0.0310		0.0150	1	06/06/2018 21:13	WG1120164
Molybdenum	0.00876		0.00500	1	06/06/2018 21:13	WG1120164

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0195		0.00200	1	06/06/2018 16:29	WG1120165

Method Blank (MB)

(MB) R3317045-1 06/08/18 12:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	9.00		2.82	10.0

L998976-01 Original Sample (OS) • Duplicate (DUP)

(OS) L998976-01 06/08/18 12:58 • (DUP) R3317045-4 06/08/18 12:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1030	1080	1	4.76		5

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

(LCS) R3317045-2 06/08/18 12:58 • (LCSD) R3317045-3 06/08/18 12:58

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 %
Dissolved Solids	8800	8620	8560	98.0	97.3	85.0-115			0.698	5

Method Blank (MB)

(MB) R3316958-1 06/08/18 15:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	9.00		2.82	10.0

L999329-02 Original Sample (OS) • Duplicate (DUP)

(OS) L999329-02 06/08/18 15:04 • (DUP) R3316958-4 06/08/18 15:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	57300	22400	1	87.5	J3	5

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

(LCS) R3316958-2 06/08/18 15:04 • (LCSD) R3316958-3 06/08/18 15:04

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	8700	8760	98.9	99.5	85.0-115			0.687	5

L998305-01 Original Sample (OS) • Duplicate (DUP)

(OS) L998305-01 06/06/18 09:05 • (DUP) R3315720-3 06/06/18 09:05

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.48	8.47	1	0.118		1

Sample Narrative:

OS: 8.48 at 18.2C
DUP: 8.47 at 18.1C

L999115-02 Original Sample (OS) • Duplicate (DUP)

(OS) L999115-02 06/06/18 09:05 • (DUP) R3315720-4 06/06/18 09:05

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	6.69	6.69	1	0.000		1

Sample Narrative:

OS: 6.69 at 13.2C
DUP: 6.69 at 13.4C

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

(LCS) R3315720-1 06/06/18 09:05 • (LCSD) R3315720-2 06/06/18 09:05

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	su	su	su	%	%	%			%	%
pH	10.0	9.99	9.99	99.9	99.9	99.0-101			0.000	1

Sample Narrative:

LCS: 9.99 at 17.4C
LCSD: 9.99 at 17.5C

Method Blank (MB)

(MB) R3316098-1 06/06/18 20:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	0.0661	J	0.00990	0.100
Sulfate	U		0.0774	5.00

L999032-03 Original Sample (OS) • Duplicate (DUP)

(OS) L999032-03 06/07/18 00:27 • (DUP) R3316098-4 06/07/18 01:13

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	3.59	3.61	1	0.650		15

L999115-03 Original Sample (OS) • Duplicate (DUP)

(OS) L999115-03 06/07/18 03:32 • (DUP) R3316098-7 06/07/18 04:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	24.4	24.6	1	0.942		15
Fluoride	0.153	0.225	1	38.0	P1	15
Sulfate	41.3	41.7	1	0.991		15

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

(LCS) R3316098-2 06/06/18 20:56 • (LCSD) R3316098-3 06/06/18 21:11

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 %
Chloride	40.0	39.3	39.8	98.3	99.5	80.0-120			1.24	15
Fluoride	8.00	7.70	7.77	96.3	97.1	80.0-120			0.825	15
Sulfate	40.0	38.9	39.6	97.3	98.9	80.0-120			1.61	15

L999032-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L999032-03 06/07/18 00:27 • (MS) R3316098-5 06/07/18 01:28 • (MSD) R3316098-6 06/07/18 01:44

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	3.59	57.3	53.7	107	100	1	80.0-120			6.60	15

L999115-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L999115-03 06/07/18 03:32 • (MS) R3316098-8 06/07/18 04:33

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	24.4	76.1	103	1	80.0-120	
Fluoride	5.00	0.153	5.05	97.9	1	80.0-120	
Sulfate	50.0	41.3	85.8	89.0	1	80.0-120	

Method Blank (MB)

(MB) R3316378-1 06/07/18 10:04

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Sulfate	U		0.0774	5.00

L999676-01 Original Sample (OS) • Duplicate (DUP)

(OS) L999676-01 06/07/18 19:54 • (DUP) R3316378-4 06/07/18 20:10

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	10.9	11.0	1	0.873		15

L999755-04 Original Sample (OS) • Duplicate (DUP)

(OS) L999755-04 06/07/18 23:27 • (DUP) R3316378-7 06/07/18 23:44

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	ND	0.000	1	0.000		15

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

(LCS) R3316378-2 06/07/18 10:20 • (LCSD) R3316378-3 06/07/18 10:37

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Sulfate	40.0	41.7	40.2	104	101	80.0-120			3.70	15

L999676-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L999676-01 06/07/18 19:54 • (MS) R3316378-5 06/07/18 20:27 • (MSD) R3316378-6 06/07/18 20:43

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Sulfate	50.0	10.9	60.9	60.4	100	99.0	1	80.0-120			0.817	15

L999755-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L999755-04 06/07/18 23:27 • (MS) R3316378-8 06/08/18 00:00

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Sulfate	50.0	ND	49.9	99.7	1	80.0-120	

Method Blank (MB)

(MB) R3316025-1 06/06/18 20:26

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Boron	U		0.0126	0.200
Calcium	U		0.0463	1.00
Lithium	U		0.00530	0.0150
Molybdenum	U		0.00160	0.00500

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

(LCS) R3316025-2 06/06/18 20:28 • (LCSD) R3316025-3 06/06/18 20:31

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Barium	1.00	1.03	1.02	103	102	80.0-120			1.41	20
Boron	1.00	1.03	1.01	103	101	80.0-120			1.69	20
Calcium	10.0	9.82	9.74	98.2	97.4	80.0-120			0.724	20
Lithium	1.00	1.02	1.02	102	102	80.0-120			0.0963	20
Molybdenum	1.00	1.04	1.03	104	103	80.0-120			0.909	20

L999032-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L999032-03 06/06/18 20:34 • (MS) R3316025-5 06/06/18 20:39 • (MSD) R3316025-6 06/06/18 20:41

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Barium	1.00	0.134	1.14	1.14	100	100	1	75.0-125			0.00880	20
Boron	1.00	ND	1.15	1.15	100	100	1	75.0-125			0.104	20
Calcium	10.0	214	217	220	34.1	63.5	1	75.0-125	V	V	1.35	20
Lithium	1.00	0.0510	1.05	1.05	99.5	99.5	1	75.0-125			0.0426	20
Molybdenum	1.00	ND	1.04	1.04	104	104	1	75.0-125			0.699	20

Method Blank (MB)

(MB) R3315951-1 06/06/18 15:16

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200

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

(LCS) R3315951-2 06/06/18 15:21 • (LCSD) R3315951-3 06/06/18 15:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.0508	0.0506	102	101	80.0-120			0.448	20

L999032-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L999032-03 06/06/18 15:30 • (MS) R3315951-5 06/06/18 15:39 • (MSD) R3315951-6 06/06/18 15:44

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	ND	0.0495	0.0521	97.9	103	1	75.0-125			5.14	20

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

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

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
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.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

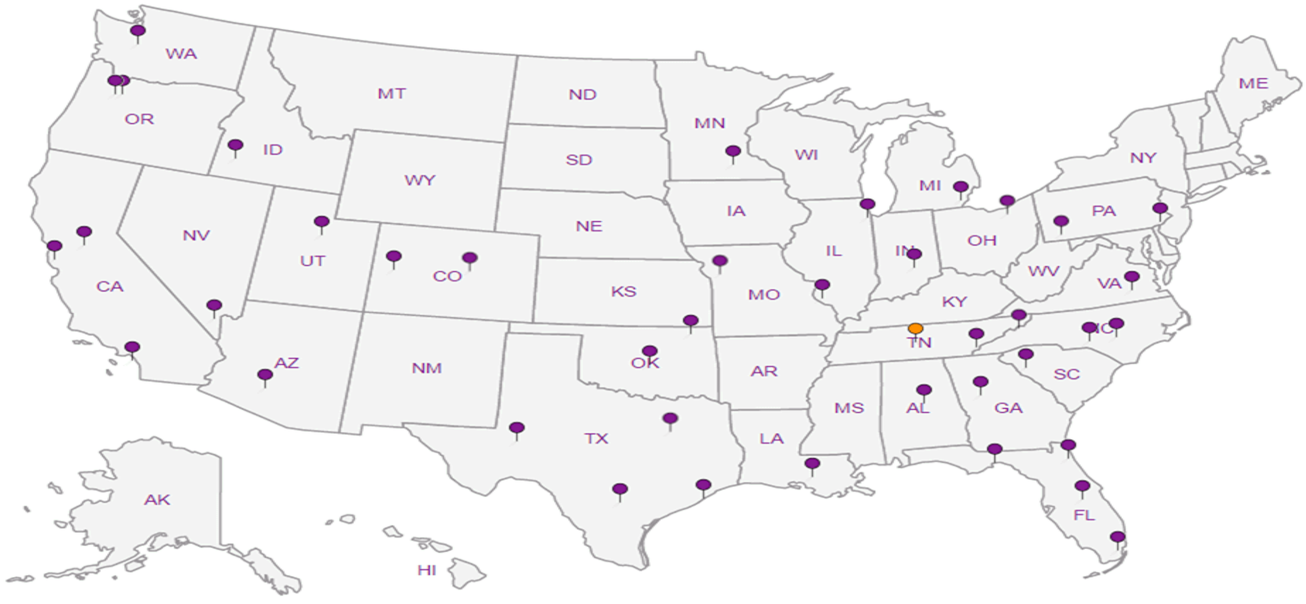
Third Party Federal Accreditations

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

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

Our Locations

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:
Attn: Ellen Bouse
300 N 65th St
Kansas City, KS 66102

Pres Chk L2

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

Report to: **Ingrid Setzler**

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

Project Description: **groundwater**

City/State Collected: Kansas City, KS

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

Client Project # **BPU Nearman Ck CCR**

Lab Project # **KCKAN02-MW NEARMAN C**

Collected by (print): Keith Smith

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N___ Y___

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

Quote #

Date Results Needed

L # L999032

C085

Acctnum: **KCKAN02**
Template: **T135796**
Prelogin: **P655800**
TSR: **650 - Linda Cashman**
PB: 5-31-18 MB
Shipped Via: **FedEX Standard**

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,F,So4,pH 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-2A		GW		6-4	1155	3	X	X	X		-01
MW-3		GW		6-4	1110	3	X	X	X		-02
MW-4		GW		6-4	1005	3	X	X	X		-03
MW-8A		GW		6-4	0815	3	X	X	X		-04
MW-10		GW		6-4	0925	3	X	X	X		-05
DUP-1		GW		6-4	0 —	3	X	X	X		-06
		GW				3	X	X	X		
MATRIX SPIKE		GW		6-4	1005	3	X	X	X		-03
MATRIX SPIKE DUPLICATE		GW		6-4	1005	3	X	X	X		.03

* 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 # 4361 6933 8102

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: 6-4-18 | Time: 1250 | Received by: (Signature) Randi K. Hazlett

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature) | Date: | Time: | Received by: (Signature)

Temp: 3.4 °C | Bottles Received: 24

If preservation required by Login: Date/Time

Relinquished by : (Signature) | Date: | Time: | Received for lab by: (Signature)

Date: 6/5/18 | Time: 8:45

Hold:

Condition: NCF / [✓ OK]

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

October 11, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L1031071
Samples Received:	10/03/2018
Project Number:	BPU Nearman Ck CCR
Description:	groundwater

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

Entire Report Reviewed By: Stacy Kennedy

Stacy Kennedy
Project Manager

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

MW-2A L1031071-01 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 16:05	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176739	1	10/08/18 17:29	10/08/18 18:03	MMF
Wet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 18:40	10/06/18 18:40	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 13:52	ST

MW-3 L1031071-02 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/02/18 10:35	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1177067	1	10/09/18 19:14	10/09/18 20:03	MMF
Wet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 18:54	10/06/18 18:54	MAJ
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 16:05	10/09/18 16:05	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 13:55	ST

MW-4 L1031071-03 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/02/18 11:20	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1177067	1	10/09/18 19:14	10/09/18 20:03	MCG
Wet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 19:36	10/06/18 19:36	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 13:58	ST

MW-8A L1031071-04 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 14:15	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176739	1	10/08/18 17:29	10/08/18 18:03	MMF
Wet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 19:50	10/06/18 19:50	MAJ
Wet Chemistry by Method 9056A	WG1175177	5	10/06/18 20:45	10/06/18 20:45	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 13:27	TRB

MW-10 L1031071-05 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 15:15	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176739	1	10/08/18 17:29	10/08/18 18:03	MMF
Wet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 21:13	10/06/18 21:13	MAJ
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 16:18	10/09/18 16:18	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 14:00	ST

MW-13 L1031071-06 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 10:50	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176739	1	10/08/18 17:29	10/08/18 18:03	MMF
Wet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 21:27	10/06/18 21:27	MAJ

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

MW-13 L1031071-06 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 10:50	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 16:32	10/09/18 16:32	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 14:03	ST

MW-14 L1031071-07 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 12:05	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176740	1	10/08/18 17:35	10/08/18 18:22	MMF
Wet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 21:41	10/06/18 21:41	MAJ
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 16:46	10/09/18 16:46	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 14:05	ST

MW-15 L1031071-08 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 13:00	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176740	1	10/08/18 17:35	10/08/18 18:22	MMF
Wet Chemistry by Method 9040C	WG1175923	1	10/04/18 14:16	10/04/18 14:16	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 22:23	10/06/18 22:23	MAJ
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 17:00	10/09/18 17:00	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 14:08	ST

DUP-1 L1031071-09 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 00:00	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176740	1	10/08/18 17:35	10/08/18 18:22	MMF
Wet Chemistry by Method 9040C	WG1175923	1	10/04/18 14:16	10/04/18 14:16	AMB
Wet Chemistry by Method 9056A	WG1175177	1	10/06/18 22:37	10/06/18 22:37	MAJ
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 17:14	10/09/18 17:14	MAJ
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 14:11	ST

MW-2A L1031071-10 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 16:05	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:14	LD

MW-3 L1031071-11 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/02/18 10:35	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:18	LD

MW-4 L1031071-12 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/02/18 11:20	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:22	LD

MW-8A L1031071-13 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 14:15	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 21:33	LD

MW-10 L1031071-14 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 15:15	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:26	LD

MW-13 L1031071-15 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 10:50	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:30	LD

MW-14 L1031071-16 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 12:05	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:34	LD

MW-15 L1031071-17 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 13:00	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:52	LD

DUP-1 L1031071-18 GW

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 00:00	10/03/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:56	LD

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

Stacy Kennedy

Stacy Kennedy
Project Manager

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	580		10.0	1	10/08/2018 18:03	WG1176739

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.96	T8	1	10/04/2018 07:30	WG1175188

Sample Narrative:

L1031071-01 WG1175188: 6.96 at 17.3C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	5.12		1.00	1	10/06/2018 18:40	WG1175177
Fluoride	0.208		0.100	1	10/06/2018 18:40	WG1175177
Sulfate	68.5		5.00	1	10/06/2018 18:40	WG1175177

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.157		0.00500	1	10/04/2018 13:52	WG1175384
Boron	ND		0.200	1	10/04/2018 13:52	WG1175384
Calcium	163		1.00	1	10/04/2018 13:52	WG1175384
Lithium	0.0270		0.0150	1	10/04/2018 13:52	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 13:52	WG1175384

Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Dissolved Solids	747		13.3	1	10/09/2018 20:03	WG1177067

Wet Chemistry by Method 9040C

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	su			date / time	
pH	6.83	T8	1	10/04/2018 07:30	WG1175188

Sample Narrative:

L1031071-02 WG1175188: 6.83 at 17.3C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Chloride	7.13		1.00	1	10/06/2018 18:54	WG1175177
Fluoride	0.186		0.100	1	10/06/2018 18:54	WG1175177
Sulfate	136		25.0	5	10/09/2018 16:05	WG1178040

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Barium	0.163		0.00500	1	10/04/2018 13:55	WG1175384
Boron	ND		0.200	1	10/04/2018 13:55	WG1175384
Calcium	207		1.00	1	10/04/2018 13:55	WG1175384
Lithium	0.0481		0.0150	1	10/04/2018 13:55	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 13:55	WG1175384

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	619		13.3	1	10/09/2018 20:03	WG1177067

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.91	T8	1	10/04/2018 07:30	WG1175188

Sample Narrative:

L1031071-03 WG1175188: 6.91 at 17.3C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	1.95		1.00	1	10/06/2018 19:36	WG1175177
Fluoride	0.177		0.100	1	10/06/2018 19:36	WG1175177
Sulfate	87.0		5.00	1	10/06/2018 19:36	WG1175177

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.121		0.00500	1	10/04/2018 13:58	WG1175384
Boron	ND		0.200	1	10/04/2018 13:58	WG1175384
Calcium	176		1.00	1	10/04/2018 13:58	WG1175384
Lithium	0.0304		0.0150	1	10/04/2018 13:58	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 13:58	WG1175384

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	920		20.0	1	10/08/2018 18:03	WG1176739

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.95	T8	1	10/04/2018 07:30	WG1175188

Sample Narrative:

L1031071-04 WG1175188: 6.95 at 17.3C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	26.2		1.00	1	10/06/2018 19:50	WG1175177
Fluoride	0.394		0.100	1	10/06/2018 19:50	WG1175177
Sulfate	419		25.0	5	10/06/2018 20:45	WG1175177

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.0602		0.00500	1	10/04/2018 13:27	WG1175384
Boron	2.31		0.200	1	10/04/2018 13:27	WG1175384
Calcium	122		1.00	1	10/04/2018 13:27	WG1175384
Lithium	0.0174		0.0150	1	10/04/2018 13:27	WG1175384
Molybdenum	0.00967		0.00500	1	10/04/2018 13:27	WG1175384

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	822		20.0	1	10/08/2018 18:03	WG1176739

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.98	T8	1	10/04/2018 07:30	WG1175188

Sample Narrative:

L1031071-05 WG1175188: 6.98 at 17.3C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	18.6		1.00	1	10/06/2018 21:13	WG1175177
Fluoride	0.219		0.100	1	10/06/2018 21:13	WG1175177
Sulfate	234		25.0	5	10/09/2018 16:18	WG1178040

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.129		0.00500	1	10/04/2018 14:00	WG1175384
Boron	1.22		0.200	1	10/04/2018 14:00	WG1175384
Calcium	179		1.00	1	10/04/2018 14:00	WG1175384
Lithium	0.0281		0.0150	1	10/04/2018 14:00	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 14:00	WG1175384

MW-13
Collected date/time: 10/01/18 10:50

SAMPLE RESULTS - 06

L1031071

Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Dissolved Solids	542		10.0	1	10/08/2018 18:03	WG1176739

Wet Chemistry by Method 9040C

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	su			date / time	
pH	7.10	T8	1	10/04/2018 07:30	WG1175188

Sample Narrative:

L1031071-06 WG1175188: 7.1 at 17.3C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Chloride	19.5		1.00	1	10/06/2018 21:27	WG1175177
Fluoride	0.380		0.100	1	10/06/2018 21:27	WG1175177
Sulfate	155		25.0	5	10/09/2018 16:32	WG1178040

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Barium	0.205		0.00500	1	10/04/2018 14:03	WG1175384
Boron	ND		0.200	1	10/04/2018 14:03	WG1175384
Calcium	95.0		1.00	1	10/04/2018 14:03	WG1175384
Lithium	0.0296		0.0150	1	10/04/2018 14:03	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 14:03	WG1175384

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	839		13.3	1	10/08/2018 18:22	WG1176740

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.70	T8	1	10/04/2018 07:30	WG1175188

Sample Narrative:

L1031071-07 WG1175188: 6.7 at 17.3C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	21.5		1.00	1	10/06/2018 21:41	WG1175177
Fluoride	0.208		0.100	1	10/06/2018 21:41	WG1175177
Sulfate	221		25.0	5	10/09/2018 16:46	WG1178040

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.0765		0.00500	1	10/04/2018 14:05	WG1175384
Boron	ND		0.200	1	10/04/2018 14:05	WG1175384
Calcium	200		1.00	1	10/04/2018 14:05	WG1175384
Lithium	0.0297		0.0150	1	10/04/2018 14:05	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 14:05	WG1175384

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	505		10.0	1	10/08/2018 18:22	WG1176740

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.45	T8	1	10/04/2018 14:16	WG1175923

Sample Narrative:

L1031071-08 WG1175923: 7.45 at 19.9C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	16.4		1.00	1	10/06/2018 22:23	WG1175177
Fluoride	0.462		0.100	1	10/06/2018 22:23	WG1175177
Sulfate	194		25.0	5	10/09/2018 17:00	WG1178040

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.107		0.00500	1	10/04/2018 14:08	WG1175384
Boron	ND		0.200	1	10/04/2018 14:08	WG1175384
Calcium	78.3		1.00	1	10/04/2018 14:08	WG1175384
Lithium	0.0428		0.0150	1	10/04/2018 14:08	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 14:08	WG1175384

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	808		13.3	1	10/08/2018 18:22	WG1176740

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.96	T8	1	10/04/2018 14:16	WG1175923

Sample Narrative:

L1031071-09 WG1175923: 6.96 at 20.1C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	18.7		1.00	1	10/06/2018 22:37	WG1175177
Fluoride	0.217		0.100	1	10/06/2018 22:37	WG1175177
Sulfate	232		25.0	5	10/09/2018 17:14	WG1178040

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Barium	0.128		0.00500	1	10/04/2018 14:11	WG1175384
Boron	1.23		0.200	1	10/04/2018 14:11	WG1175384
Calcium	179		1.00	1	10/04/2018 14:11	WG1175384
Lithium	0.0286		0.0150	1	10/04/2018 14:11	WG1175384
Molybdenum	ND		0.00500	1	10/04/2018 14:11	WG1175384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00359		0.00200	1	10/04/2018 22:14	WG1175507

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00210		0.00200	1	10/04/2018 22:18	WG1175507

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	10/04/2018 22:22	WG1175507

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0278		0.00200	1	10/04/2018 21:33	WG1175507

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0245		0.00200	1	10/04/2018 22:26	WG1175507

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0252		0.00200	1	10/04/2018 22:30	WG1175507

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	10/04/2018 22:34	WG1175507

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00482		0.00200	1	10/04/2018 22:52	WG1175507

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0241		0.00200	1	10/04/2018 22:56	WG1175507

Method Blank (MB)

(MB) R3349100-1 10/08/18 18:03

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

L1030903-38 Original Sample (OS) • Duplicate (DUP)

(OS) L1030903-38 10/08/18 18:03 • (DUP) R3349100-4 10/08/18 18:03

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	451	381	1	16.8	J3	5

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

(LCS) R3349100-2 10/08/18 18:03 • (LCSD) R3349100-3 10/08/18 18:03

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 %
Dissolved Solids	8800	8800	9230	100	105	85.0-115			4.77	5

Method Blank (MB)

(MB) R3349075-1 10/08/18 18:22

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

L1028145-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1028145-04 10/08/18 18:22 • (DUP) R3349075-4 10/08/18 18:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	3890	3930	1	1.02		5

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

(LCS) R3349075-2 10/08/18 18:22 • (LCSD) R3349075-3 10/08/18 18:22

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 %
Dissolved Solids	8800	8590	8630	97.6	98.1	85.0-115			0.465	5

Method Blank (MB)

(MB) R3349517-1 10/09/18 20:03

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

L1031308-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1031308-02 10/09/18 20:03 • (DUP) R3349517-4 10/09/18 20:03

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	128	135	1	5.32	J3	5

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

(LCS) R3349517-2 10/09/18 20:03 • (LCSD) R3349517-3 10/09/18 20:03

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 %
Dissolved Solids	8800	8870	8890	101	101	85.0-115			0.225	5

L1030740-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1030740-01 10/04/18 07:30 • (DUP) R3347505-3 10/04/18 07:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.08	8.06	1	0.248		1

Sample Narrative:

OS: 8.08 at 17.5C

DUP: 8.06 at 17.5C

L1031071-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1031071-03 10/04/18 07:30 • (DUP) R3347505-4 10/04/18 07:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	6.91	6.93	1	0.289		1

Sample Narrative:

OS: 6.91 at 17.3C

DUP: 6.93 at 17.3C

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

(LCS) R3347505-1 10/04/18 07:30 • (LCSD) R3347505-2 10/04/18 07:30

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	su	su	su	%	%	%			%	%
pH	10.0	9.99	9.99	99.9	99.9	99.0-101			0.000	1

Sample Narrative:

LCS: 9.99 at 17.3C

LCSD: 9.99 at 17.3C

L1030539-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1030539-01 10/04/18 14:16 • (DUP) R3347726-3 10/04/18 14:16

Analyte	Original Result su	DUP Result su	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
pH	7.57	7.58	1	0.132		1

Sample Narrative:

OS: 7.57 at 20.2C

DUP: 7.58 at 20.2C

L1031262-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1031262-03 10/04/18 14:16 • (DUP) R3347726-4 10/04/18 14:16

Analyte	Original Result su	DUP Result su	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
pH	7.30	7.33	1	0.410		1

Sample Narrative:

OS: 7.3 at 19.9C

DUP: 7.33 at 20C

L1031262-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1031262-08 10/04/18 14:16 • (DUP) R3347726-5 10/04/18 14:16

Analyte	Original Result su	DUP Result su	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
pH	7.87	7.88	1	0.127		1

Sample Narrative:

OS: 7.87 at 20.1C

DUP: 7.88 at 19.2C

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

(LCS) R3347726-1 10/04/18 14:16 • (LCSD) R3347726-2 10/04/18 14:16

Analyte	Spike Amount su	LCS Result su	LCSD Result su	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
pH	10.0	9.96	9.96	99.6	99.6	99.0-101			0.000	1

Sample Narrative:

LCS: 9.96 at 21.1C

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

(LCS) R3347726-1 10/04/18 14:16 • (LCSD) R3347726-2 10/04/18 14:16

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	su	su	su	%	%	%			%	%

LCSD: 9.96 at 21.1C

Method Blank (MB)

(MB) R3348698-1 10/06/18 16:10

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

L1031021-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1031021-01 10/06/18 17:44 • (DUP) R3348698-4 10/06/18 17:58

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Chloride	2.31	2.28	1	1.53		15
Fluoride	0.144	0.131	1	9.81		15
Sulfate	36.3	36.6	1	0.725		15

L1031071-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1031071-04 10/06/18 19:50 • (DUP) R3348698-6 10/06/18 20:04

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Chloride	26.2	26.4	1	0.915		15
Fluoride	0.394	0.398	1	1.01		15

L1031071-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1031071-04 10/06/18 20:45 • (DUP) R3348698-9 10/06/18 20:59

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	419	413	5	1.28		15

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

(LCS) R3348698-2 10/06/18 16:24 • (LCSD) R3348698-3 10/06/18 16:38

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.5	38.9	98.7	97.2	80.0-120			1.44	15
Fluoride	8.00	7.86	7.87	98.2	98.3	80.0-120			0.0992	15
Sulfate	40.0	40.3	39.8	101	99.5	80.0-120			1.38	15

L1031021-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1031021-01 10/06/18 17:44 • (MS) R3348698-5 10/06/18 18:12

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	2.31	52.0	99.4	1	80.0-120	
Fluoride	5.00	0.144	5.03	97.7	1	80.0-120	
Sulfate	50.0	36.3	84.1	95.6	1	80.0-120	

L1031071-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1031071-04 10/06/18 19:50 • (MS) R3348698-7 10/06/18 20:18 • (MSD) R3348698-8 10/06/18 20:31

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	26.2	75.3	75.4	98.3	98.4	1	80.0-120			0.0617	15
Fluoride	5.00	0.394	5.32	5.34	98.5	98.8	1	80.0-120			0.357	15

Method Blank (MB)

(MB) R3349152-1 10/09/18 14:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.0774	5.00

L1032264-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1032264-01 10/09/18 18:10 • (DUP) R3349152-4 10/09/18 18:23

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	5.81	5.90	1	1.66		15

L1032357-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1032357-01 10/09/18 21:24 • (DUP) R3349152-9 10/09/18 21:38

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	382	377	10	1.37		15

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

(LCS) R3349152-2 10/09/18 15:04 • (LCSD) R3349152-3 10/09/18 15:18

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 %
Sulfate	40.0	38.3	38.7	95.9	96.7	80.0-120			0.847	15

L1032264-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1032264-01 10/09/18 18:10 • (MS) R3349152-5 10/09/18 18:37

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	5.81	51.4	91.2	1	80.0-120	

Method Blank (MB)

(MB) R3347627-1 10/04/18 13:20

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Barium	U		0.00170	0.00500
Boron	U		0.0126	0.200
Calcium	U		0.0463	1.00
Lithium	U		0.00530	0.0150
Molybdenum	U		0.00160	0.00500

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

(LCS) R3347627-2 10/04/18 13:22 • (LCSD) R3347627-3 10/04/18 13:25

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Barium	1.00	1.04	1.04	104	104	80.0-120			0.212	20
Boron	1.00	0.983	0.996	98.3	99.6	80.0-120			1.24	20
Calcium	10.0	9.83	9.81	98.3	98.1	80.0-120			0.152	20
Lithium	1.00	1.00	1.00	100	100	80.0-120			0.118	20
Molybdenum	1.00	1.07	1.07	107	107	80.0-120			0.527	20

L1031071-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1031071-04 10/04/18 13:27 • (MS) R3347627-5 10/04/18 13:32 • (MSD) R3347627-6 10/04/18 13:35

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Barium	1.00	0.0602	1.05	1.08	99.0	102	1	75.0-125			2.60	20
Boron	1.00	2.31	3.22	3.25	91.6	94.4	1	75.0-125			0.865	20
Calcium	10.0	122	131	131	82.1	85.3	1	75.0-125			0.240	20
Lithium	1.00	0.0174	0.988	1.01	97.1	99.6	1	75.0-125			2.55	20
Molybdenum	1.00	0.00967	1.05	1.08	104	107	1	75.0-125			2.40	20

Method Blank (MB)

(MB) R3347842-1 10/04/18 21:04

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Arsenic	U		0.000250	0.00200

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

(LCS) R3347842-2 10/04/18 21:08 • (LCSD) R3347842-3 10/04/18 21:12

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Arsenic	0.0500	0.0500	0.0513	99.9	103	80.0-120			2.54	20

L1030727-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1030727-01 10/04/18 21:16 • (MS) R3347842-5 10/04/18 21:25 • (MSD) R3347842-6 10/04/18 21:29

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	0.0500	0.00270	0.0542	0.0527	103	100	1	75.0-125			2.73	20

L1031071-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1031071-13 10/04/18 21:33 • (MS) R3347842-7 10/04/18 21:37 • (MSD) R3347842-8 10/04/18 21:41

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	0.0500	0.0278	0.0794	0.0782	103	101	1	75.0-125			1.54	20

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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
J3	The associated batch QC was outside the established quality control range for precision.
T8	Sample(s) received past/too close to holding time expiration.

ACCREDITATIONS & LOCATIONS

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

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
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 [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

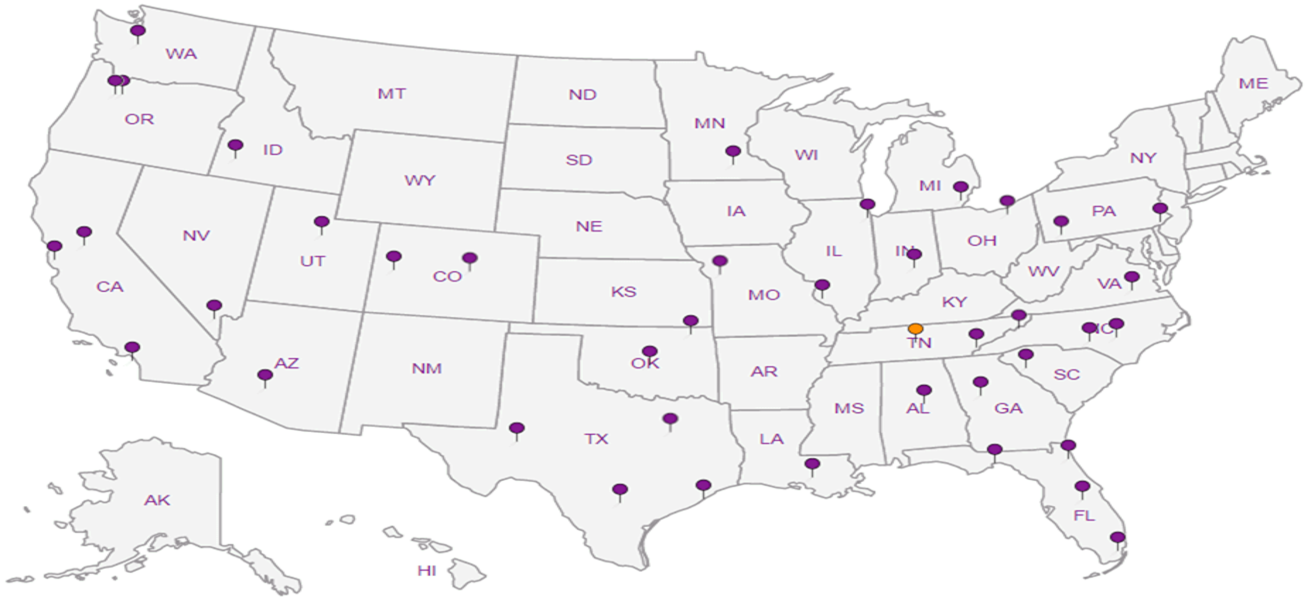
Third Party Federal Accreditations

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

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

Our Locations

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



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Pres Chk

Report to:
Ingrid Setzler

Email To:
isetzler@bpu.com;kbrown@bpu.com;bhoye@b .rn

Project Description: **groundwater**

City/State Collected:

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

Client Project #
BPU Nearman Ck CCR

Lab Project #
KCKAN02-MW NEARMAN C

Collected by (print): Jonathan Hermanson

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

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

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

L# 1031071
D235

Acctnum: **KCKAN02**
Template: **T135796**
Prelogin: **P674202**
TSR: **650 - Linda Cashman**
PB: TB 9-26-18
Shipped Via: **FedEX Standard**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,F,SO4,pH 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3 2	TDS 250mlHDPE-NoPres								Remarks	Sample # (lab only)
MW-2A	Grab	GW	—	10.1.18	1605	3	X	X	X									01/-10
MW-3	Grab	GW	—	10.2.18	1035	3	X	X	X									02/-11
MW-4	Grab	GW	—	10.2.18	1120	3	X	X	X									03/-12
MW-8A	Grab	GW	—	10.1.18	1415	3	X	X	X									04/-13
MW-10	Grab	GW	—	10.1.18	1515	3	X	X	X									05/-14
MW-13	Grab	GW	—	10.1.18	1050	3	X	X	X									06/-15
MW-14	Grab	GW	—	10.1.18	1205	3	X	X	X									07/-16
MW-15	Grab	GW	—	10.1.18	1300	3	X	X	X									08/-17
DUP-1	Grab	GW	—	10.1.18	—	3	X	X	X									09/-18
		GW				3	X	X	X									

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

Remarks: Rush Arsenic Results

RAD SCREEN: <0.5 mR/hr

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __ ______

Tracking # NO #

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	
	10.2.18	1201			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.[illegible] °C	Bottles Received: 33
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/3/18	Time: 9:08

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Pres Chk

Report to:
Ingrid Setzler

Email To:
isetzler@bpu.com;kbrown@bpu.com;bhoye@b rm

Project Description: groundwater

City/State Collected:

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

Client Project #
BPU Nearman Ck CCR

Lab Project #
KCKAN02-MW NEARMAN C

Collected by (print): Jonathan Hermanson

Site/Facility ID #

P.O. #

Collected by (signature):

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

Quote #

Date Results Needed

Immediately Packed on Ice N __ Y X

Analysis / Container / Preservative

Chain of Custody Page __ of __

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L# 1031071

Table #

Acctnum: **KCKAN02**
Template: **T135796**
Prelogin: **P674202**
TSR: **650 - Linda Cashman**
PB: Tb 9-26-18
Shipped Via: **FedEX Standard**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Cl,F,SO4,pH 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	TDS 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MATRIX SPIKE	Grab	GW	–	10.1.18	1415	3	X	X	X		-041-13
MATRIX SPIKE DUPLICATE	Grab	GW	–	10.1.18	1415	3	X	X	X		-041-13

10.2.18

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

Remarks:

RAD SCREEN: <0.5 mR/hr

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: 10.2.18
Time: 1201
Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 5.8 IR41±0 °C
Bottles Received: 33

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature)

Date: 10/3/18
Time: 9:00

Hold:

Condition: NCF / [✓ OK]

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 01, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L1031413
Samples Received:	10/03/2018
Project Number:	62801 BPU Nearman
Description:	groundwater
Report To:	Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By: Cassandra Foster

Cassandra Foster
Project Manager

12065 Lebanon Rd   Mount Juliet, TN 37122   615-758-5858   800-767-5859   www.pacenational.com

TABLE OF CONTENTS

MW-3 L1031413-01 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	10/02/18 10:35	10/03/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1175897	1	10/06/18 13:00	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1175897	1	10/06/18 13:00	10/10/18 12:50	RGT

MW-4 L1031413-02 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	10/02/18 11:20	10/03/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1175897	1	10/06/18 13:00	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1175897	1	10/06/18 13:00	10/10/18 12:50	RGT

MW-13 L1031413-03 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 10:50	10/03/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

MW-14 L1031413-04 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 12:05	10/03/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

MW-15 L1031413-05 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	10/01/18 13:00	10/03/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

MW-2A L1031413-06 Non-Potable Water

Collected by	Collected date/time	Received date/time
Jonathan H.	10/03/18 09:50	10/04/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

Collected by	Collected date/time	Received date/time
Jonathan H.	10/03/18 08:10	10/04/18 08:45

MW-8A L1031413-07 Non-Potable Water

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

Collected by	Collected date/time	Received date/time
Jonathan H.	10/03/18 09:15	10/04/18 08:45

MW-10 L1031413-08 Non-Potable Water

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

Collected by	Collected date/time	Received date/time
Jonathan H.	10/03/18 00:00	10/04/18 08:45

DUP-1 L1031413-09 Non-Potable Water

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	MK
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	MK
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

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

Cassandra Foster

Cassandra Foster
Project Manager

MW-3

Collected date/time: 10/02/18 10:35

SAMPLE RESULTS - 01

L1031413

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.514		0.371	0.582	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.555		0.549	0.911	10/30/2018 11:04	WG1175897

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.0406		0.178	0.329	10/10/2018 12:50	WG1175897
(T) Barium-133	*81.0*			*30.0-110*	*10/10/2018 12:50*	WG1175897

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	0.0875		0.434	0.755	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.186		0.624	1.06	10/30/2018 11:04	WG1175897

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.0983		0.190	0.309	10/10/2018 12:50	WG1175897
(T) Barium-133	*88.7*			*30.0-110*	*10/10/2018 12:50*	WG1175897

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	0.555		0.417	0.593	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.765		0.620	0.844	10/30/2018 11:04	WG1181125

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.210		0.203	0.251	10/19/2018 13:55	WG1181125
(T) Barium-133	*87.9*			*30.0-110*	*10/19/2018 13:55*	WG1181125

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	-1.24		0.707	1.1	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.138		0.853	1.28	10/30/2018 11:04	WG1181125

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.138		0.146	0.182	10/19/2018 13:55	WG1181125
(T) Barium-133	*90.4*			*30.0-110*	*10/19/2018 13:55*	WG1181125

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	1.14		0.760	1.13	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	1.35		1.00	1.46	10/30/2018 11:04	WG1181125

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.210		0.240	0.327	10/19/2018 13:55	WG1181125
(T) Barium-133	*93.2*			*30.0-110*	*10/19/2018 13:55*	WG1181125

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	1.14		0.758	1.02	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	1.25		0.940	1.31	10/30/2018 11:04	WG1181125

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.104		0.182	0.29	10/19/2018 13:55	WG1181125
(T) Barium-133	*86.0*			*30.0-110*	*10/19/2018 13:55*	WG1181125

Radiochemistry by Method 904

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	0.583		0.472	0.609	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.589		0.671	0.948	10/30/2018 11:04	WG1181125

Radiochemistry by Method SM7500Ra B M

Analyte	Result pCi/l	Qualifier	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-226	0.00546		0.199	0.339	10/19/2018 13:55	WG1181125
(T) Barium-133	*92.0*			*30.0-110*	*10/19/2018 13:55*	WG1181125

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

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	0.256		0.427	0.543	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.350		0.545	0.698	10/30/2018 11:04	WG1181125

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.0941		0.118	0.155	10/19/2018 13:55	WG1181125
(T) Barium-133	*94.6*			*30.0-110*	*10/19/2018 13:55*	WG1181125

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

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-228	-0.430		0.421	0.532	10/30/2018 11:04	WG1184606
(T) Barium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606
(T) Yttrium	*100*			*30.0-110*	*10/30/2018 11:04*	WG1184606

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.350		0.639	0.706	10/30/2018 11:04	WG1181125

Radiochemistry by Method SM7500Ra B M

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.350		0.218	0.174	10/19/2018 13:55	WG1181125
(T) Barium-133	*95.5*			*30.0-110*	*10/19/2018 13:55*	WG1181125

Method Blank (MB)

(MB) R3355561-1 10/30/18 11:04

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-228	-0.561		0.262
(T) Barium	*100*		
(T) Yttrium	*100*		

L1031749-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1031749-01 10/30/18 11:04 • (DUP) R3355561-5 10/30/18 11:04

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit pCi/l
Radium-228	0.392	2.47	1	145	1.74		20	3
(T) Barium	*100*	*100*						
(T) Yttrium	*100*	*100*						

Laboratory Control Sample (LCS)

(LCS) R3355561-2 10/30/18 11:04

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	4.08	81.7	80.0-120	
(T) Barium			*100*		
(T) Yttrium			*100*		

L1031413-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1031413-07 10/30/18 11:04 • (MS) R3355561-3 10/30/18 11:04 • (MSD) R3355561-4 10/30/18 11:04

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	20.0	0.583	18.0	16.3	87.0	78.8	1	70.0-130			9.61		20
(T) Barium		*100*			*100*	*100*							
(T) Yttrium		*100*			*100*	*100*							

Method Blank (MB)

(MB) R3349894-1 10/10/18 12:50

Analyte	MB Result pCi/l	MB Qualifier	MB MDA pCi/l
Radium-226	0.0236		0.0569
(T) Barium-133	*86.4*		

L1029993-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1029993-09 10/10/18 12:50 • (DUP) R3349894-5 10/10/18 12:50

Analyte	Original Result pCi/l	DUP Result pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit pCi/l
Radium-226	0.0135	-0.0145	1	200	0.202		20	3
(T) Barium-133	*84.4*	*89.2*						

Laboratory Control Sample (LCS)

(LCS) R3349894-2 10/10/18 12:50

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	5.72	114	80.0-120	
(T) Barium-133			*85.9*		

L1030904-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1030904-04 10/10/18 12:50 • (MS) R3349894-3 10/10/18 12:50 • (MSD) R3349894-4 10/10/18 12:50

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.1	0.0487	21.5	24.1	107	120	1	75.0-125			11.1		20
(T) Barium-133		*52.2*			*35.4*	*60.6*							

Method Blank (MB)

(MB) R3353062-5 10/19/18 14:02

	MB Result	MB Qualifier	MB MDA
Analyte	pCi/l		pCi/l
Radium-226	0.0628		0.0269
(T) Barium-133	*100*		

L1031413-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1031413-06 10/19/18 13:55 • (DUP) R3353062-4 10/19/18 13:55

	Original Result	DUP Result	Dilution	DUP RPD	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
Analyte	pCi/l	pCi/l		%			%	pCi/l
Radium-226	0.104	0.930	1	160	2.04		20	3
(T) Barium-133	*86.0*	*98.3*						

Laboratory Control Sample (LCS)

(LCS) R3353062-1 10/19/18 13:55

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	pCi/l	pCi/l	%	%	
Radium-226	5.02	5.41	108	80.0-120	
(T) Barium-133			*81.3*		

L1031413-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1031413-07 10/19/18 13:55 • (MS) R3353062-2 10/19/18 13:55 • (MSD) R3353062-3 10/19/18 13:55

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	MS RER	RPD Limits
Analyte	pCi/l	pCi/l	pCi/l	pCi/l	%	%		%			%		%
Radium-226	20.1	0.00546	22.2	21.5	110	107	1	75.0-125			3.30		20
(T) Barium-133		*92.0*			*90.3*	*85.8*							

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

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

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

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
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 [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

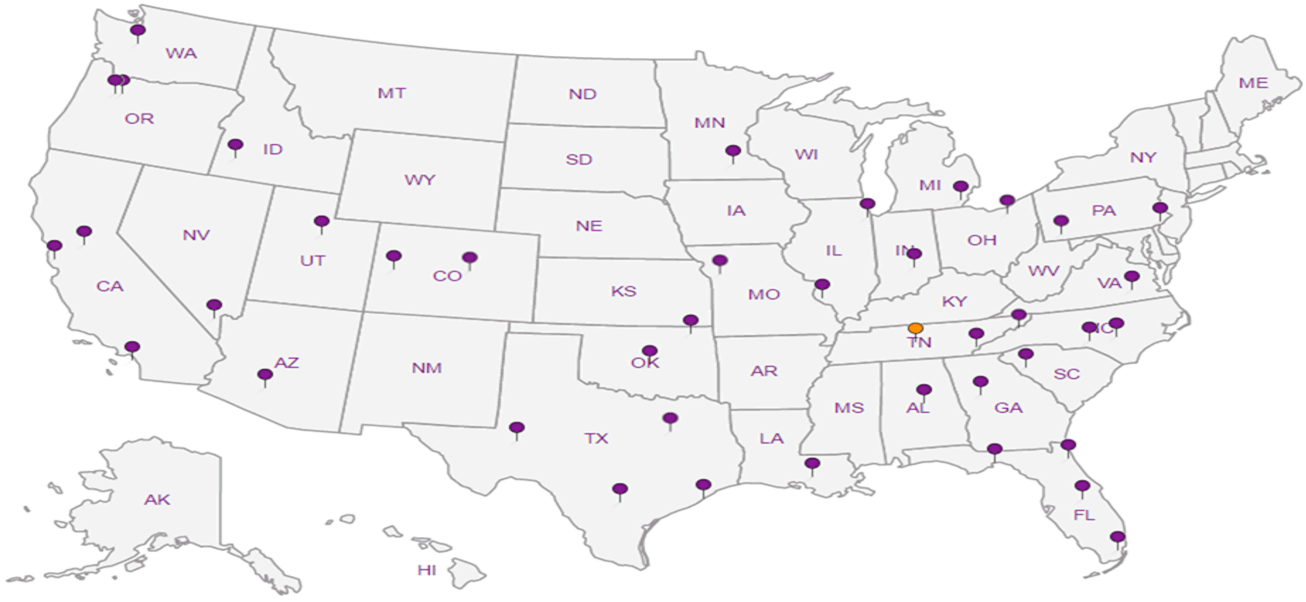
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

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

Our Locations

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



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Report to:
Ingrid Setzler

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

Project Description: groundwater

City/State Collected:

Phone: 913-573-9806

Fax:

Client Project #
62801 BPU Nearman

Lab Project #
KCKAN02-MW NEARMAN

Collected by (print): Jonathan Hermanson

Site/Facility ID #

P.O. #

Collected by (signature): Jonathan Hermanson

Quote #

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

Immediately Packed on Ice N __ Y X

Chain of Custody Page __ of __

Pace Analytical®
National Center for Testing & Innovation

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

L# 1031413

I171

Acctnum: KCKAN02
Template:T133397
Prelogin: P674201
TSR: 650 - Linda Cashman
PB: TB 9-26-18
Shipped Via: FedEX Ground

Analysis / Container / Preservative

Pres Chk: J

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Tota Rad,RA226,RA228 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
MW-2A	Grab	GW	–	10.1.18	1605	3	X		01
MW-3	Grab	NPW	–	10.2.18	1035	3	X		02
MW-4	Grab	GW	–	10.2.18	1120	3	(		
MW-8A	Grab	GW	–	10.1.18	1415	3	(		
MW-10	Grab	GW	–	10.1.18	1515	3	X		03
MW-13	Grab	GW	–	10.1.18	1050	3	X		04
MW-14	Grab	GW	–	10.1.18	1205	3	X		05
MW-15	Grab	GW	–	10.1.18	1300	3	X		
DUP-1	Grab	GW	–	10.1.18	–	3	X		
		~~GW~~ JH				3	X		

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

Remarks:
Lid off of (1) MW-4/leaked in cooler

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) Jonathan Hermanson
Date: 10.2.18
Time: 1201
Received by: (Signature)

Trip Blank Received: Yes [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: -0.9 2.6 °C
Bottles Received: 33

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature)

Date: 10/3/18
Time: 845

Hold:

Condition: NCF / [✓ OK]

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Pres Chk: ✓

Report to: Ingrid Setzler

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

Project Description: groundwater

City/State Collected:

Phone: 913-573-9806
Fax:

Client Project # 62801 BPU Nearman

Lab Project # KCKAN02-MW NEARMAN

Collected by (print): Jonathan Hermanson

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ____ Y ✓

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Total Rad,RA226,RA228 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
MATRIX SPIKE	Grab	GW	–	10.1.18	1415	3	X		
MATRIX SPIKE DUP	Grab	GW	–	10.1.18	1415	3	X		

10.2.18

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

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

L# 1031413

Table #

Acctnum: **KCKAN02**
Template: **T133397**
Prelogin: **P674201**
TSR: **650 - Linda Cashman**
PB: TB 9-26-18
Shipped Via: **FedEX Ground**

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

Remarks:

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __ ______

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)
Date: 10.2.18
Time: 1201

Received by: (Signature)

Trip Blank Received: Yes [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:

Received by: (Signature)

Temp: -0 °C 21.6 A1 13
Bottles Received: 33

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:

Received for lab by: (Signature)

Date: 10/3/18
Time: 845

Hold:

Condition: NCF / OK

Kansas City Board Public Utilities
300 N. 65th St
Kansas City, KS 66102

Billing Information:

Report to: Ingrid Setzler

Email To: isetzler@bpu.com, Kbrown@bpu.com, Bhoye@burns mcd.com

Project Description: groundwater

City/State Collected:

Phone: 913-573-9806
Fax:

Client Project # 62801 BPU Newmann

Lab Project #

Collected by (print): Jonathan Hermanson

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N F Y ___

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Pres Chk b

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

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

L# 1206

Acctnum: **KCKAN02**
Template: T133397
Prelogin: P674201
TSR: 650-Linda Cashman
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Total Rad, Ra226, RA226	Remarks	Sample # (lab only)
mw-2A	Grab	GW	~	10.3.18	0950	3	X		06
mw-8A/MS	Grab	GW	~	10.3.18	0810	3	X		07
mw-8A/MSD	Grab	GW	–	10.3.18	0810	3	X		07
mw-8A ⓢⓗ	Grab	GW	–	10.3.18	0810	3	X		07
mw-10	Grab	GW	–	10.3.18	0915	3	X		08
Dup-1	Grab	GW	–	10.3.18	0 —	3	X		09

10.3.18

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

Remarks: RAD SCREEN: <0.5 mR/hr

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: 10.3.18
Time: 1030
Received by: (Signature)

Trip Blank Received: Yes [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 24.4 +.2 24.8 °C
Bottles Received: 18

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature)

Date: 10/4/18
Time: 845

Hold:

Condition: [✓ NCF] / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 02, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L1039637
Samples Received:	10/31/2018
Project Number:	NEARMAN CREEK
Description:	Dissolved Arsenic
Report To:	Ms. Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By: Stacy Kennedy

Stacy Kennedy
Project Manager

TABLE OF CONTENTS

DPGW-2/GW01 L1039637-01 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/29/18 16:00	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:34	LD

DPGW-8/GW01 L1039637-02 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/29/18 17:35	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:38	LD

DPGW-7/GW01 L1039637-03 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/29/18 18:35	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:42	LD

DPGW-1/GW01 L1039637-04 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/30/18 09:25	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:46	LD

DPGW-DUP/GW01 L1039637-05 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/30/18 00:00	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:50	LD

DPGW-3/GW01 L1039637-06 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/30/18 10:50	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:54	LD

DPGW-6/GW01 L1039637-07 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/30/18 12:45	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:58	LD

DPGW-5/GW01 L1039637-08 GW

Collected by	Collected date/time	Received date/time
Lewis Turner	10/30/18 14:00	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 20:15	LD

	Collected by	Collected date/time	Received date/time
DPGW-4/GW01 L1039637-09 GW	Lewis Turner	10/30/18 15:15	10/31/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 18:56	LD

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

Stacy Kennedy

Stacy Kennedy
Project Manager

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 19:34	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 19:38	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 19:42	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	0.0258		0.00200	1	11/01/2018 19:46	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	0.0239		0.00200	1	11/01/2018 19:50	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 19:54	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	0.00273		0.00200	1	11/01/2018 19:58	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	0.0314		0.00200	1	11/01/2018 20:15	WG1189558

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 18:56	WG1189558

Method Blank (MB)

(MB) R3356156-1 11/01/18 18:28

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Arsenic,Dissolved	U		0.000250	0.00200

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

(LCS) R3356156-2 11/01/18 18:32 • (LCSD) R3356156-3 11/01/18 18:36

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Arsenic,Dissolved	0.0500	0.0501	0.0490	100	98.0	80.0-120			2.17	20

L1039533-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039533-03 11/01/18 18:40 • (MS) R3356156-5 11/01/18 18:48 • (MSD) R3356156-6 11/01/18 18:52

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic,Dissolved	0.0500	0.00290	0.0493	0.0494	92.9	93.1	1	75.0-125			0.230	20

L1039637-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039637-09 11/01/18 18:56 • (MS) R3356156-7 11/01/18 19:00 • (MSD) R3356156-8 11/01/18 19:04

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic,Dissolved	0.0500	ND	0.0486	0.0495	94.0	95.7	1	75.0-125			1.73	20

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

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

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
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 [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

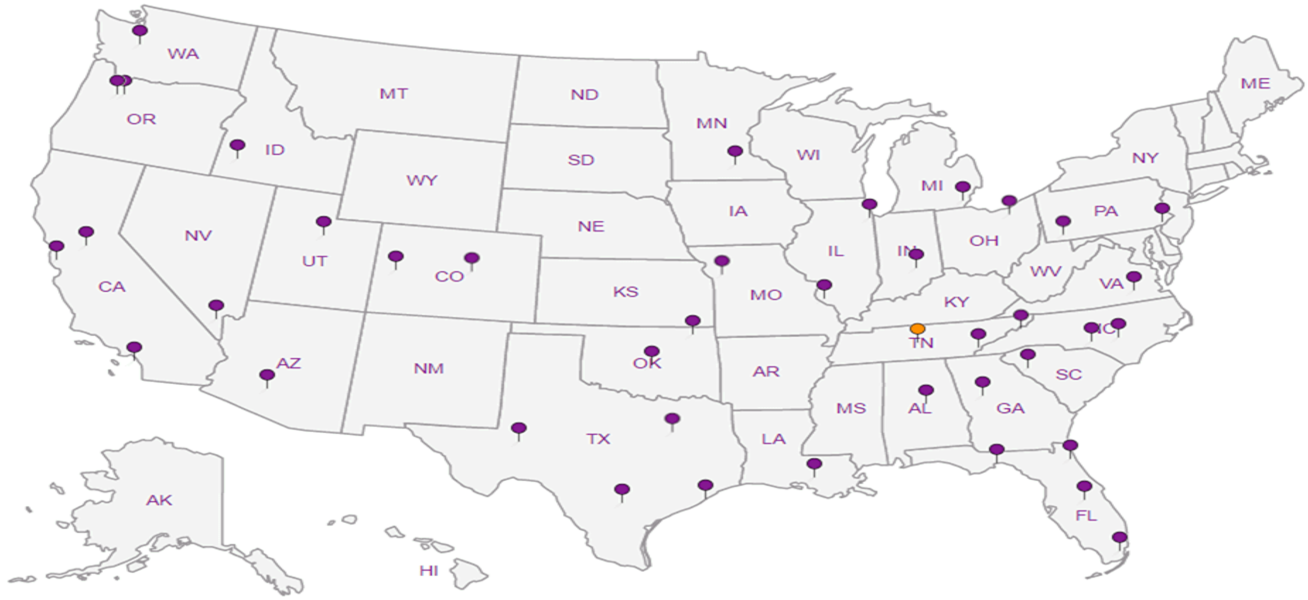
Third Party Federal Accreditations

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

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

Our Locations

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



Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Pres Chk: 22

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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

Report to: Ms. Ingrid Setzler

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

Project Description: Nearman Creek

City/State Collected:

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

Client Project #: Nearman Creek

Lab Project #: KCKANO2-NEARMAN AS

L# 1639637

C085

Acctnum: KCKAN02
Template: T142240
Prelogin: P678300
TSR: 650 - Linda Cashman
PB:
Shipped Via: FedEX Ground

Collected by (print): Lewis Turner

Site/Facility ID #

P.O. #

Collected by (signature): LT

Immediately Packed on Ice N___ Y X

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

Quote #

Date Results Needed: 2 DAY TAT

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss As (Fld Filter) 250mlHDPE-HNO3	Remarks	Sample # (lab only)
DPGW-2/GW01	G	GW	20-24'	10/29/18	1600	1	X		-01
DPGW-8/GW01	G	GW	16-20'	10/29/18	1735	1	X		02
DPGW-7/GW01	G	GW	21-25'	10/29/18	1835	1	X		03
DPGW-1/GW01	G	GW	22-26'	10/30/18	0925	1	X		04
DPGW-Dup/GW01	G	GW	—	10/30/18	—	1	X		05
DPGW-3/GW01	G	GW	22-26'	10/30/18	1050	1	X		06
DPGW-6/GW01	G	GW	20-24'	10/30/18	1245	1	X		07
DPGW-5/GW01	G	GW	24-28'	10/30/18	1400	1	X		08
DPGW-4/GW01	G	GW	24-28	10/30/18	1515	1	X		09
DPGW-4/GW01 MS/MSD	G	GW	24-28	10/30/18	1515	2	X	MS/MSD	09

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

Remarks: 2 DAY TAT

RAD SCREEN: <0.5 mR/hr

pH _______ Temp _______
Flow _______ Other _______

Samples returned via:
__ UPS ✓ FedEx __ Courier __ ______

Tracking # 4624 2990 3746

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) LT
Date: 10/30/18
Time: 1608
Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 1.1-.1=1.0 °C
Bottles Received: 11-BL

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature)

Date: 10/31/18
Time: 845

Hold:

Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 26, 2018

Kansas City Board of Public Utilities

Sample Delivery Group:	L1046228
Samples Received:	11/21/2018
Project Number:	Nearman Creek
Description:	groundwater
Report To:	Ms. Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By: Stacy Kennedy

Stacy Kennedy
Project Manager

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

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

MW-2A L1046228-01 GW

Collected by	Collected date/time	Received date/time
KS	11/20/18 12:05	11/21/18 07:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 08:23	JDG
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 09:03	JDG

MW-3 L1046228-02 GW

Collected by	Collected date/time	Received date/time
KS	11/20/18 11:15	11/21/18 07:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:08	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 08:27	JPD

MW-4 L1046228-03 GW

Collected by	Collected date/time	Received date/time
KS	11/20/18 10:30	11/21/18 07:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:26	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 08:32	JPD

MW-8A L1046228-04 GW

Collected by	Collected date/time	Received date/time
KS	11/20/18 13:50	11/21/18 07:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:31	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 08:49	JPD

MW-10 L1046228-05 GW

Collected by	Collected date/time	Received date/time
KS	11/20/18 12:50	11/21/18 07:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:35	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 08:54	JPD

MW-13 L1046228-06 GW

Collected by	Collected date/time	Received date/time
KS	11/19/18 14:00	11/21/18 07:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:40	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 08:59	JPD

MW-14 L1046228-07 GW

Collected by	Collected date/time	Received date/time
KS	11/19/18 16:10	11/21/18 07:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:45	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 09:04	JPD

Collected by	Collected date/time	Received date/time
KS	11/19/18 16:55	11/21/18 07:30

MW-15 L1046228-08 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 08:45	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 08:04	JPD

Collected by	Collected date/time	Received date/time
KS	11/19/18 15:15	11/21/18 07:30

MW-16 L1046228-09 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:49	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 09:08	JPD

Collected by	Collected date/time	Received date/time
KS	11/20/18 00:00	11/21/18 07:30

DUP L1046228-10 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:54	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 09:13	JPD

Collected by	Collected date/time	Received date/time
KS	11/19/18 15:40	11/21/18 07:30

RINSATE L1046228-11 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1200145	1	11/22/18 12:38	11/23/18 09:58	JPD
Metals (ICPMS) by Method 6020	WG1200149	1	11/21/18 16:19	11/23/18 09:18	JPD

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

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

Stacy Kennedy

Stacy Kennedy
Project Manager

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00324		0.00200	1	11/23/2018 09:03	WG1200149
Arsenic,Dissolved	0.00230		0.00200	1	11/23/2018 08:23	WG1200145

MW-3

Collected date/time: 11/20/18 11:15

SAMPLE RESULTS - 02

L1046228

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	11/23/2018 08:27	WG1200149
Arsenic,Dissolved	ND		0.00200	1	11/23/2018 09:08	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	11/23/2018 08:32	WG1200149
Arsenic,Dissolved	ND		0.00200	1	11/23/2018 09:26	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0183		0.00200	1	11/23/2018 08:49	WG1200149
Arsenic,Dissolved	0.0146		0.00200	1	11/23/2018 09:31	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00789		0.00200	1	11/23/2018 08:54	WG1200149
Arsenic,Dissolved	0.00453		0.00200	1	11/23/2018 09:35	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0240		0.00200	1	11/23/2018 08:59	WG1200149
Arsenic,Dissolved	0.0233		0.00200	1	11/23/2018 09:40	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	11/23/2018 09:04	WG1200149
Arsenic,Dissolved	ND		0.00200	1	11/23/2018 09:45	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00509		0.00200	1	11/23/2018 08:04	WG1200149
Arsenic,Dissolved	0.00535		0.00200	1	11/23/2018 08:45	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0350		0.00200	1	11/23/2018 09:08	WG1200149
Arsenic,Dissolved	0.0356		0.00200	1	11/23/2018 09:49	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00821		0.00200	1	11/23/2018 09:13	WG1200149
Arsenic,Dissolved	0.00472		0.00200	1	11/23/2018 09:54	WG1200145

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.00200	1	11/23/2018 09:18	WG1200149
Arsenic,Dissolved	ND		0.00200	1	11/23/2018 09:58	WG1200145

Method Blank (MB)

(MB) R3362344-1 11/23/18 08:31

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.000250	0.00200

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

(LCS) R3362344-2 11/23/18 08:36 • (LCSD) R3362344-3 11/23/18 08:40

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	0.0500	0.0502	0.0513	100	103	80.0-120			2.10	20

L1046228-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1046228-08 11/23/18 08:45 • (MS) R3362344-5 11/23/18 08:54 • (MSD) R3362344-6 11/23/18 08:58

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 %
Arsenic,Dissolved	0.0500	0.00535	0.0537	0.0554	96.7	100	1	75.0-125			3.04	20

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

Method Blank (MB)

(MB) R3362316-1 11/23/18 07:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200

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

(LCS) R3362316-2 11/23/18 07:54 • (LCSD) R3362316-3 11/23/18 07:59

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 %
Arsenic	0.0500	0.0489	0.0493	97.7	98.6	80.0-120			0.850	20

L1046228-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1046228-08 11/23/18 08:04 • (MS) R3362316-5 11/23/18 08:13 • (MSD) R3362316-6 11/23/18 08:18

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 %
Arsenic	0.0500	0.00509	0.0551	0.0530	100	95.8	1	75.0-125			3.94	20

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

ONE LAB. NATIONWIDE.

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

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
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 [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

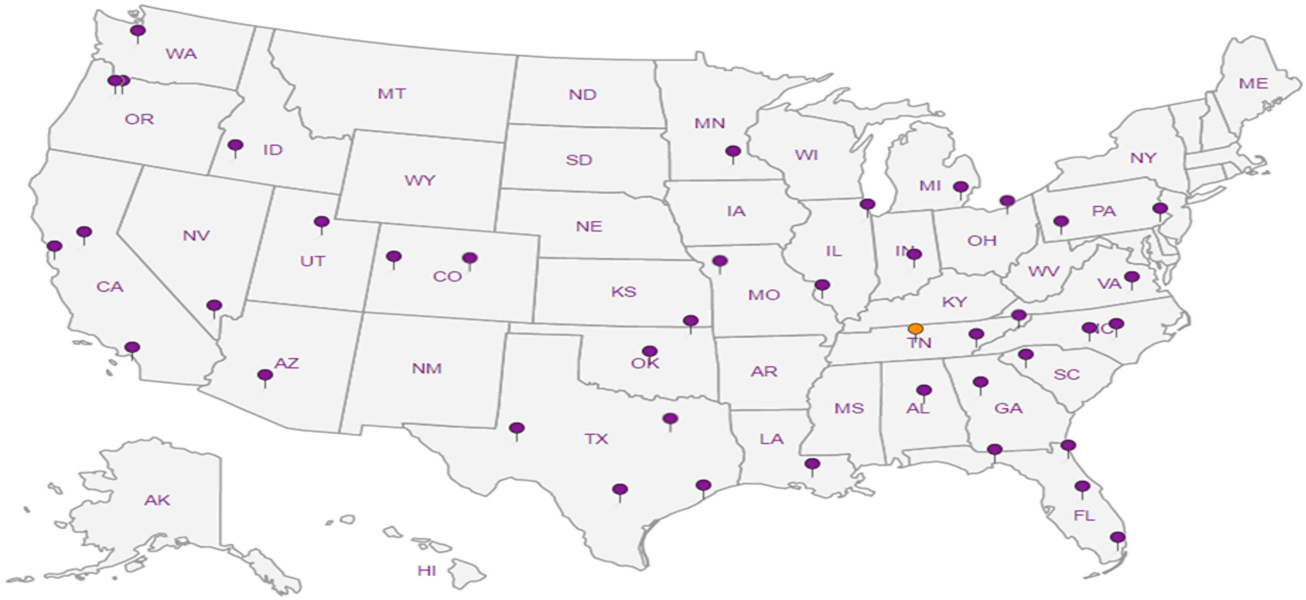
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

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

Our Locations

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



*RUSH TURN

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Pres Chk

Report to: Ms. Ingrid Setzler

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

Project Description: groundwater

City/State Collected:

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

Client Project #: Nearman Creek

Lab Project #: KCKANO2-NEARMAN AS

Collected by (print): K. Schutte

Site/Facility ID #:

P.O. #:

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

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

Quote #:

Date Results Needed:

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

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

L# L1046228

C170

Acctnum: KCKAN02
Template: T143030
Prelogin: P681121
TSR: 650 - Linda Cashman
PB: TB 11-14-18
Shipped Via: FedEX Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss AS-Field filter 250mlHDPE-HNO3 62	Total As 250mlHDPE-HNO3 62	Remarks	Sample # (lab only)
MW-2A		GW		11-20	1205	2	X	X		-01
MW-3		GW		11-20	1115	2	X	X		02
MW-4		GW		11-20	1030	2	X	X		03
MW-8A		GW		11-20	1350	2	X	X		04
MW-10		GW		11-20	1250	2	X	X		05
MW-13		GW		11-19	1400	2	X	X		06
MW-14		GW		11-19	1610	2	X	X		07
MW-15		GW		11-19	1655	2	X	X		08
MW-16		GW		11-19	1515	2	X	X		09
DUP		GW		11-20	—	2	X	X		10

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

Remarks: 24HR RUSH TAT

RAD SCREEN: <0.5 mR/hr

pH ______ Temp ______
Flow ______ Other ______

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

Samples returned via:
__ UPS __ FedEx __ Courier __ ______

Tracking #

Relinquished by: (Signature)	Date: 11-20	Time: 1420	Received by: (Signature)	Trip Blank Received: Yes / [✓ No] 0 HCL / MeoH TBR
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C IR-0.1 0.1 cor #3 Bottles Received: 26
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) Adam R	Date: 11/21/18 Time: 8:30

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

★RUSH TURN

Kansas City Board of Public Utilities

300 N 65th Street
Kansas City, KS 66102

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

Pres Chk

Report to: Ms. Ingrid Setzler

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

Project Description: groundwater

City/State Collected:

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

Client Project #: Nearman Creek CCR

Lab Project #: KCKANO2-NEARMAN AS

Collected by (print): K. Schmitt

Site/Facility ID #:

P.O. #:

Collected by (signature):

Immediately Packed on Ice N ____ Y ____

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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National Center for Testing & Innovation

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

L# L1046228

Table #

Acctnum: KCKAN02
Template: T143030
Prelogin: P681121
TSR: 650 - Linda Cashman
PB: TB 11-14-18
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss As-Field filter 250mlHDPE-HNO3	Total As 250mlHDPE-HNO3	Remarks	Sample # (lab only)
RINSATE		GW		11-19	1540	2	X	X		-11
		GW				2	X	X		
MATRIX SPIKE		GW		11-19	1655	2	X	X		08
MATRIX SPIKE DUP		GW		11-19	1655	2	X	X		08

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

Remarks: ★24 HR RUSH TAT.

RAD SCREEN: <0.5 mR/hr

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: 11-20 | Time: 1420 | Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR
0

Relinquished by : (Signature) | Date: | Time: | Received by: (Signature)

Temp: °C 0.2-0.1=0.1 ✓ 13
Bottles Received: 8C

If preservation required by Login: Date/Time

Relinquished by : (Signature) | Date: | Time: | Received for lab by: (Signature)

Date: 11/21/18 Time: 8:30

Hold:

Condition: NCF / [✓ OK]

Memorandum

Date: March 28, 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 – March 2018
Project No. 88777

Groundwater samples were collected for analysis of Appendix IV parameters 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 March 8, 2018 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
Fluoride	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, cadmium, chromium, cobalt, lithium, molybdenum, and selenium. Metals performed by SW-846 6020 include antimony, arsenic, lead, 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.

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate parameters for the March groundwater sampling event.

3. Holding Times – All samples were analyzed within the recommended method holding times.

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:

    - Radium-226 (0.0466 pCi/L) was detected in the method blank in batch WG1083701. Radium-228 had a negative result in the method blank in batch WG1086807 and was considered not detected. 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 method blank detections, as these data will be used for statistical analyses, the samples were qualified as follows:

        - All of the samples except MW-3 had radium-226 detections less than five times their associated blank value. Because combined radium has historically been detected in these wells, they were qualified as estimated (J) based on professional judgment.

    - Lead was detected in one of the method blanks in batch WG1083098. All of the associated samples were nondetect for the; thus, carryover was not a concern and no qualifiers were necessary.

6. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – The LCS contains a matrix similar to that of the sample that has been spiked with known concentrations of target analytes. The LCS is prepared and analyzed by the same method as the samples. As a measure of analytical accuracy, the results of the LCS are compared against the known analyte concentrations in the spike to determine the percent recovery (REC). The purpose of the LCS is to determine the performance of the laboratory with respect to analyte recovery, independent of field sample matrix interference. For some methods, the lab performed a LCSD. The results between the LCS and LCSD were compared with each other for reproducibility using the relative percent difference (RPD). All LCS/LCSD RECs and/or RPDs were within their respective QC limits.

7. Matrix Spike/Matrix Spike Duplicates (MS/MSD) – MS/MSDs are typically run for organic and inorganic analyses. A sample is split into three portions (original, MS and MSD), and a known amount of a target analyte is added (spiked) to two portions (MS and MSD) of the sample. The results of these two portions are compared with each other for reproducibility using the RPD. They are also compared against the unspiked portion of the sample for REC of the spike. Qualification is typically limited to the spiked sample for any MS/MSD issues, unless otherwise noted. The site specific MS/MSD was performed on sample MW-4. 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 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.

   One field duplicate pair was collected for the March 2018 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-1: The combined radium results slightly exceeded the normalized difference. These results were previously qualified for method blank detections. All other field duplicate results were adequately replicated, and no qualifiers were added based on field duplicate review.

10. Detection and Quantitation Limits – No dilutions for any analytes/samples were noted.

11. Conclusion – The data were reviewed for achievement of any method-specified QA/QC criteria. The data are valid, as qualified, for use in reporting the results of this investigation.

Attachments

Table 1: Data Qualifiers
Table 2: Field Duplicate Results

Table 1
Data Qualifiers
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – March 2018

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-4 MW-8A MW-10 DUP-1 (MW-8A)	L976513-01 L976513-03 L976513-04 L976513-05 L976513-06	Combined Radium	J	Method blank detections for radium-226 (see text)

QC = quality control
J = qualified as estimated

Table 2
Field Duplicate Results (Detections Only)
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – March 2018

Parameter	Unit	MW-8A L976517-04	Dup-1 L976517-06	Meets QC Criteria
Antimony	mg/l	0.002 U	0.002 U	Yes
Arsenic	mg/l	0.0206	0.021	Yes
Barium	mg/l	0.0657	0.065	Yes
Beryllium	mg/l	0.002 U	0.002 U	Yes
Cadmium	mg/l	0.002 U	0.002 U	Yes
Chromium	mg/l	0.01 U	0.01 U	Yes
Cobalt	mg/l	0.01 U	0.01 U	Yes
Fluoride	mg/l	0.348	0.347	Yes
Lead	mg/l	0.002 U	0.002 U	Yes
Lithium	mg/l	0.029	0.0281	Yes
Mercury	mg/l	0.0002 U	0.0002 U	Yes
Molybdenum	mg/l	0.00833	0.00816	Yes
Selenium	mg/l	0.01 U	0.01 U	Yes
Thallium	mg/l	0.002 U	0.002 U	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	0.628 J +/- 0.726	0.308 J +/- 0.604	No

mg/l = milligrams per liter
pCi/l = picoCuries/liter
QC = quality control
J = qualified as estimated during QC review
su = standard unit
U = nondetect

Memorandum

Date: July 3, 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 – June 2018
Project No. 88777

Groundwater samples were collected for analysis of Appendix IV parameters 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 June 4, 2018 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
Chloride, Fluoride, and Sulfate	SW-846 9056A
Dissolved Solids	2540 C-2011
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, boron, calcium, lithium, and molybdenum. Analysis of arsenic was performed by SW-846 6020.
[2] Project reporting requirements per the Sampling and Analysis Plan are for a combined radium-226/radium-228 concentration. These were measured separately, and the combined result was calculated and reported by the laboratory.

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

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

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate parameters for the June 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:

   - Dissolved solids were detected in one or more method blanks. All associated samples were greater than five times the method blank detections; thus, carryover was not a concern and no qualifiers were necessary.

   - Fluoride was detected in the method blank at a low-level concentration. The following associated samples were less than five times the blank concentration: MW-2A, MW-3, MW-4, and MW-10. When compared to historical results, fluoride has been detected at these locations as concentrations similar to the June 2018 detections. As a result, these data were qualified as estimated, biased high (J+)

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 used to spike the sample was less than one-fourth the parent sample concentration. Additionally, the lab flagged the MS/MSD results with a "V" qualifier indicating the sample concentration was too high to evaluate accurate spike recoveries. The lab also noted matrix interference for this analyte. Overall, no conclusions could be drawn from this MS/MSD analysis for calcium, and no qualifiers were added.

   All other MS/MSD results were within their respective QC limits.

8. <u>Laboratory Duplicate Results</u> – 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. <u>Field Duplicate Results</u> – 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 June 2018 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-1: The combined radium results exceeded the normalized difference. The results were qualified as estimated (J). All other field duplicate results were adequately replicated.

10. <u>Detection and Quantitation Limits</u> – One or more samples were diluted for sulfate in order to bring the target analyte into linear range of the instrument. The reporting limits were adjusted accordingly, and no qualifiers were necessary for dilutions.

11. <u>Conclusion</u> – The data were reviewed for achievement of any method-specified QA/QC criteria. The data are valid, as qualified, for use in reporting the results of this investigation.

    <u>Attachments</u>

    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 – June 2018

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 DUP-1 (MW-8A)	L998977-01 L998977-02 L998977-03 L998977-04 L998977-05 L998977-06	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).
MW-2A MW-3 MW-4 MW-10	L998977-01 L998977-02 L998977-03 L998977-05	Fluoride	U	Method blank detections for fluoride (see text)
MW-8A DUP-1	L998977-04 L998977-06	Combined Radium	J	Field Duplicate - normalized difference exceedance

QC = quality control
J = qualified as estimated
U = qualified as nondetect

Table 2
Field Duplicate Results (Detections Only)
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – June 2018

Parameter	Unit	MW-8A L999032-04 L998977-04	Dup-1 L999032-06 L998977-06	Meets QC Criteria
Total Dissolved Solids	mg/l	853	881	Yes
pH	su	6.97 J	6.98 J	Yes
Chloride	mg/l	25.7	25.5	Yes
Fluoride	mg/l	0.453	0.441	Yes
Sulfate	mg/l	353	360	Yes
Barium	mg/l	0.0559	0.0548	Yes
Boron	mg/l	2.44	2.47	Yes
Calcium	mg/l	129	129	Yes
Lithium	mg/l	0.0262	0.031	Yes
Molybdenum	mg/l	0.00865	0.00876	Yes
Arsenic	mg/l	0.0204	0.0195	Yes
Radium-226 + 228 (Calc) (Uncertainty)	pCi/l	1.32 +/- 0.977	0.211 +/- 1.25	No

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 4, 2018

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 & November 2018
Project No. 88777

Groundwater samples were collected for analysis of assessment monitoring parameters at the Nearman Creek Power Station Bottom Ash Pond at the Kansas City Board of Public Utilities (BPU) site in Kansas City, Kansas. These samples were collected October 1-3, 2018. Additionally, total and/or dissolved arsenic samples were collected October 29-30, 2018 (direct push samples) and November 19-20, 2018 (monitoring wells) in order to collect data for an alternate source demonstration study at the site (further details provided under separate cover). All noted samples were submitted to Pace Analytical National Center for Testing & Innovation of Mount Juliet, Tennessee (Pace) (formerly known as ESC Lab Sciences) for analysis by one or more of the following methods:

Parameters	Analytical Method
Total and/or Dissolved Metals	SW-846 6010B
Chloride, Fluoride, Sulfate	SW-846 9056A
Dissolved Solids	SM 2540 C-2011
pH	SW-846 9040C
Radium 226 and 228[2] (Combined)	SM 7500 Ra B M (radium-226) EPA 904.0 (radium-228)

Notes:
[1] Metals performed by SW-846 6010B include total and/or dissolved arsenic. Other metals may include total barium, boron, calcium, lithium, and/or molybdenum.
[2] Project reporting requirements per the Sampling and Analysis Plan are for a combined radium-226/radium-228 concentration. These were measured separately, and the combined result was calculated and reported by the laboratory.

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

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

2. Requested Analyses Completed – All analyses were completed as requested for the appropriate parameters for the October and November groundwater sampling events.

3. Holding Times – The lab flagged all pH results for the October 1-3 sampling event with an "T8" to indicate the sample was received too close to the holding time expiration/past holding time for analysis. All reported pH results for these dates in sample delivery group (SDG) L1031071 should

be considered estimated (J). Note, the pH was also measured in the field and would provide a more accurate measurement as they are recorded on-site at the time of sample collection.

With the above exception, all other samples were extracted and/or analyzed within their respective holding time.

4. Sample Preservation – All samples were received by the laboratory at or within the recommended 2 to 6 degrees Celsius (ºC) sample preservation temperature range. No samples were received frozen, and all were considered viable.

5. Laboratory Method Blanks – Method blanks were reviewed to determine the potential for sample cross contamination due to handling within the laboratory. With the following exceptions, no detections of target analytes were noted in the method blanks:

    - Radium-226 (0.0236 and 0.0628 pCi/L) was detected in the method blanks in batches WG1175897 and WG1181125, respectively (SDG L1031413). Radium-228 had a negative result in the method blank in batch WG1184606 and was considered not detected. 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 method blank detections, as these data will be used for statistical analyses, the samples were qualified as follows:

        - All of the samples except Dup-1 had radium-226 detections less than five times their associated blank value. Because combined radium has historically been detected in these wells, they were qualified as estimated (J) based on professional judgment.

6. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – The LCS contains a matrix similar to that of the sample that has been spiked with known concentrations of target analytes. The LCS is prepared and analyzed by the same method as the samples. As a measure of analytical accuracy, the results of the LCS are compared against the known analyte concentrations in the spike to determine the percent recovery (REC). The purpose of the LCS is to determine the performance of the laboratory with respect to analyte recovery, independent of field sample matrix interference. For some methods, the lab performed a LCSD. The results between the LCS and LCSD were compared with each other for reproducibility using the relative percent difference (RPD). All LCS/LCSD RECs and/or RPDs were within their respective QC limits.

7. Matrix Spike/Matrix Spike Duplicates (MS/MSD) – MS/MSDs are typically run for organic and inorganic analyses. A sample is split into three portions (original, MS and MSD), and a known amount of a target analyte is added (spiked) to two portions (MS and MSD) of the sample. The results of these two portions are compared with each other for reproducibility using the RPD. They are also compared against the unspiked portion of the sample for REC of the spike. Qualification is typically limited to the spiked sample for any MS/MSD issues, unless otherwise noted. Site-specific

MS/MSDs were collected during each sampling event. The following summarizes these site-specific MS/MSD analyses:

- October 1-3, 2018: MW-8A, the spike amount of calcium was less than one-fourth the sample concentration and no conclusion could be made regarding the MS/MSD for this analyte

- October 29-30, 2018: DPGW-4: all MS/MSD results within control limits

- November 19-20, 2018: all MS/MSD results within control limits

8. <u>Laboratory Duplicate Results</u> – 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. <u>Field Duplicate Results</u> – 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.

Field duplicates were collected during each sampling event. Table 2 presents side-by-side comparisons 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. The following summarizes the field duplicate review:

- MW-10 // DUP-1 (October 1-3 sampling event/SDGs L1030171/ L1031413): All results were adequately replicated

- DPGW-1 // DPGW-DUP (October 29-30 sampling event/SDG L1039637):
  All results were adequately replicated

- MW-10 // DUP (November 19-20 sampling event/SDG L1046228):
  All results were adequately replicated

10. Detection and Quantitation Limits – The sulfate for one or more samples collected October 1-2 2018 required a dilution to account for high concentrations and/or matrix interferences. Qualifiers were not necessary based on these dilutions.

11. Conclusion – The data were reviewed for achievement of any method-specified QA/QC criteria. The data are valid, as qualified, for use in reporting the results of this investigation.

Attachments

Table 1: Data Qualifiers
Table 2: Field Duplicate Results

Table 1
Data Qualifiers
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – October & November 2018

Sample Identification	Laboratory Number	Parameter(s)	Data Qualifier	Reason for Qualification
MW-2A MW-3 MW-4 MW-8A MW-10 MW-13 MW-14 MW-15	L1031413-06 L1031413-01 L1031413-02 L1031413-07 L1031413-08 L1031413-03 L1031413-04 L1031413-05	Combined Radium	J	Method blank detections for radium-226 (see text)
MW-2A MW-3 MW-4 MW-8A MW-10 MW-13 MW-14 MW-15 DUP-1	L1031071-01 L1031071-02 L1031071-03 L1031071-04 L1031071-05 L1031071-06 L1031071-07 L1031071-08 L1031071-09	pH	J	Holding time exceeded (see text)

J - Estimated Value

Table 2
Field Duplicate Results
Kansas City Board of Public Utilities (BPU) - Kansas City, Kansas
Nearman Creek Power Station Bottom Ash Pond – October & November 2018

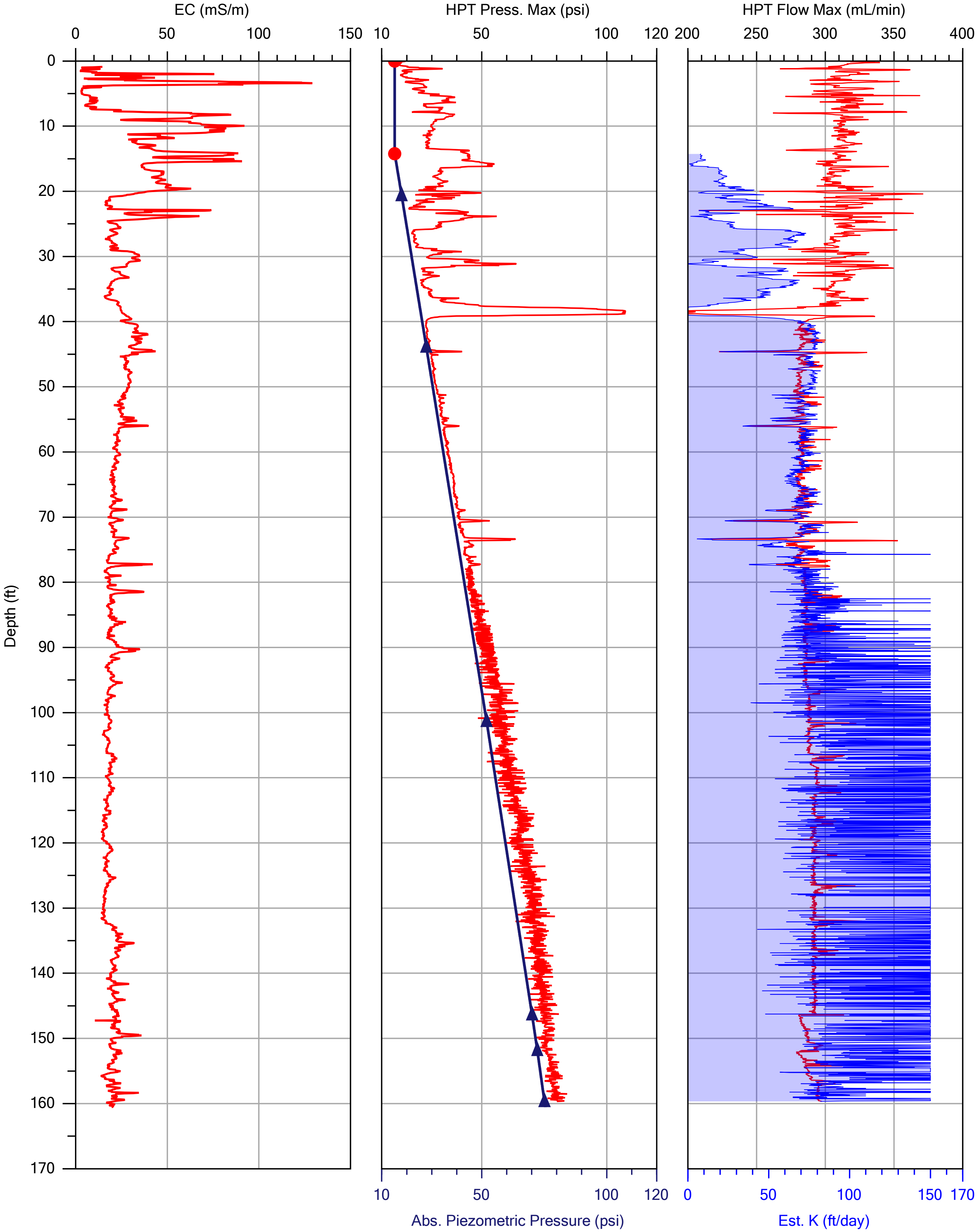
	Sample Identification: Date Sampled: SDG(s):	MW-10 October 1, 2018 L1031413 (radium)/ L1031071 (all others)	DUP-1 October 1, 2018 L1031413 (radium)/ L1031071 (all others)	Meets QC Criteria
Parameter	**Unit**			
Dissolved Solids	mg/l	822	808	Yes
Chloride	mg/l	18.6	18.7	Yes
Fluoride	mg/l	0.219	0.217	Yes
Sulfate	mg/l	234	232	Yes
pH	su	6.98 J	6.96 J	Yes
Arsenic	mg/l	0.0245	0.0241	Yes
Barium	mg/l	0.129	0.128	Yes
Boron	mg/l	1.22	1.23	Yes
Calcium	mg/l	179	179	Yes
Lithium	mg/l	0.0281	0.0286	Yes
Molybdenum	mg/l	0.005 U	0.005 U	Yes
Combined Radium (including +/- uncertainty)	pCi/l	0.350 J (+/- 0.545)	0.350 J (+/- 0.639)	Yes

	Sample ID: Date Sampled: SDG(s):	DPGW-1 October 30, 2018 L1039637	DPGW-DUP October 30, 2018 L1039637	Meets QC Criteria
Arsenic, Dissolved	mg/l	0.0258	0.0239	Yes

	Sample ID: Date Sampled: SDG(s):	MW-10 November 20, 2018 L1046228	Dup November 20, 2018 L1046228	Meets QC Criteria
Arsenic, Dissolved	mg/l	0.00453	0.00472	Yes
Arsenic, Total	mg/l	0.00789	0.00821	Yes

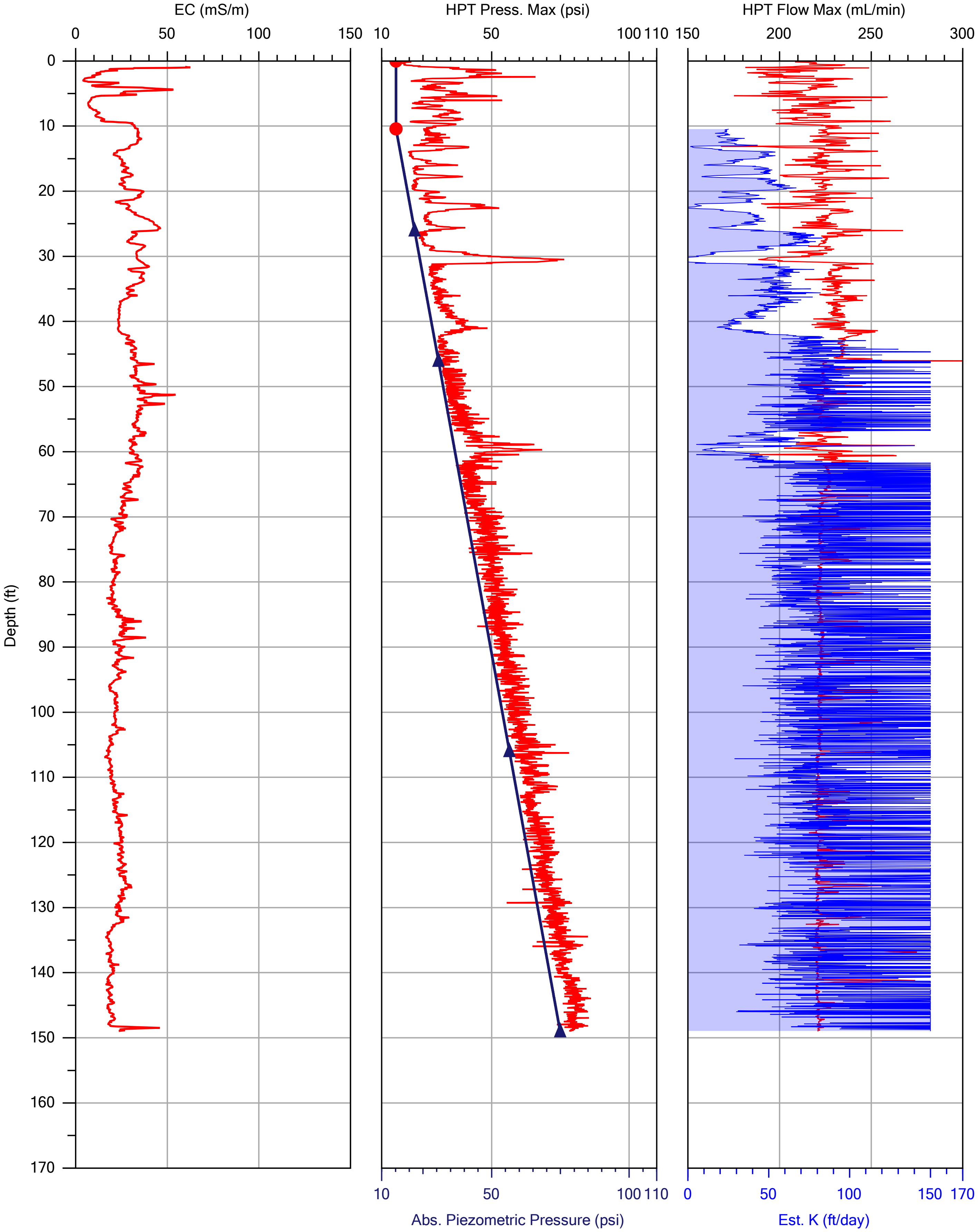
J - Estimated Value
mg/l - Milligrams per Liter
pCi/l - picoCuries per Liter
QC - Quality Control
SDG - Sample Delivery Group
su - Standard Unit
U - Nondetect

APPENDIX D – HPT / EC LOGS



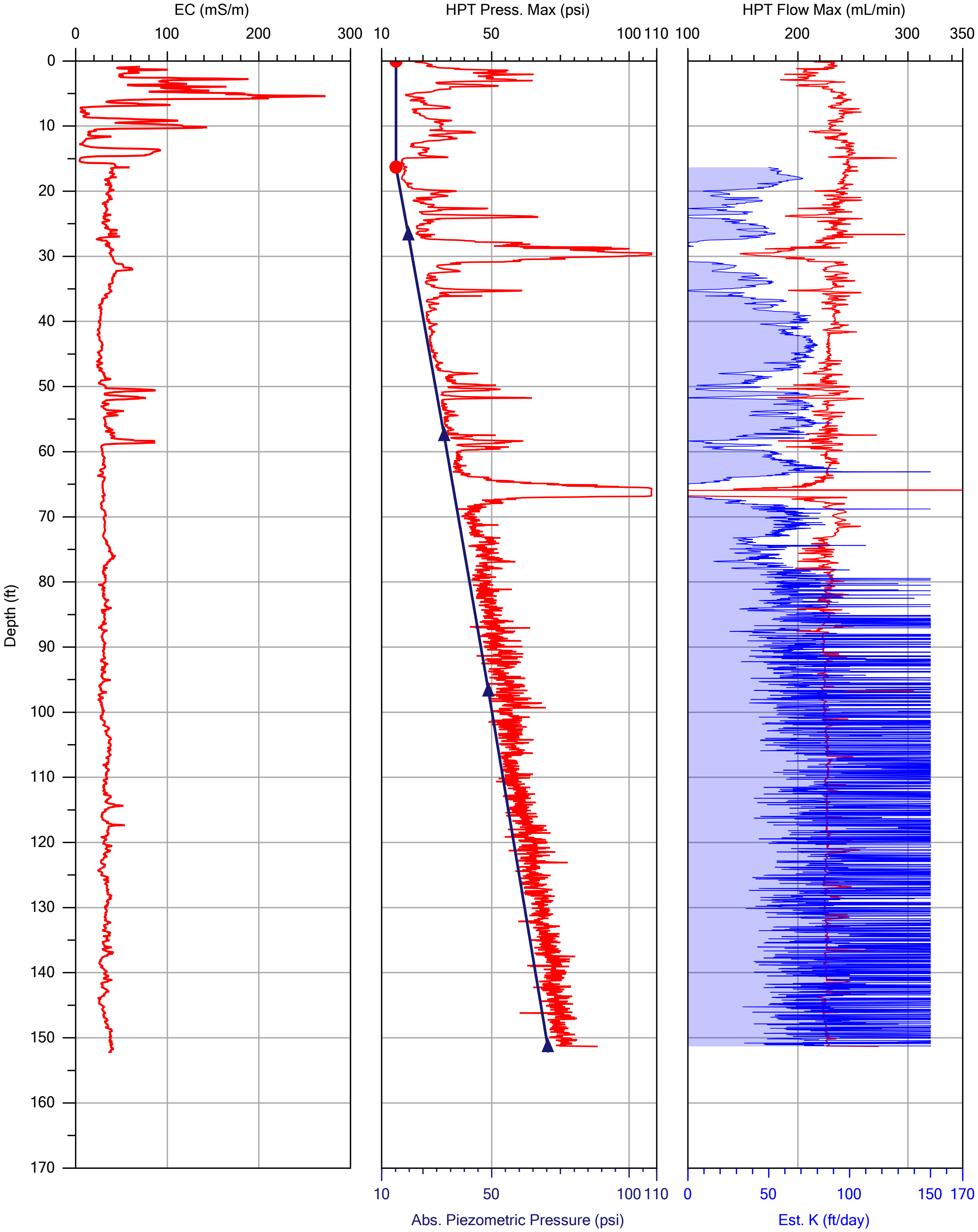
P-E-S
Plains Environmental Services

		File: SB-01.HPT
Company: PES	Operator: Jason A	Date: 9/4/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



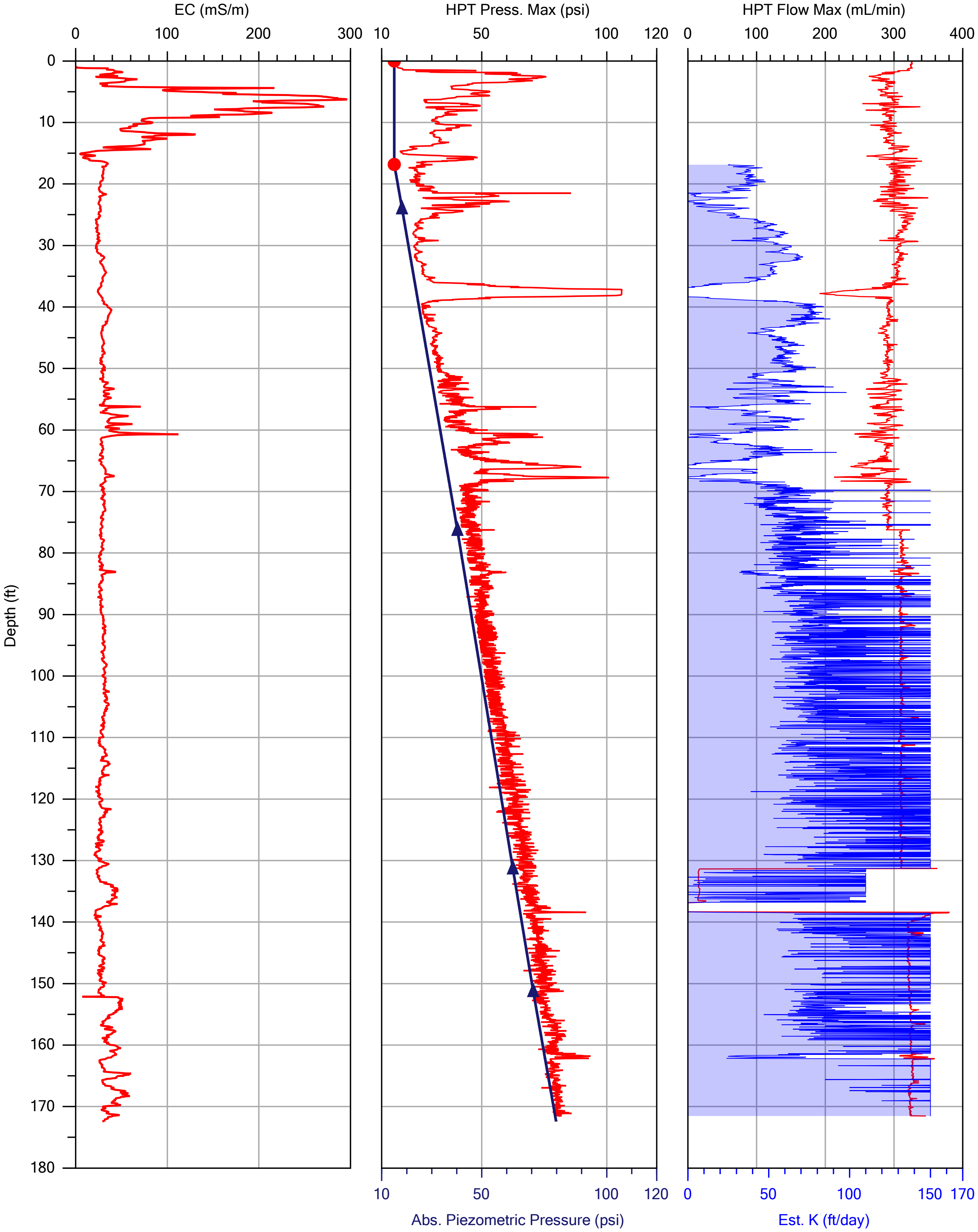
P-E-S
Plains Environmental Services

		File: SB-02.HPT
Company: PES	Operator: Jason A	Date: 9/6/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



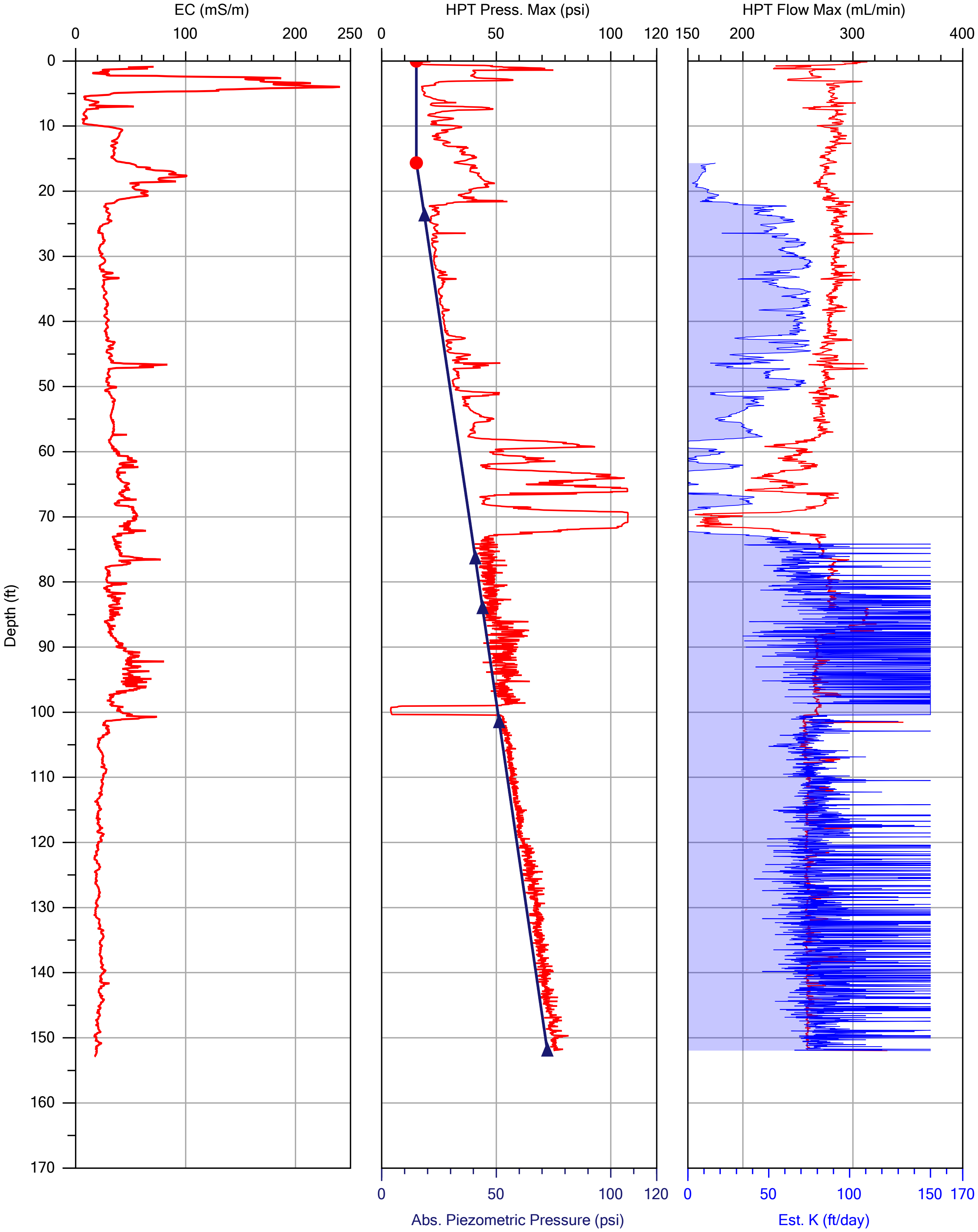
P-E-S
Plains Environmental Services

		File: SB-03.HPT
Company: PES	Operator: Jason A	Date: 9/6/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



P-E-S
Plains Environmental Services

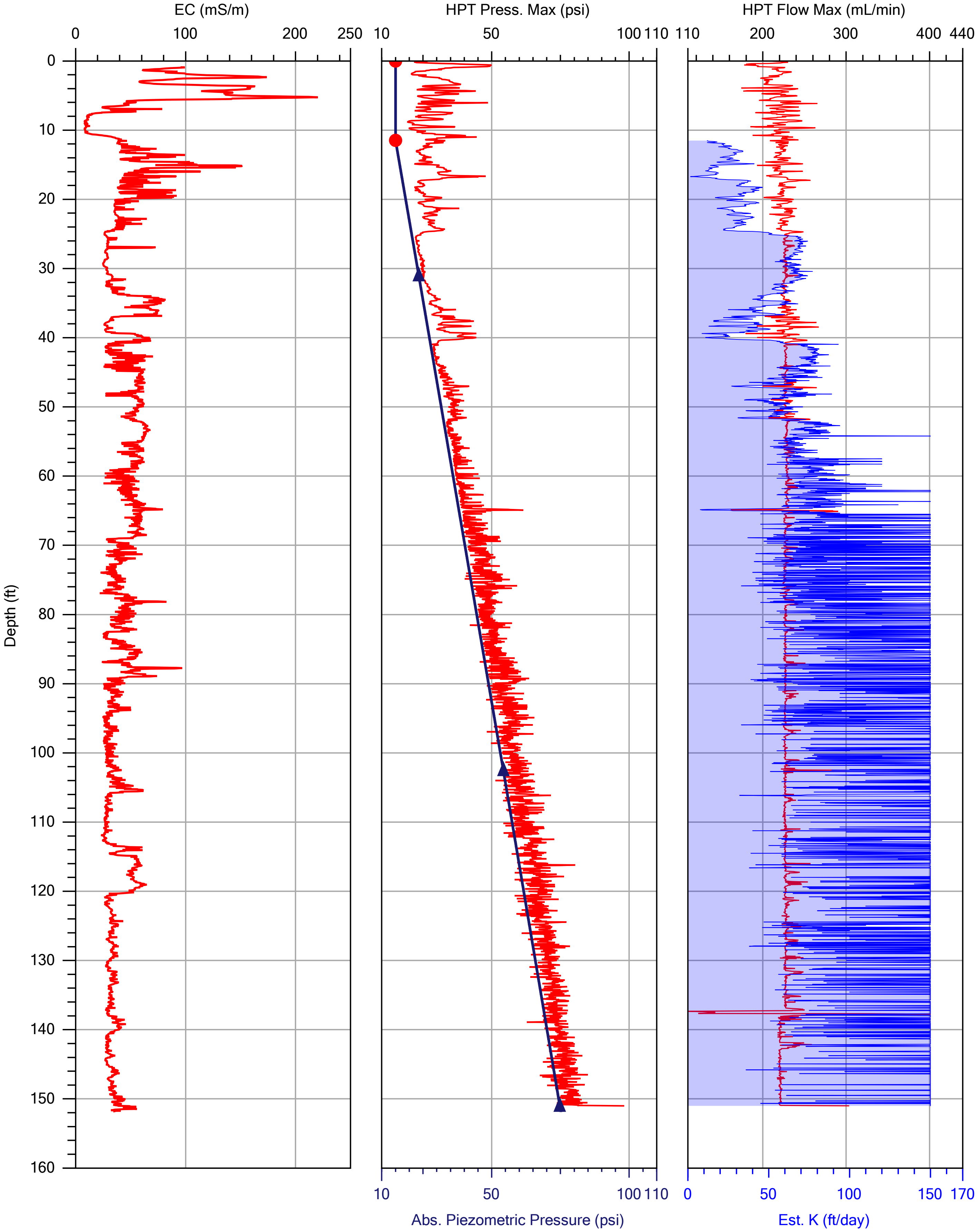
Company: PES	Operator: Jason A	File: SB-04.HPT Date: 9/5/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



P-E-S

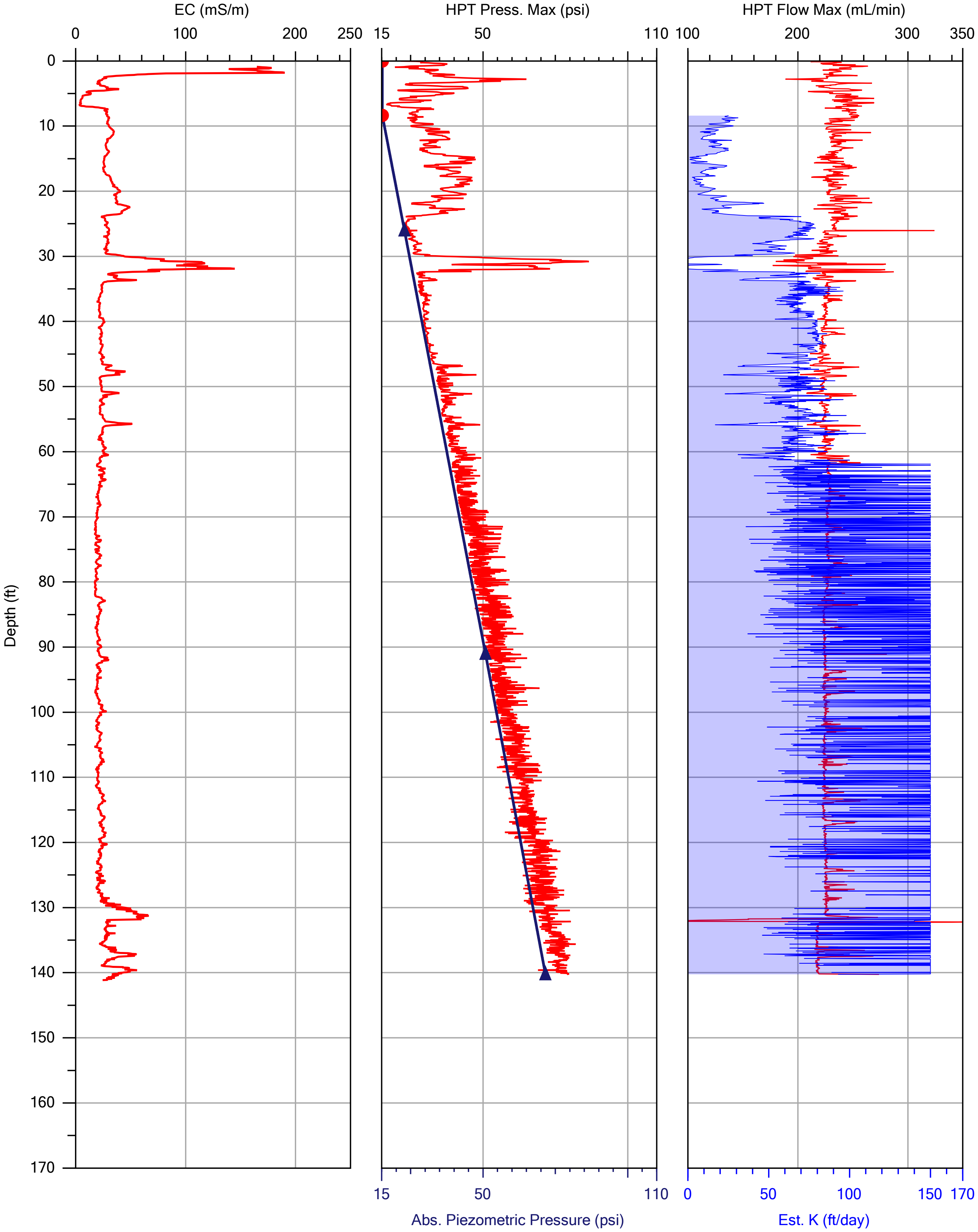
Plains Environmental Services

		File: SB-05 MERGED.HPT
Company: PES	Operator: Jason A	Date: 9/5/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



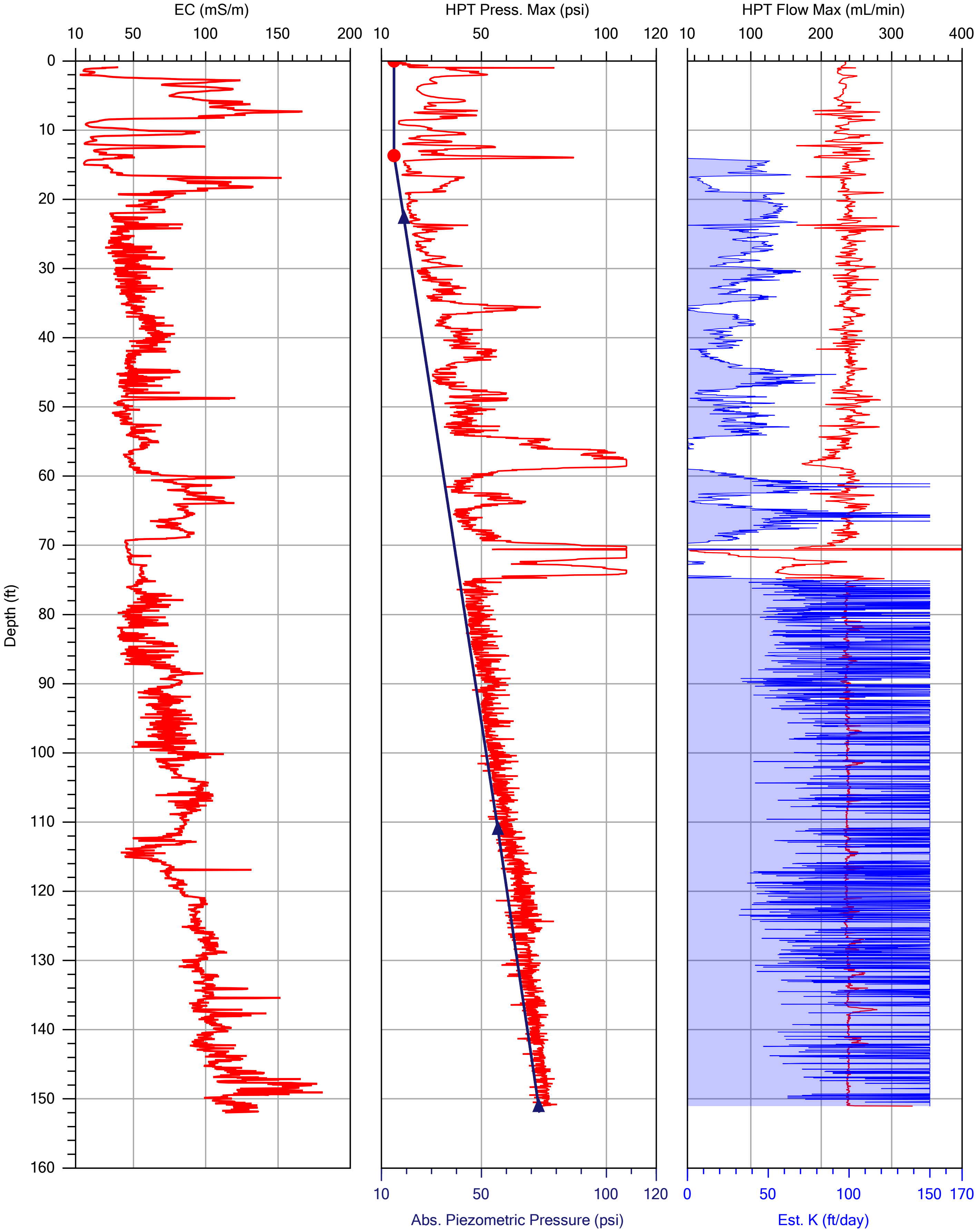
P-E-S
Plains Environmental Services

		File: SB-06.HPT
Company: PES	Operator: Jason A	Date: 9/7/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



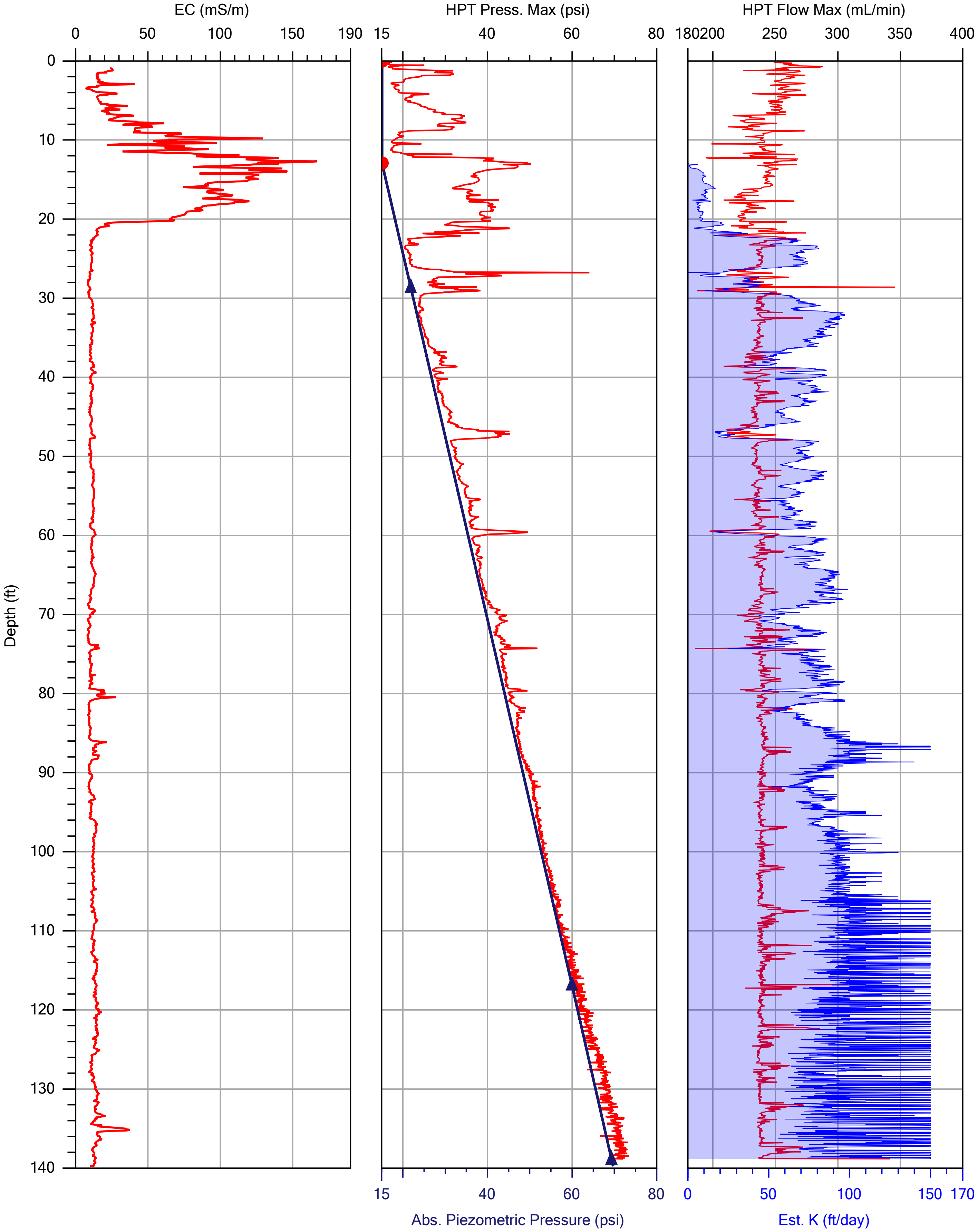
P-E-S
Plains Environmental Services

		File: SB-07.HPT
Company: PES	Operator: Jason A	Date: 9/6/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



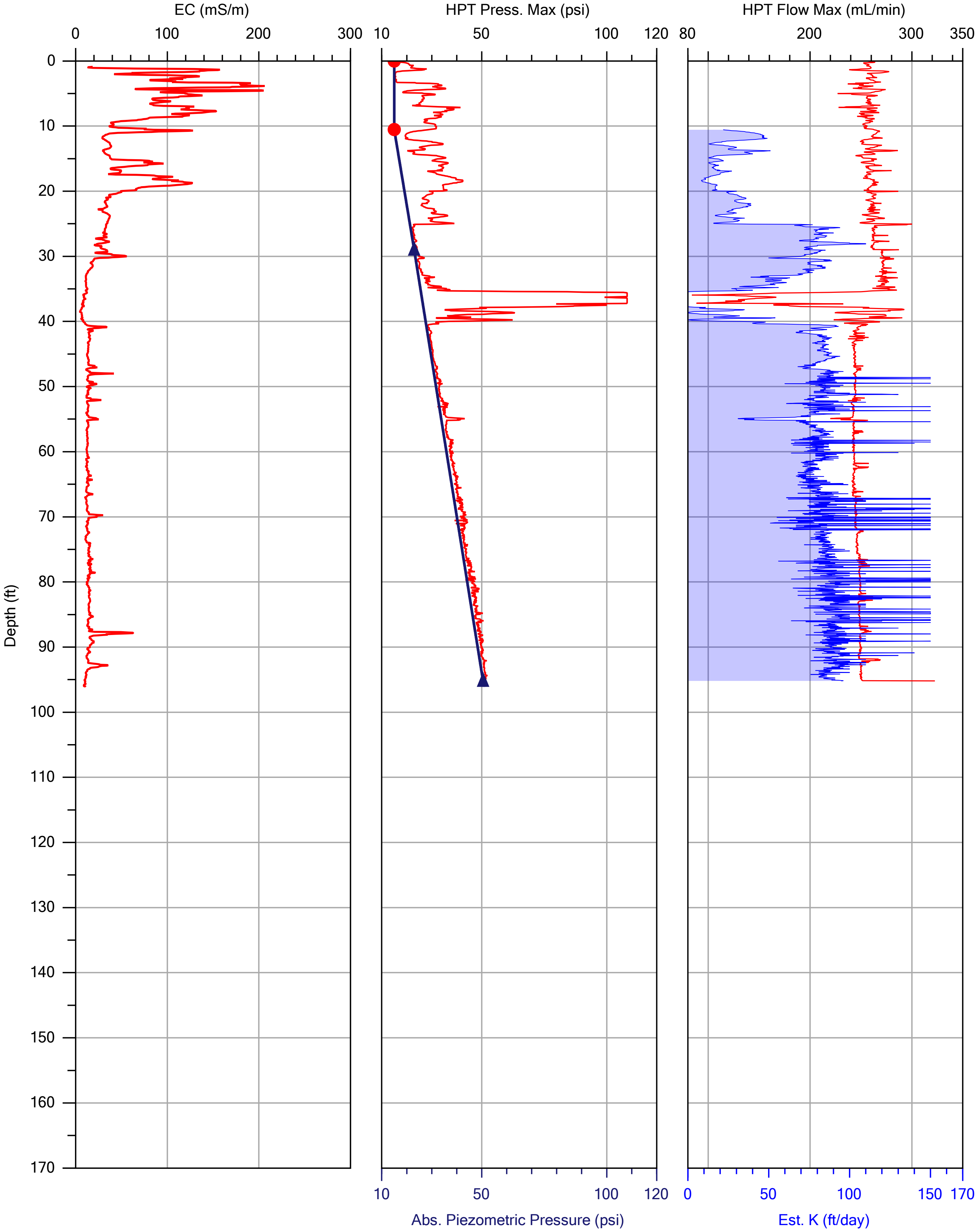
P-E-S
Plains Environmental Services

		File: SB-08.HPT
Company: PES	Operator: Jason A	Date: 9/7/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



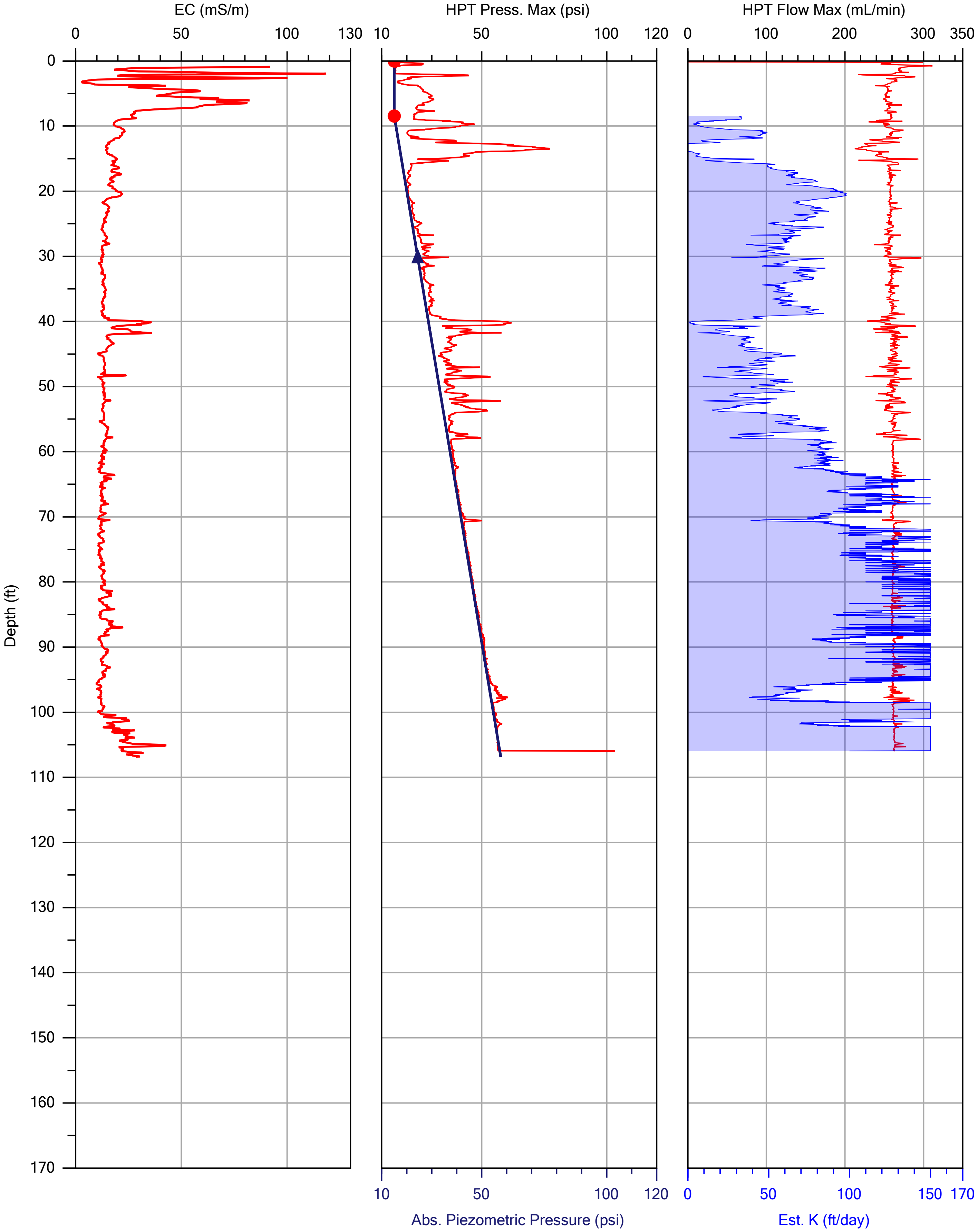
P-E-S
Plains Environmental Services

		File: SB-09.HPT
Company: PES	Operator: Jason A	Date: 9/7/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



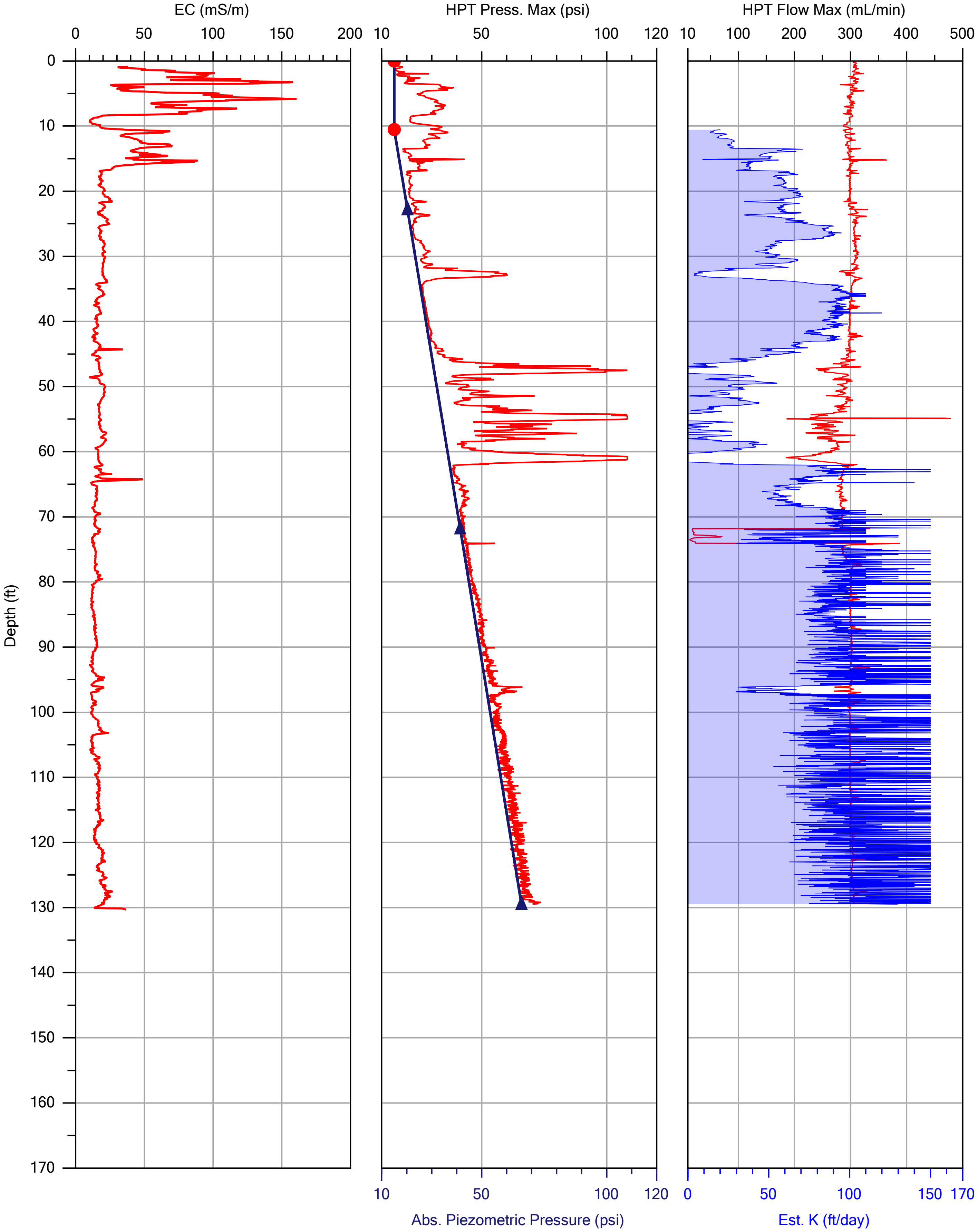
P-E-S
Plains Environmental Services

		File: SB-10.HPT
Company: PES	Operator: Jason A	Date: 9/10/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



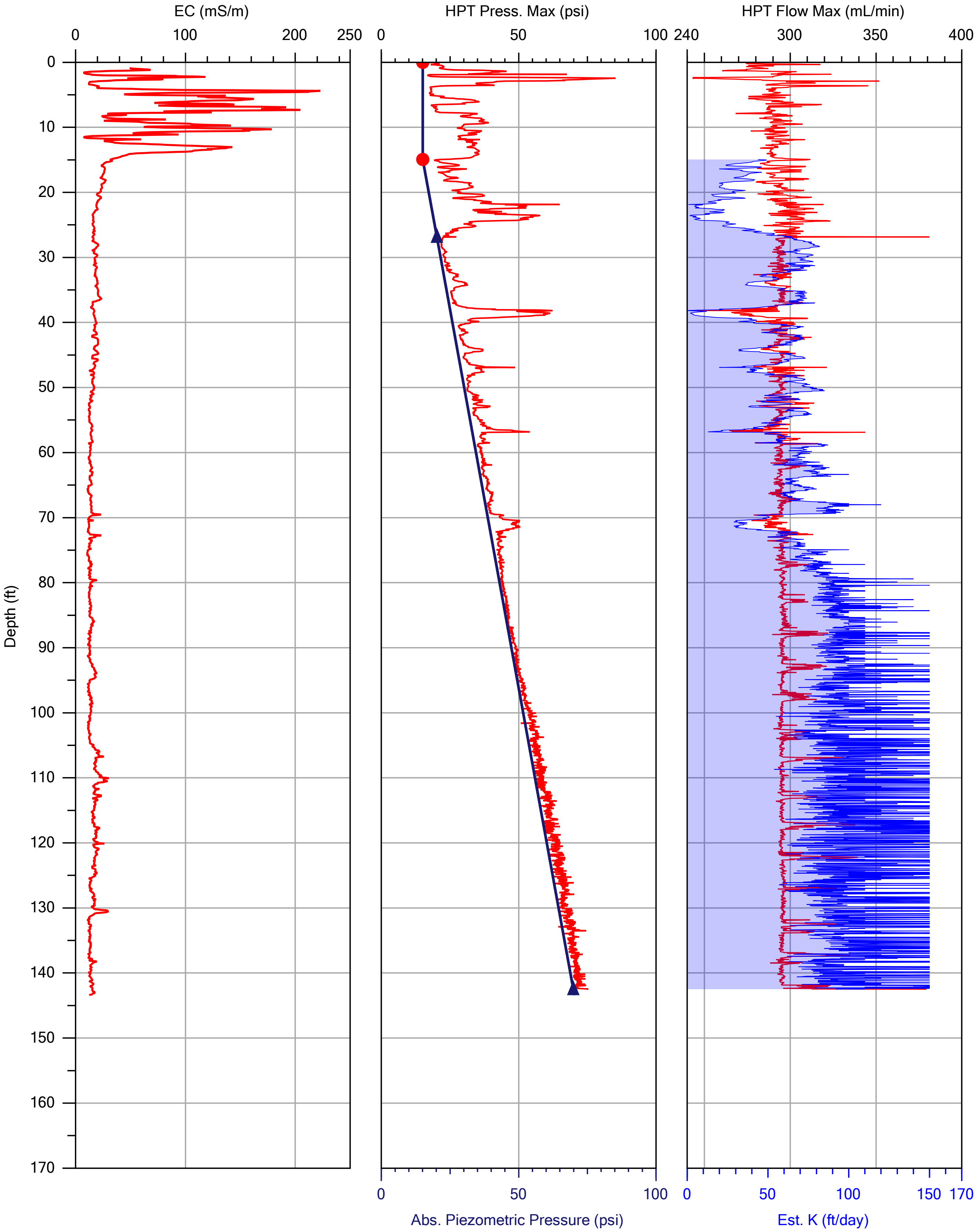
P-E-S
Plains Environmental Services

		File: SB-11.HPT
Company: PES	Operator: Jason A	Date: 9/10/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



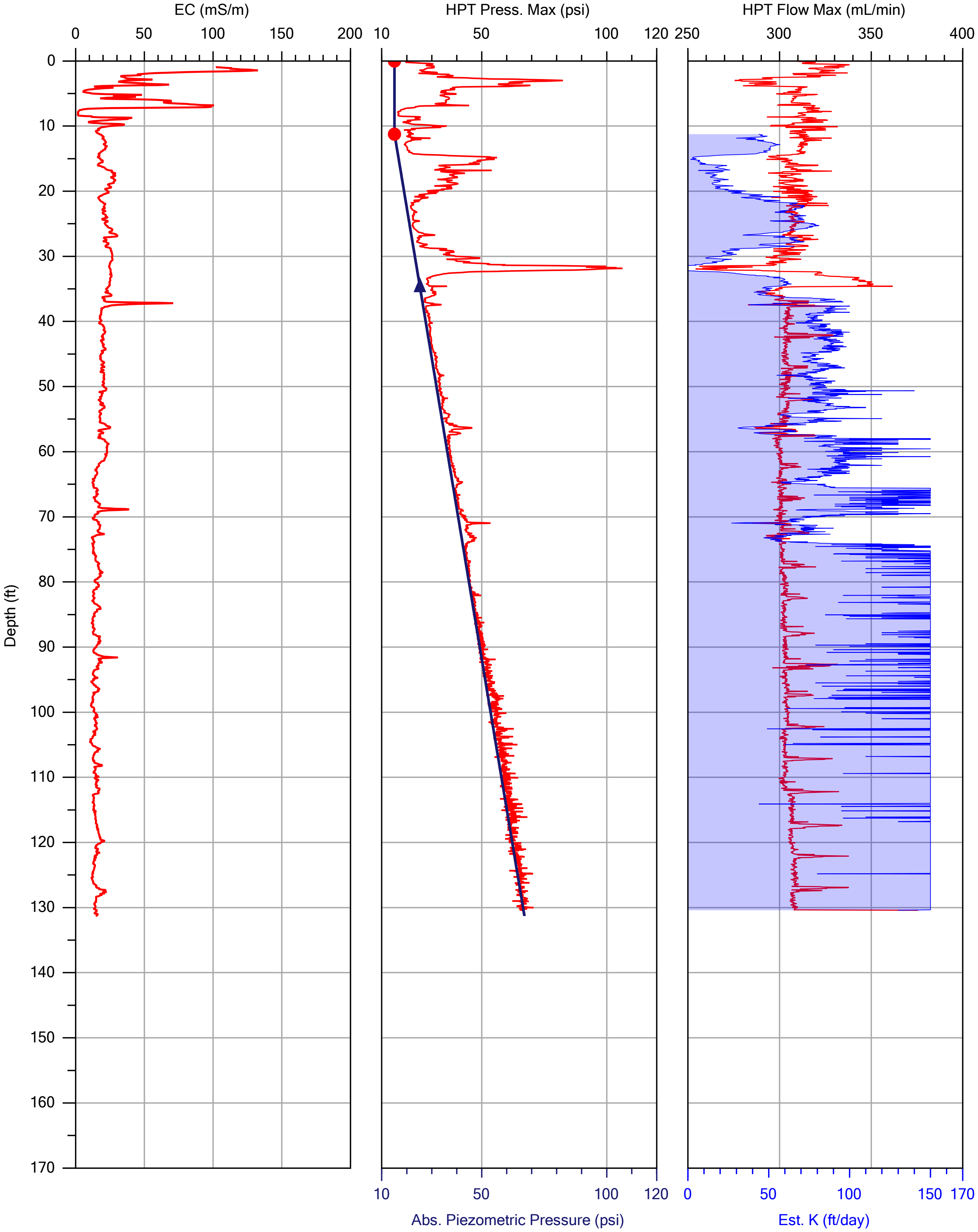
P-E-S
Plains Environmental Services

		File: SB-12.HPT
Company: PES	Operator: Jason A	Date: 9/11/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



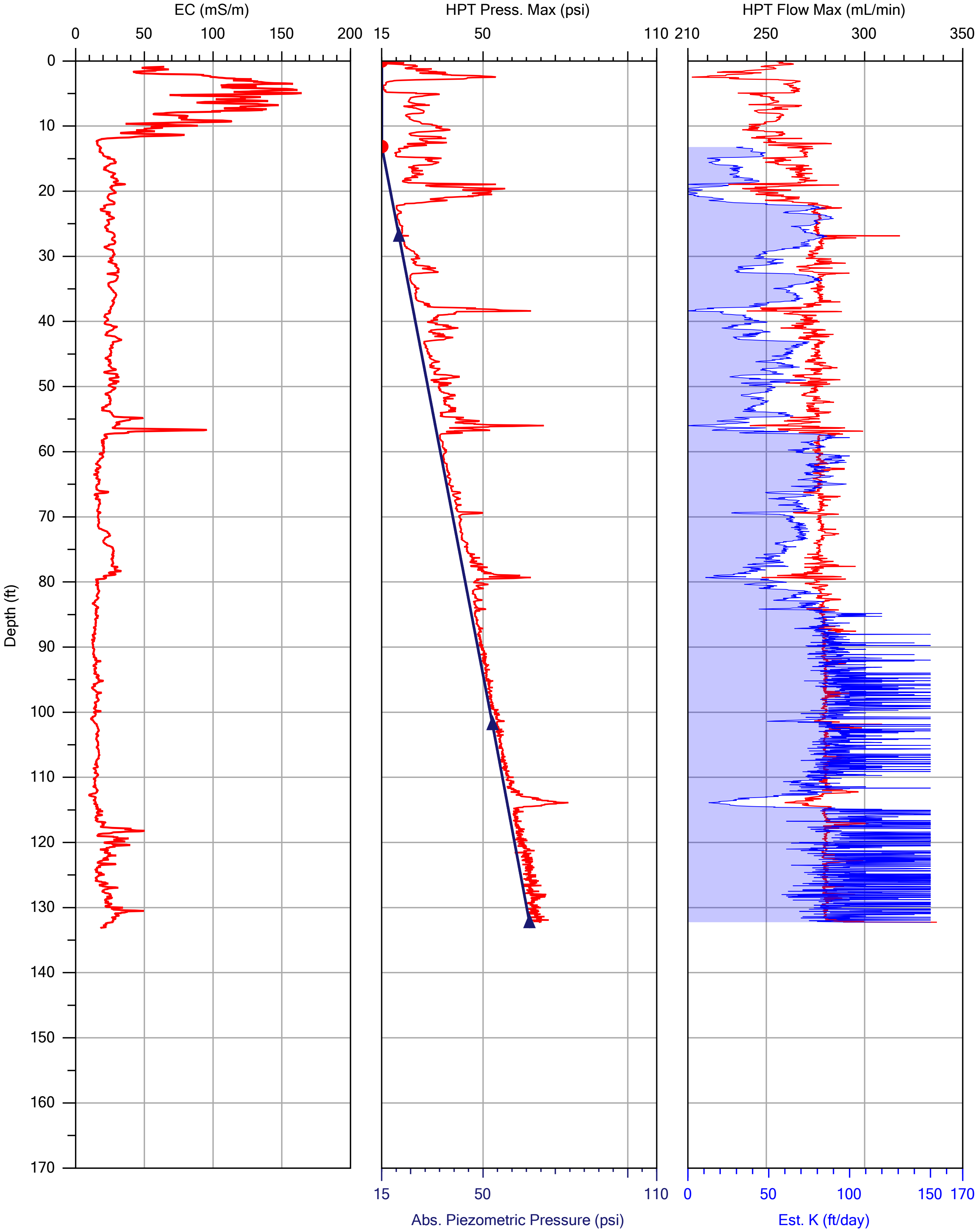
P-E-S
Plains Environmental Services

		File: SB-13.HPT
Company: PES	Operator: Jason A	Date: 9/11/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



P-E-S
Plains Environmental Services

		File: SB-14.HPT
Company: PES	Operator: Jason A	Date: 9/11/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS



P-E-S
Plains Environmental Services

		File: SB-15.HPT
Company: PES	Operator: Jason A	Date: 9/12/2018
Project ID: Nearman Creek	Client: B&McD	Location: Kansas City KS

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