



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

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

Kansas City, Kansas

Project No. 88777

1/31/2019

prepared by

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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	Groundwater Monitoring Plan for the Nearman Creek Power Station
Program	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 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. <u>https://www.federalre</u> gister.gov/documents/2018/07/30/2018-16262/hazardous-and-solid-waste-management-systemdisposal-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

Table 2-2Monitoring Well Gauging Data - May 29, 2018Kansas City Board of Public UtilitiesNearman 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

Table 2-3Monitoring Well Gauging Data - October 1, 2018Kansas City Board of Public UtilitiesNearman 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

Table 2-4Monitoring Well Gauging Data - October 31, 2018Kansas City Board of Public UtilitiesNearman 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

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

					Sample Location Sample Date	MW-3 10/29/2015	MW-3 1/27/2016	MW-3 4/27/2016	MW-3 7/25/2016	MW-3 10/25/2016	MW-3 1/24/2017	MW-3 4/24/2017	MW-3 7/25/2017	MW-3 9/14/2017	MW-3 3/8/2018
Analytical Method	Analyte	Unit	Calculated		ASD										
Appendix III - Detection	Monitoring		Background Limit ¹	GWPS ²	Background Limit ³										
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	рН	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	рН	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 - Assessme	ent 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.

2 = Groundwater Protection Standards established for the BA Pond on September 13, 2018.

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

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

				:	Sample Location Sample Date	MW-3 6/4/2018	MW-3 10/2/2018	MW-3 11/20/2018	MW-4 10/30/2015	MW-4 1/27/2016	MW-4 4/27/2016	MW-4 7/25/2016	MW-4 10/25/2016	MW-4 1/24/2017
Analytical Method	Analyte	Unit	Calculated		ASD									
Appendix III - Detection	Monitoring		Background Limit ¹	GWPS ²	PS ² Background Limit ³									
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	рН	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	рН	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 - Assessme	ent 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

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.

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

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

					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		ASD								
Annondiv III Detection			Background	GWPS ²	Background		•	•	•				
Appendix III - Detection	Monitoring		Limit ¹		Limit ³								
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	рН	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	рН	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 - Assessme	nt 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	0.060234		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

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.

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

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

				5	Sample Location Sample Date	MW-2A 1/27/2016	DUP-1 1/27/2016	MW-2A 4/27/2016	MW-2A 7/25/2016	MW-2A 10/25/2016	MW-2A 1/23/2017	MW-2A 4/24/2017	DUP-2 4/24/2017	MW-2A 7/25/2017	DUP-1 7/25/2017
						Duplice	Duplicate Pair					Duplicate Pair		Duplico	ate 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	рН	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 - Assessme	ent Monitoring														
6020	Antimony	mg/l				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				
6010B	Cadmium	mg/l				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				
6010B	Cobalt	mg/l				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				
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				
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				
6010B	Selenium	mg/l			[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				
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.

2 = Groundwater Protection Standards established for the BA Pond on September 13, 2018.

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

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

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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

				:	Sample Location	MW-2A	DUP-1	MW-2A	MW-2A	MW-2A	MW-2A	MW-8A	DUP-1A	MW-8A
Analytical Mothod	Analyto	Unit	Calculated			9/14/2017	9/14/2017	3/8/2018	0/4/2010	10/1 &	11/20/2018	10/29/2015	10/29/2015	1/2//2016
Analytical Method	Analyte	Onit	Background	CWPS ²	Background	Duplica	ne Pull					Duplice	ite Puli	
Appendix III - Detection	Monitoring		L imit ¹	GWF5	L imit ³									
6010B	Boron	ma/l	0.272			021	02U	NS	02U	02U	NS	2 37	2 38	2 48
6010B	Calcium	ma/l	240.5			155	155	NS	156	163	NS	186	185	168
9056MOD	Chloride	ma/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

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.

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

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

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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

				\$	Sample Location Sample Date	MW-8A 4/28/2016	DUP-2 4/28/2016	MW-8A 7/25/2016	MW-8A 10/25/2016	MW-8A 1/23/2017	MW-8A 4/24/2017	MW-8A 7/25/2017	MW-8A 9/14/2017	MW-8A 3/8/2018	DUP-1 3/8/2018
Analytical Method	Analyte	Unit	Calculated		ASD	Duplico	nte Pair							Duplica	ate Pair
Appendix III - Detection	Monitoring		Background Limit ¹	GWPS ²	Background Limit ³			1	1			1	1	· ·	
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	рН	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	рН	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 - Assessme	ent 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

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J- = Result qualified as estimated with potential low bias

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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

				S	Sample Location	MW-8A	DUP-1	MW-8A	MW-8A	MW-10	MW-10	MW-10	DUP-1	MW-10	DUP-1
					Sample Date	6/4/2018	6/4/2018	10/1 &	11/20/2018	10/29/2015	1/27/2016	4/27/2016	4/27/2016	7/25/2016	7/25/2016
Analytical Method	Analyte	Unit	Calculated		ASD	Duplice	ate Pair					Duplico	ate Pair		
Appendix III - Detection	Monitoring	-	Background	GWPS ²	Background			•	-	-				-	
	5		Limit		Limit										
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	рН	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	рН	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 - Assessme	ent 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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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

				:	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		ASD	Duplico	nte Pair							Duplico	nte Pair
Appendix III - Detection	Monitoring		Background Limit ¹	GWPS ²	Background Limit ³										
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	рН	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	рН	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 - Assessme	nt 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.

2 = Groundwater Protection Standards established for the BA Pond on September 13, 2018.

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

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

				:	Sample Location Sample Date	MW-10 11/20/2018	DUP 11/20/2018	MW-13 10/1/2018	MW-13 11/19/2018	MW-14 10/1/2018	MW-14 11/19/2018	MW-15 10/1/2018	MW-15 11/19/2018	MW-16 11/19/2018
Analytical Method	Analyte	Unit	Calculated		ASD									
Appendix III - Detection	Monitoring		Background Limit ¹	GWPS ²	Background Limit ³								•	
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	рН	su	7.206			NS	NS	7.1 J	NS	6.7 J	NS	7.45 J	NS	NS
In Situ	рН	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 - Assessme	ent 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

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

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

Sample Dat Dat	Identification: e(s) Sampled: a Package(s): Note(s):	GWPS	DPGW-5/GW01 10/30/2018 L1039637-08	DPGW-6/GW01 10/30/2018 L1039637-07	DPGW-7/GW01 10/29/2018 L1039637-03	DPGW-8/GW01 10/29/2018 L1039637-02	
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. su - Standard Units

GWPS - Groundwater Protection Standard

J - Estiimated Value

mg/l - Milligrams per Liter

N/A - Not Applicable

U -Nondetect

FIGURES




Source: ESRI and Burns & McDonnell Engineering



ssued: January, 29 2019



- Well Not Used in CCR Monitoring
- lssued: January, 29 2019

- groundwater levels measured on May 29, 2018 and should be considered approximate.





Source: ESRI and Burns & McDonnell Engineering

ssued: January, 29 2019

Piezometric Surface Contour

NEARMAN CREEK POWER STATION KANSAS CITY BPU KANSAS CITY, KS



Piezometric Surface Contour

Issued: January, 29 2019

NEARMAN CREEK POWER STATION KANSAS CITY BPU KANSAS CITY, KS



Piezometric Surface Contour 733.54 Water Level Elevation Issued: January, 29 2019

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





Issued: January, 16 201

KANSAS CITY BPU KANSAS CITY, KS



Issued: January, 16 2019



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

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INDEX AND CERTIFICATION

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

Project No. 88777

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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.



12/12/18 11:34 AM

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

Date: December 12, 2018

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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	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
СҮ	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 waterbearing 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:

✤ <u>An alternative source exists</u>. 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

	Sar	nple 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						Duplica	ite 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	рН	su	6.34	-	7.05 J	6.94 J	6.93 J	6.97 J	6.98 J	6.94 J
In Situ	рН	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 Ide	entification:	GWPS	MW-2A	MW-3	MW-4	MW-8A	MW-10	DUP-1				
Date(s	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 &	L1031071-02/11 &	L1031071-03/12 &	L1031071-04/13 &	L1031071-05/14 &	L1031071-09/18 &				
			L1031413-06	11031413-01	L1031413-02	L1031413-07	L1031413-08	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				
рН	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				
			1									
Sample Ide	entification:	GWPS	MW-13	MW-14	MW-15							
Date(s	s) Sampled:		10/1/2018	10/1/2018	10/1/2018							
Data	Package(s):		L1031071-06/15 &	L1031071-07/16 &	L1031071-08/17 &							
			L1031413-03	L1031413-04	L1031413-05							
	Note(s):											
Analyte	Unit	N1/A	540	000	505							
Dissolved Solids	mg/i	N/A	542	839	505							
	mg/i	N/A	19.5	21.5	16.4							
	mg/i	4	0.38	0.208	0.462							
	mg/i	N/A	155	221	194							
Arsenic, I otal	mg/i	0.01	0.0252	0.002 0	0.00482							
Barium, Iotal	mg/I	2	0.205	0.0765	0.107							
Boron, Iotal	mg/l	N/A	0.2 0	0.2 U	0.2 0							
Calcium, Iotal	mg/i	N/A	95	200	/8.3							

Samp D D	le Identification: ate(s) Sampled: Data Package(s): Note(s):	GWPS	MW-13 10/1/2018 L1031071-06/15 & L1031413-03	MW-14 10/1/2018 L1031071-07/16 & L1031413-04	MW-15 10/1/2018 L1031071-08/17 & L1031413-05	
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	pCi/I - picoCuries per Liter
J	- Estiimated Value	su - Standard Units
mg/l	- Milligrams per Liter	U -Nondetect
N/A	- Not Applicable	

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 Date(s) Sampled Data Package(s) Note(s)		GWPS	DPGW-1/GW01 10/30/2018 L1039637-04	DPGW-DUP/GW01 10/30/2018 L1039637-05 *(Dup of DPGW-1/GW01)	DPGW-2/GW01 10/29/2018 L1039637-01	DPGW-3/GW01 10/30/2018 L1039637-06	DPGW-4/GW01 10/30/2018 L1039637-09				
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 Date(s) Sampled Data Package(s) Note(s)		GWPS	DPGW-5/GW01 10/30/2018 L1039637-08	DPGW-6/GW01 10/30/2018 L1039637-07	DPGW-7/GW01 10/29/2018 L1039637-03	DPGW-8/GW01 10/29/2018 L1039637-02					
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: Date(s) Sampled: Data Package(s): Note(s):		GWPS	MW-2A 11/20/2018 L1046228-01	MW-3 11/20/2018 L1046228-02	MW-4 11/20/2018 L1046228-03	MW-8A 11/20/2018 L1046228-04	MW-10 11/20/2018 L1046228-05	DUP 11/20/2018 L1046228-10 Dup of MW-10			
Analyte	Unit										
Arsenic, Total	mg/l	0.010	0.00324	0.002 U	0.002 U	0.0183	0.00789	0.00821			
Arsenic, Dissolved	mg/l	*(Total arsenic)	0.0023	0.002 U	0.002 U	0.0146	0.00453	0.00472			

Sample Ide Date(s Data I	entification: s) Sampled: Package(s): Note(s):	GWPS	MW-13 11/19/2018 L1046228-06	MW-14 11/19/2018 L1046228-07	MW-15 11/19/2018 L1046228-08	MW-16 11/19/2018 L1046228-09	
Analyte	Unit						
Arsenic, Total	mg/l	0.010	0.024	0.002 U	0.00509	0.035	
Arsenic, Dissolved	mg/l	*(Total arsenic)	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	t of the Bottom Ash Pond or direct-push samples at a concentration greater than the GWP	З.
GWPS	- Groundwater Protection Standard	pCi/I - picoCuries per Liter	

- J Estiimated Value
- mg/I Milligrams per Liter
- N/A Not Applicable

su - Standard Units

U -Nondetect

Table 1-4Monitoring Well Gauging Data - October 1, 2018Kansas City Board of Public UtilitiesNearman 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 1-5Monitoring Well Gauging Data - October 31, 2018Kansas City Board of Public UtilitiesNearman Creek Power Station Bottom Ash Pond

Well	Date Measured	Top of Casing Elevation	Total Depth Constructed	Measured Total Depth	Measured Water Level	Elevation of Water Level
	modourou	(ft MSL)	(ft bTOC)	(ft bTOC)	(ft bTOC)	(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 2-12015-2016 Bottom Ash Pond Arsenic Results
Kansas City Board of Public UtilitiesNearman Creek Power Station Bottom Ash Pond

	Sar	mple 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			Duplico	nte Pair	Duplico	nte Pair		
6020	Arsenic	mg/l	0.010	0.002 U	0.002 U	0.00224	0.00205	0.002 U

	Sa	GWPS	BA POND 7/25/2016	DUP-2	BA POND	DUP-2	
		L849542-07 20160702-07	L849542-09 20160702-09	L868992-07 20161076-07	L868992-09 20161076-09		
Analytical Method Analyte Unit				Duplica	ite Pair	Duplica	nte 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 and Burns & McDonnell Engineering



Source: ESRI and Burns & McDonnell Engineering

ssued: December, 7 2018

NEARMAN CREEK POWER STATION KANSAS CITY BPU KANSAS CITY, KS



-> Approximate Groundwater Flow Direction

Piezometric Surface Contour

736.02 Water Level Elevation

ssued: December, 7 2018

\Clien IGHT

Path: Z:\ COPYRI



A

Source: ESRI and Burns & McDonnell Engineering

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


Source: ESRI and Burns & McDonnell Engineering

733.54 Water Level Elevation Issued: December, 7 2018



Issued: December, 7 2018



APPENDIX A - SEPTEMBER 2018 MONITORING WELL DRILL LOGS

Project Name KC-RQ() A1	POLLADIA A CC	ecit	Project Num	per	8877	17			Boring Nu	umber	mw-	-15-	
Ground Elevation		Location	Kar	1505	. C.	4 11	۲. ۲		Page	l	lof z		
Air Monitoring Equipment	el Ur								Total Foo	tage	30		
Drilling Type	Hole Size	ə	Overburder	Footage	• .	Bedroc	k Footag	je	No.	of Sample	s	No. of Core Box	es
Direct Rich	2"/444		2	2			-						
Drilling Company	1		••••••••••••••••••••••••••••••••••••••		Dril	ler(s) 🏌	ony 1	Poull	<u>ر</u>		I		
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Date 9-20-18	То	9-2	0-18		Fiel	d Observ	/er(s)	ier,	n B	ollin			
Depth (feet)	Description	.*		Class	Blow Count	Recov.	Run/ Time	Sampl Desig	eBZ	PID (ppi BH	m) S	Remarks Water Leve	/ els
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BZ=Breathing Zone B	H=Bore Hole	S=Sample						<u> </u>	<u> </u>		05	1601 Form WC	

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								•		Boring Nu	mber	mw	-13
Project N	Name	ACBPU							•	Page	20	52	
Project N	Number <	18777						•		Date	9:20	,-13	· · · · · · · · · · · · · · · · · · ·
Depth						Blow		Run/	Sample		PID (ppm)	Remarks/
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Ground Elevation		Location	Ka	1 5a	< ()	h)	20		Page	100	5-2	
Air Monitoring Equipment	· La .	- I				<u> </u>			Total Foot	age ,	30	
Drilling Type	Hole Siz	ze	Overburder	n Footage		Bedroc	k Footag	e	No. d	of Samples		No. of Core Boxes
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Drilling Company	1- (1			Dr	iller(s)		0	. /			
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BZ=Breathing Zone BH=Bore Hole S=Sample

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Project Numb	er SSII7			- <u>r</u>			Date	9-26	18	
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APPENDIX B – KDHE NOTIFICATION AND CONCURRENCE LETTERS



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

BRH/sam

3. Detta

Mr. Brian R. Hoye, PG Project Manager

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 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

Project Name Nearma	in Creek	Project Nun	^{nber} g	387	77			Boring Number DPGW	
Ground Elevation	Location	1	~					Page 1 of2	0
Air Monitoring Equipment	M							Total Footage	
Drilling Type	Hole Size	Overburde	n Footage	э	Bedro	ck Foota	age	No. of Samples	No. of Core Boxes
Direct-Push	3.75"	<i></i> 20)		\sim	A		3	NA
Drilling Company	ès				Driller(s)	Blas	se M	artin	
Drilling Rig 783	3 DT				Type of Sampler	Ac	otate	Skeve	
Date 10/30/18	To 10/	30/18			Field Obser	ver(s)	Henry	I Turner ST.	5
Depth (feet)	Description		Class	Blo Cou	ow Recov	Run/ Time	Samp Desig	lePID (ppm) · BZ BH S	Remarks/ Water Levels
Asphalt grave (o.4' 'ay, very dark gray.iel anp , nedwn to low , teacy.	brown plasticity,	ML	N	A	NA	DPGw SS01	~A - \	START OBIS DUAI-TUSE Offset XJ
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uet, trace p	last-cay, soft		Sp						0835
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BZ=Breathing Zone

BH=Bore Hole S=Sample



							Boring I	Number	DPGW-	· [
Project	Name Neurman Creek						Page	2 of	6	
Project	Number 88717						Date	10/30	1,3	
Depth (feet)	Description	Class	Blow		Run/	Sampl	e	PID (ppn	n)	
14	- Sand Jown (1048 1/2) Surger	Class		Reco		Desig	. BZ	ВН	S	Water Levels
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Project N	^{Name} Neorma	n Creek		Project Num	ber	887	77			Boring Number	N-2
Ground	Elevation		Location							Page OF D	i
Air Moni	toring Equipment	NA	<u> </u>							Total Footage 25	
D	rilling Type	Hole S	ize	Overburder	n Footage		Bedroo	k Footaç	je	No. of Samples	No. of Core Boxes
Direc	.t-Push	3.75		95	•		٢	UA		3	NA
Drilling C	Company EPS					Dri	iller(s)	Blase	Mo	rtin	
Drilling F	^{Rig} 7877	DT				Ty: Sa	pe of mpler	Aceta	te sh	eere	
Date	0/29/18	Tc	0 10/00	ñ/18		Fie	ld Obsen	/er(s)	Lewis	Turner J.F.	7
Depth (feet)		Description			Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ BH	Remarks/ S Water Levels
	SILT , trace	clay, very di	ark gray	ish brown	ML	MA	•	NA		MA	START 1454 -
	(104R 5/2), plastic, red	uamp, trace p : um to soft	lesticity + Consiste	to non ncu.					DPGW	2	Dux1-Tube
			·	· .			3.5/		5501		
2	traction co	lie				P	3				
	CAND for	cell yelle e	d hour		ļ						
3 -	(104R 5/6) f	ine ara: . 1	oose, da	np	Sp						
	pourly graded			•							
								•			
5				<u> </u>					DOLU		
	SILT, SONES	olastic, sof	gray (1 t consist	oyry,) Hencu	ML				SSOD		
6 _				-,.			3.5/		5-6		
	harrowski tilitilijion - Alfikjezio	The sound of the low sector of the sound of the	the state of the second	- Course and a	-		/5				<u>v</u>
	SAND, trace	silt, pale	brown	(104R6/3)	_						moisture
8	Finegrain,	loose, dam	, to no ?	t to wet,	76						
	Porty graves).									
9 -											
											1457 =
11 -											
							3.8/5				â
12 _											
-	keeping 1	ren dere un	en (cria	(136)							
	Stored a	, gr	1 2 2)								
14						· .					

BZ=Breathing Zone BH=Bore Hole

S=Sample



		00049637549-ester047364		ann ann an Anna Anna Anna Anna Anna			Boring N	Number ${\cal D}$	pgw-d	25 ²²² 0wm
Project	Name Nearman Creek						Page	2 of 2	<u>}</u>	
Project	Number 6977		- <u>r</u>				Date /	0/29/18		
Depth (feet)	Description	Class	Blow	t Recov	Run/	Sample	e BZ	PID (ppm	n) S	Remarks/ Water Levels
14	SAND, dark grayish brown (Lover 41.)	CA.	MA		NA			NA	-	_
1	Fireto redium grain, losse, wet	sp								1500 -
12 -	-									
16 _	-									-
	-			Ч,						-
17 -	-			1/5						
	-									
18 -										
19	4									
20 -	trace shale fragment,	Statement and a state								1510 -
-	- , , , , , , , , , , , , , , , , , , ,					DPGW.	8			Offsite Boning
91 -						G-Wol				For GU
ן אר				5/5						
23 -										-
24 -										
-										ISUN STOR
<u> 35 –</u>										1013 014
-	Bottom of Boring - SAND HEAVE.									-
-										-
_										
-										
-										
-										
-										-
			i							



Project	Name Neorma	in Creek		Project Nun	^{nber} 8	87	רק'			Boring Nu	^{mber} D	966	-3	
Ground	l Elevation		Location							Page	1 af a	<i>≻</i>		
Air Mor	nitoring Equipment	NA	I							Total Foota	^{age} 20			
	Drilling Type	Hole	e Size	Overburde	n Footage	,	Bedroo	ck Foota	ge	No. c	of Samples		No. of Core Box	es
Die	ect-Push	3.	<i>d5</i>	Sc)		N	A			3		MA	
Drilling	Company EPS						Driller(s)	Bla	se n	natio				
Drilling	Rig 7822	DT					Type of Sampler	Aca.	h lo	Sleave	9			
Date	10/30/18	~ 1	To 10/3	0/18			Field Obser	ver(s)	Ler.	JREA LI TU		J-T	5	
Depth		Descript		,	Class	Blo	w Recov.	Run/	Sampl		PID (ppm)		Remarks	/ uls
	CLAY with S. 14	, very Jone	grayist bro	walion R3/5)CL		<u>~</u>	NA	Desig.	BZ	вп	3	START 101	1) –
	SELT, trace cl	ey brown	~ (104RY/3)	, Jano			14	,					Dual-Tube	
1	Non plaster,	soft cons	Stercy	, a	ML				DPGW SSOI	-3				
2				-			315		1-2'					_
	SAND, trace grain, lowe,	silt, bru dana, or	Docly a color	13)fine	Sp									
3 -			in given							2				
	-													_
4							- - 							
5	I mm dork sean	•			·			<u></u>					1015	<u> </u>
-	-									ŧ				
6 _													-	
							3.5/							
7							3							_
8									DPGW	-3				_
0 1									5502	5'				-
9 _									Dip					-
													1018	
10	Becomes wet									<u></u>			moisture	
- - 11														
			·				4/5							
12 _														$\overline{-}$
13 -	SAND, trace ST	h fire t	-omesium e	ram	SP									
14 -	506~ (1041241	3) 10050,	ver, por	y gradel	-									
3Z=Breat	hina Zone 🛛 🛛 🛛 🛛 🖓	=Bore Hole	S=Sample									051	1601 Form WCE	J-2-1

BZ=Breathing Zone BH=Bore Hole



							Boring N	umber	DPGW	-3
Project I	Name Nearman Creek						Page	2 01	<i>ډ</i> ک	
Project I	Number 88777					-	Date	10/30	/18	
Depth			Blow		Run/	Sample	,	PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	ВН	S	Water Levels
14 - 	SAND, trace silt, Fire to course, firegrand traces. Scourd (104R4/3), lowe, net, cellgrades	Sp	NA		Ma			NA		1020
17	Dark area bloud(104R3/1) 0.84			5/5						
(9 2										- - 9072 860/
	Botton of Boring. SAND HEAVE.					99-39 Dben	- 3			offset Boring - For fru -



Project Name	r Creek		Project Num	ber <u>8</u> 6	<u>777</u>)			Boring Nu	ımber T	26h	1-Y-1
Ground Elevation		Location)						Page	1 of 2	\mathcal{F}	
Air Monitoring Equipment	MA								Total Foot	age ds		
Drilling Type	ct Name Nearman Creek P Nearman Creek P Ind Elevation Location onitoring Equipment NA Drilling Type Hole Size P 17 cect - Push 3. 25 " 19 Company EPS 10/30/18 To 10/20/15 10/30/18 To 10/20/15 10/30/18 To 10/20/15 10/20/15 10/30/18 To 10/20/15 1					Bedroc	k Foota	ge	No.	of Samples		No. of Core Boxes
Direct-push	3.3	d5 ''	<i>ə5</i>	s .		\sim	'A			3		\sim 4
Drilling Company	_1	<u></u>			Dri	ller(s)	Blac	e ma	rtia			
Drilling Rig	DT				Typ Sai	be of mpler	Acet	fete S	leeve			
Date 10/30/10		To ha/2	. <i>I. v.</i>		Fie	ld Observ	^{rer(s)} /	PLIC	Turne	- 1-	T7	
Depth (feet)	Descripti	ion		Class	Blow Count	Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm)	S	Remarks/ Water Levels
- SEVE With	clay very	dark gray	rich brown		MA		NA			NA	L	START 1495
(10yr 7/s)	dans, nei	Na plost	JE.7. y, Soft.	BNL		ə <i>1</i> 5		Орсы 5501 1-д'	9- Y			Dual Jube _
4 - SEVT NEW - demp. Non 5	dark grayi plastic ,ss	sh brown ft.	(104R ³¹ 2)	mL								1436
6 7 SAND, +ra finegrain 9 1 9	ce s.74 pa house, da	ile brown (np. pourly	10 YR 6/3) geaded.	sp		θŀ						
-2 - 10058, JAN) Finegras) Poorly g	ark grayist n , trace M roded Bewa	h brown edium wes wet	sp		3}5		ррсы- 550д 10-11 '	Y			moisture

			Boring Number DPGW-Y							
Project I	Name Nearman Creek		Page	2082	•					
Project I	Number 88777				1		Date	10/30/18		
Depth	Description	Class	Blow	Deserv	Run/	Sample	P7	PID (ppm))	Remarks/
IV -	Can the sill a shirth how	Class	M		NA	Desig.		NA		
-	Lipus V/N Fine arous trace medium	SP								143
	long dalt and will									
-	i war wor , party graei									-
- 01										-
17 _				4/5						
-										
13 -										
			1	1						
9 _				ļ						
										1470
}• –										
-										
- 16										
-				5/5						-
_ ۲										
ן אז										
-										
24 _						Decm	y			Boring Office #
-						66.01	,			for Gw
dr _						ms/m	<u>ده</u>			1445 STOP -
-	Bottom of Boring - SAND HEAVE.									-
-										
-										-
										-
-										-
-										-
_										
	1				-					



Project Name Near ma	Project Num	^{iber} 8	87	77			Boring Number	~ 5			
Ground Elevation		Location							Page / of 2		
Air Monitoring Equipment	MA	<u> </u>							Total Footage		
Drilling Type	Hole Size		Overburder	n Footage	•	Bedroo	k Foota	ge	No. of Samples	No. of Core Bo	xes
Direct-Push	3,85		Ə5	-		\sim	A		3	NA	
Drilling Company						Driller(s)	Bla	æ N	lartin.		
Drilling Rig 7832 ()T					Type of Sampler	Ace	tate -	sleeve		
Date 10/30/18	То	(0	130/100			Field Obsen	/er(s)	Lei	is Turner for	17	
Depth (feet)	Description			Class	Blc Cou	ow Recov.	Run/ Time	Sampl Desig	e PID (ppm) BZ BH	Remarks S Water ⁻ Lev	s/ rels
SILT with d (104R 3/2) d 1 2 SILT , Very damp to moist 4 5 6 7	lanp , ned.un lanp , ned.un Oork gray.il t. trave plast	grayin plastic brown ic.ity, su	th brown 2-77, Soft. (wyr.3/2) oft.	mL	N	A 2.5% 315	NA	Dp64 5501 1-2'	-5	START 13. DUAL . TWOE	
8 9 SAND, trace brown (104A 10 poorly grive) 11 12 13	s.H. pole br 41,), fineg	own(ioy rain, 1	re615) sose, met	26		315		Doctor SS02 9-10' NS/MS	5	1320 Noisture	
14											

			Boring Number DPG5								
Project	Name Nearmon Creek						Page	2 of 2			
Project	Number 88777						Date	10/30/1	8		
Depth			Blow		Run/	Sample	e	PID (ppr	n)		
(feet)	Description	Class	Count	Recov	: Time	Desig.	BZ	BH	S	Water Levels	_
19	SAND I tracesilt, pale brown (104R6/3)	sp	NA		NA			NA			
15 -	poorlygrades.				+					1324	-
											-
16 -	-									-	_
-					-						_
17 –				1/5						-	-
-	-										
¹ 8							2			-	
- 	SAND. Very dork gray (bley 1 3/2) fire	T A				ed at					1
' :	to coarse grain, loose, but, moderately	>(
20 -										1307	1
											_
21 -										-	-
-				5/2	1					,	
99 _	Finegrain			3						-	-
_		1									-
93 –										-	
-											
24 -	more gravel.					DOGLIN	٣			Offset Boring	-
						Gwol	,			1340 STOP	
25 -						09-00					
-	Bottom ut isoning - Heaving SAFD										
-											
-						-					
-										-	-
										· -	
										-	
-										-	-
-										-	
										-	



Project Name Near Man	Project Name Projec					77				Boring N	lumber	P 6-40 -	6	
Ground Elevation		Location								Page) of	: 3		
Air Monitoring Equipment	NA									Total Foo	otage 35			
Drilling Type	Hole Size	•	Overburde	en Footage	э	Be	droc	k Foota	ge	No.	of Samples		No. of Core Bo	xes
Direct-Push	3.25		35	5			~	YA-			3		NA	
Drilling Company						Driller(s		BIA_	se N	lartin				
Drilling Rig 7833 0	51					Type of Samplei		Acet	ste s	sleeve				
Date 10/30/18	То	10/3	0/18			Field Ob	serv	/er(s)	Len	istur	ner y	E-F-		
Depth (feet)	Description			Class	Bk	ow Re unt	cov.	Run/ Time	Sampl Desig	eBZ	PID (ppm)	S	Remarks Water Lev	s/ els
- CLAY with si	14. very derie	grayish	brown	CL	N	Ą		NĄ			NA		START UYC	, _
1 = (104R >12), 1 = plosticity, 1	[[loyR >1]), vanp, medium to trace plosticity, medium consistency								DPGW	-6				_
STIT Araia	- Stur, trace clay very dark gray:sh					31			5501					-
2 brown (1041	brown (104R 3/2) damp. trace plastic.7					- 19			1-0					
- Mesium con	medium wasistency.													_
4														
							·						1142-	
5			-				_				999-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6		1198	
SELT, +race	clay, dark gro	y (IOYR	۲ <i>4</i>)	ML										
	ratic, melium	wasthen	cy.											
7							-							-
8														-
9														
_ SILT with all _ dame. medium	lay, brown (ioyr 4/3)	ML									1.11.72	
10	prestrent, me	io.va wa	Jistency -				_			54-750 ⁶			(143	
Stir with da	y, brown (10	4R.4/2) (an -			25								
12 pleatic.ty. da	- very deric grayist brown (104RZIS) meduan					1.1								_
13	-													
14														4

BZ=Breathing Zone BH:





			Boring Number DPGW-6							
Project	Name Nearman (reck						Page	2 of	3	
Project	Number 83777		-		1		Date	10/30/18	;	
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm BH) S	Remarks/ Water Levels
14	SILVE, with clay, brown (104R413) and bery dark gray: sh brown (104R3/3) dans medium al. which medium consistence	ML	NA		NA			NA		1144
16 -				5/5		Орьш 5002 15-16	-6			
17 — 18 —	STUT with very fine Sand, Jark grayish brown (104R4/2) thoist to wet, nonplasti , soft wasistency.	ML			-					moisture
19 -	SAND with with Exercision , dark									1146
ð1 —	gravist brown (13418418) wet, loose, poorlygrades.	sp		\$1		*	DPGW-1 GW01 20-24'	6		Offset Boring For Gw.
93 -				75	-					
ач Эч										1148 -
20 -							<u> </u>			
- - -6				5/5	-					
28 29										
30	SILT with day and fire sand, very dark greenish grow (Gley 1 3/1), het, medium to high plasticity. Soft considency	ml		5/5-						15 <u>5</u> - - - -



			Boring Number DPG-W-G									
Project	Name Nearman (reek						Page 3 of 3					
Project	Number 88777						Date	10/30	/18			
Depth			Blow		Run/	Sampli	e	PID (ppm	1)	Remarks/		
(feet)	Description	Class	Coun	t Recov	. Time	Desig.	BZ	BH	S	Water Levels		
32	SILT, with clay and fine sand, very dark	m	NA	•	NA			NA				
33 -	to back all the large (Gley 13/1), wet medium			÷,				1				
				15								
34 _	-											
	-					-						
35 -						<u> </u>				1200 STOP -		
	Rother of Baring.					-						
					-							
]											
			ĺ									
	-											
-	-			3								
-						1						
	-									-		
-												
-										-		
								7		-		
-										-		
										-		
-										-		
										-		
-												
-												
-										-		
-							i			4		
									· variation of the second s			
-										-		
										-		



Project	Name Neorman	Project Number 88777						Boring N	umber DP(5W -	>		
Ground	Elevation		Location							Page	1 of 2		***
Air Mon	itoring Equipment	NA	I							Total Foo	tage 25		
C	Prilling Type	Hole Size	e	Overburde	n Footage	•	Bedroo	k Footaç	je	No.	of Samples	N	lo. of Core Boxes
Dire	kt-Push	3.25		25	-		٨	A			3		NA
Drilling (Company EP	S					Driller(s)	Blase	m	artin			
Drilling I	Rig 7837	201					Type of Sampler	aceta	te sh	ure			
Date	10/29/18	То	10/20	9/18			Field Observ	ver(s)	evis	Turi	ver FF	7	
Depth (feet)		Description		· /	Class	Blc	ow Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm) BH	S	Remarks/ Water Levels
	SEUT trace	clay , very da	rk gray	ish brown	mz	m	ə	MA			NA		START 1751
	(10 YR 3/2), U CONS: SHACY	lan, tracepl	esticity,	soft					DPGw.	7/			Dual. Tube
							2/_		501				
2	2 - JAND, trace silt, pale brown (loyry						15						- -
	SAND, Frace silf, pale brown (loyr 4) Fire grain, loose, damp, poorly grade												-
3	3				,								-
													-
													- - -
5_					<u></u>								
													-
6													
							31						-
/							-15						-
8 _	SAUD Laws (·// \ / .	 • h										
-	(10 YR 1/2)	Finearcin tr	in on	Vm.	50								-
9	louse, the 1	pourly graved	••••		75				-499D	ר			-
10	Ľ								9-10'				1758 -
	0												
								in the second				-	
	becomes wet.						415					/	noisture -
12 _	2												
													-
C_ 													
14 -													

BZ=Breathing Zone

BH=Bore Hole S=Sample



			Boring Number DPGW-7							
Project	Name Nearman Creek						Page	2 of	д	
Project	Number 88777						Date	10/29	118	
Depth			Blow		Run/	Sample	,	PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	BH	S	Water Levels
14	SAND Arace silt, darlegray: h brown	sp	NA		NA			NA		-
15 -	(10 YR 1/2) fine grain, trace ned um									1801 -
	louse, dampto bet, poorly graded									1
16 -	-									
	7			5/5						-
17 -	-									
	-									-
18 -	-									
	-									-
19 -										
						1			4	
20 -	SAND, very dark gray (10 yR 3/1), fine									
	grain, 1003e, wet, poorty grade J.	56								-
31 -	Some arganic material.					Dor	-			OFFLEE boring-
	-			5/		Gwal	/			For GW.
98 -	-			75		91-25	}			
	-									-
93 -										
-	SAND, dark gray: th brown (104R412)	-								
94 -	fine to coarse sand, fire gravel, loose, wet,	sp								
-	well graded.									1810 STOP
<u> 22 –</u>										, , , , , , , , , , , , , , , , , , ,
-	BOTTOM OF BORING. SAND HEAVE.									
-										
-										
-	4									
-										-
 -			;							
-										-
										-
-										
-										-



Project	Project Name Project N						77			Boring Number	DPGh	1-8	
Ground	Elevation		Location							Page	of	<u></u>	
Air Mon	itoring Equipment	MĄ	l							Total Footage	20		
C	Drilling Type	Hole	Size	Overburder	n Footage	e l	Bedro	ock Foota	ge	No. of Sa	mples	No. of Core Bo	xes
Die	ect-Push	3.83	5	20			i	NA		3		NA	
Drilling		S					Driller(s)	Bla	se N	lartin			
Drilling I	Rig 788	9DT					Type of Sampler	Acete	k sle	eve			
Date	10/29/18		TO 10/2	ค/เ ช			Field Obse	^{rver(s)} L	_ewis=	Turner t	45		
Depth (feet)		Descriptio	on.		Class	Blo	ow Recov	. Run/ Time	Sampl Desig	e PIC BZ) (ppm) BH	Remark S Water Lev	(s/ /els
	Stit, trace Cl	ay, very d	ark gray;	sh brown	me	N	4	NA		~	A	START 16	30
	[(loyr.36), damp. trave plasticity, nei 1 [considency,								DPGW	-8		Ducl-Tube	·
-							2.5/5	-	1628				
2	2 - SAND, trace silt, pale brown (loyr 4)								Dup				
	- SAND, Frace silt, pale brown (loyry) - Fine grain, loose, damp, poorly gra												
	3 J. with J. seece / united laces in during												
4													
												1633	-
5													
6													
							2,						
7 —							3/5						
8 													_
9 _													_
							-					1635	
10 _	1			ŀ					DpGu-	8			
	SAND, traces: It, dark gray: sh brown								10-11,				
	- (104RY/2) fire grain trace medium,						5.4					A. 3. 7. 1	
12	12 - 1000 C, MET, POORLY Graded.						5.5/5		:			moisture V	
- ₇₁													
14 -													

BZ=Breathing Zone

BH=Bore Hole S=Sample

			Boring Number DPGW-8							
Project	Name Nearman Creek						Page	2 of 2	*	
Project	Number 88777			Signation of the second se			Date /	0/29/18		
Depth			Blow		Run/	Sample		PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	BH	S	Water Levels
	SAND, trace silt idark grayish brown	Sp	NA					NA		
15 -	(10 YR Y/2) Fine grain, frace newirm,									1640 -
-	house, wet, poorly groded.									
16 _						DPGes	8			offset boing -
-			1	5/		16-22	F			For GU.
17 _				13						
18 -										
										-
19 _										
										1650 5000 -
- co		<u></u>								
· -	Bottom of Boring , SAND HEAVE.									
_										-
						:				-
-										-
-										-
-										
-										-
-				Í						-
-										
-										
_										
										-
_										-
-										-
-										-
4										-
-1										



APPENDIX D – NOVEMBER 2018 MONITORING WELL DRILL LOGS

Drilling Log												
Project Name	LANA CALLA	Project Num	^{ber} \triangleleft	8.7	177			Boring Nur	mber M	w-16		
Ground Elevation	Locatio	on K	C I C					Page	101	7	•	
Air Monitoring Equipment	I		Same (Total Foota	age			
Drilling Type	Hole Size	Overburder	n Footage		Bedroc	k Footaç	je	No. c	of Samples		No. of Core Boxes	
Divert Push	Ъ. "											
Drilling Company) i_l(. L			Driller(s)) 15 1 + 2			1	
Drilling Rig	le 7822	ØT			Type of Sampler	m	1 dx.ar	and and	<u> </u>	5	<u> </u>	
Date 11-15-18	To	15-13			Field Observ	ver(s)	Key	n Bo	In			
Depth (feet)	escription		Class	Blo	w Recov.	Run/ Time	Sampl	e	PID (ppm)	S	Remarks/ Water Levels	
$= \frac{2}{100}$	2 0 eng (300 2 0 eng (300 3 0 eng (100 3 0 eng (100) 10 yr - 11 plus 1.1 some si L1, 10	4, mas 54 8+ Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand Stand			25 0347 3:14 0347 4 5 5 7 14	0944 944 944 944 944 944 944 944 944 944				05		

			-				Boring	Numb	er M(N-16	
Project N	lame KCBPU NERMAN CACE	- /(Page	1	69-		
Project N	lumber \$\$777	42					Date	11-	157	б	
Depth	Descision	Class	Blow	Recov.	Run/	Sample		F	PID (ppm)	6	Remarks/
(leet)	Description	• •	Count		Time	Desig.	D2	-	БЦ	3	-
-	MUG + (AUG BONES C) 104/CZ				1.1						=
15-				and the second se	c94						
$ (\omega =$		8 T									
-				4							·
				5							-
\'/_	EIL+, true ane sand, wet soft,			-							
18-											
	- B x a 										
19-	SKUD WILL	• .									
	Switz mill greek										=
·30 [−]	Time " usarsup grave "i, wet										
21-	SHUP his tometing and in										
`=	wet, 10050 7 + train)										
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APPENDIX E – SANITAS[™] SOFTWARE STATISTICAL OUTPUT

Sanitas[™] v.9.5.32 For the statistical analyses of groundwater by Burns & McDonnell only. EPA 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.	<u>Date</u>	Observ.	<u>Sig.</u>	<u>Bg N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	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

	3-0-0	ورورية المعيني		LERON				$\Delta D (nnm)$		the subscripting the observation of the	
DATE: _	>-0-18		SHE:	<u>ucorn</u>		PID READING	at WELL HE	AD (ppm):		· · · · · · · · · · · · · · · · · · ·	
PROJEC		₹: ' <u>%</u>	5-11	W	/EATHER: <u></u>	105, Smph ba	f partly i	londy			
WELL N	UMBER					DEPTH TO WAT	ER (ft): <u>2</u> (1.88			
MU	-ar										
DURCIN				TO	TAL DEPTH ((ft):	WELL DIAN	IETER (inche	əs):	_	
FUNGIN					e						
CASING		SALC	SULATIC	DN: ft	of water X in casing	galions/ ≡ g foot	total gallol	ns/casing vo	ume		
Equipme	ent Used: P	edica	ated Blad	dder Pump	Nondedicat	ted Bladder Pump	b Bailer (Other		<u> </u>	
Time (24 hr)	Amount Purged (gals)	Flo (n	w Rate nl/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	
1245	Į.	l	100	6.75	14.65	0.989	47.7	45,9	6.82	24.88	
1250	6.53	4	00	6.26	15.29	0.855	211.5	54.9	1.60	24.89	
1255	1.07	4	00	6.25	15.39	1.060	9.43	51.0	0.97	24.88	
1300	1.60	4	60	6.23	15.19	1.064	5.39	48.0	0.64	24.88	
1305	2.14	40	20	6.29	15.18	1.066	3.08	46.7	0.40	24.88	
1310	2.67	67 400 6.31 15.28 1.064 2.14 44.9 0.31 24.80									
1315	3.21	40		6.37	15.21	1.069	2.01	39.6	0.26	24.83	
1320	3.74	40	0	6.39	15.18	1.069	1.74	36.5	6.21	24,88	
		<u> </u>		Co	ntinued on b	ack (circle one) y	ves kno>				
SAMPLI	NG	· ·	Equipme	nt Used: १	Same as abor	o Other					
Sample Time (24 hr)	e Tota Purge (gals	l ed	рН	Temp (C)	Conductivit (mmhos/cm	y Turbidity) (NTUs)	.ORP (mV)	D.O. (mg/L.)	Depth to Water (ft TOC)	Obs.	
1325	3.7.4		6.30	15.18	1:069	1,74	36.5	0.21	24.33	**************************************	
FINAL D	EPTH TO V	VATE	ER (ft TC): <u>24.</u> (33	TIME FINAL DE	EPTH TAKEN	1:		3104-5-00-	
SAMPLE	E ID:	M-9	A		SAMPLE	E ID FOR QC:	amerikana				
PARAMI	ETERS REC	QUE	STED FO	DR ANALYS	sis: <u>Sb,As</u>	Ba, Be, Cd,	Cr, Co, Ft;	Pb, Cr, Hy	Mo, Se, 7	h, Ra	
FERROL	JS IRON (m	ng/L):	4000		IDW T	OTAL:	Ч		а 1		
METER	MODEL No	.: <u> </u>	57556	MPS							
CHECKE	ED FLOW T	HRC	UGH CE	ELL FOR LE	EAKS: KÎ C	COMMENTS: A	AIL	•			
	,				µ	··· ···					
					,						
	7	<u>]</u>	NAME		<u> </u>	SIGNATURE			DAIE		
PREPAF	RED: dr	unth	ive fle	cunsor	·	Amplant	\sim	P	5.8.18		
REVIEW	/ED:				¥	·····					

DATE:	3. 6.18		SITE:	KIBP		PID READING	at WELL HE	AD (ppm):		tin aageege de soo <u>oorde</u> ge
PROJEC		 २: ⁰	3877	'7 .W	/EATHER:	405. Smpt	4,00	tas clau	141	
				<u> </u>	<u> </u>	(*	<u>}</u>			
				_	Ď	EPTH TO WAT	ER (ft):	7.44		
M	W-3									
				ТОТ	TAL DEPTH (ff): '	WELL DIAM	ETER (inche	es): <u>l</u>	
PURGIN	<u>IG</u>									
CASING	VOLUME (CALCI	JLATIC	N: ft	of water X in casing	gallons/ = foot	total gallor	ns/casing vol	ume	
Equipme	ent Used: D	edicat	ed Blac	Ider Pump	Nondeqicate	d Bladder Pump	Bailer (Other		-
Time	Amount	Flow	/ Rate		Temp	Conductivity	Turbidity	ORP	D.O. ¹	Depth to
(24 hr)	(gals)	(ml	/min)	рн	(C)	(mmhos/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)
1340	I	40	0	6.65	14.87	1.239	2.81	73.4	4.80	27.44
1345	0.53	6/6	0	6.27	15.05	1.2201	2.53	89.3	1,78	27.77
1350	1.07	400)	6.28	15.01	1.223	2.00	85.9	6.98	27.77
1355	1.60	400) '-	6.40	15.10	1.220	1.24	79.6	0.65	27.77
1400	2.14	40	0	6.44	15.08	1.220	1.36	71.9	0.57	21-17
1405	: 2.67 Leo 6.45 15.04 1.219 1.27 76.5 0.47 27.77									
1410	3.21	40	0	6145	15,14	1,219	1.2.4	F 6.4	0.44	27.74
10115	3.74 (100 6.45 13.16 1.219 1.31 75.8 0.42									
	l			Cc	ntinued on ba	ck (circle one) y	l /es / no	· · ·		
SAMPLI	SAMPLING Equipment Used: Same as above Other									
Sample Time	Tota	l ed	Ηα	Temp	Conductivity	Turbidity	ORP	D.O.	Depth to Water	Obs.
(24 hr)	(gals	;)		(C)	(mmhos/cm)	(NIUS)	(mV)	(mg/L)	(ft TOC)	· · · · ·
1415	3.7.4		6:45	15.16	1,2101	1.31	15.8	0,112	27.77	
FINAL D	EPTH TO V	VATE	R (ft TO	c): _27.	77	TIME FINAL DE	EPTH TAKEN	1: 1415		
SAMPLE	ID: M	W-3	3		SAMPLE	D FOR QC:	MW-3/	ms msio		
PARAME	ETERS REC	QUES.	red fo	R ANALYS	SIS: Sb.As	Ba, Be, cd,	(c, Lo, FT,	Pb, ci, Hy	Mosel	HIRK
FFRROL	JS IRON (m	a/L):	ې و مېښې و د د و و مېښې و د و و و و و و و و و و و و و و و و و		IDW TO	таL: 37	м	······································	/ (
METER	MODEL No	.: .:	15I	556 mp	<u></u>	.,				
CHECKE	CHECKED FLOW THROUGH CELL FOR LEAKS: \square COMMENTS: \square									
UNLONL							<u> </u>			
		K ¹	A N A 🗁			ONATION			DATE	
	•	$\int \frac{N}{N}$	<u>AIVIE</u>	Maria	, <u>Si</u> A	GNATURE	0 0	· •	DATE	
PREPAR	RED:			1 ucross	·/v	tuth	121	5.0	9.13	
REVIEW	'ED:				V					·

DATE:	3.8.18	SITE:	KIBP		PID READING	at WELL HE	AD (ppm):		3			
PROJEC		R: 83777	W	/EATHER:	lios, 5mph,	W, portly	clow?)					
WELL N	UMBER			D	EPTH TO WATI	ER (ft): <u>27</u> .	34	_				
	У-4 G	<u></u>	TO	TAL DEPTH (ff	t):	WELL DIAM	ETER (inche	es):				
CASING	VOLUME	CALCULATIC	DN:ft	of water X in casing	gallons/ = foot	total gallor	ns/casing vol	ume				
Equipme	ent Used: D	edicated Blad	dder Pump	Nondedicate	ed Bladder Pump	o Bailer (Other		_			
Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	рН	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	04:39			
1020	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	96.5	0,68	29.59			
16:50	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$											
10/7	2.64	100	1. 1.0	14.07	1.1015	6.34	97.4	0.35	2434			
1640	1. d. 1	900	0.00		· · · · · · ·		1 4 7-1					
			Co	ontinued on bac	ck (circle one) y	res / no						
SAMPLII	SAMPLING Equipment Used: Same às above Other											
SampleTotal PurgedTemp pHConductivity (C)Turbidity (mmhos/cm)ORP (mUs)D.O. (mV)Depth to WaterObs.												
645	3.2.1	6.68	14.87	1,194	6.34	97.4	0.33.	24.39				
FINAL D		VATER (ft TC); 24	.34	TIME FINAL DE		1: 164	5				
SAMPLE	EID: MW	1-4	/	SAMPLE I	ID FOR QC:							
PARAME	TERS REC	QUESTED FO	OR ANALYS	SIS: SSIAS.	Bo, Be. Cd. C	G. Lo. Et.	Pb. Cc. Mo	Ma Sci	The Qu			
FERROL	IS IRON (m	, , ,			TAI: 3,2	-1		1-377-				
METER		. YSI	SSL MOS		17 (km)	<u> </u>	· ·		·			
CHECKE	μητονν Ι	INCOUGH C	ell fur Li	=ANO: K CC			<u></u>		<u>,</u>			
	A	NAME		I N	GNATURE			DATE				
PREPAF	PREPARED: Jourthan Humann Arthur Announ 3.6.18											
REVIEW	REVIEWED:											

DATE:	DATE: 183-8-16. SITE: KCBPA-Nurman PID READING at WELL HEAD (ppm):									
PROJEC	T NUMBER	2: 0377	7 N	/EATHER:	Mas, Smehr	1, partly	cloudy			
WELL N	UMBER				t -		_			
[Ę	EPTH TO WAT	ER (ft): <u>2 °</u>	5,25	,		
M	W-3A									
PURGIN	G		TO	TAL DEPTH (f	it):	WELL DIAM	ETER (inche	es): <u> </u>	_	
CASING	≚ VOLUME (N ft	of water X	gallons/ =	total gallor	s/casing vol	ume		
o/ tolite	VOLUME (in casing	foot		is baoing to			
Equipme	nt Used; D	edicated Blac	der Pump	Nondedicate	ed Bladder Pump	o Bailer (Other	<u></u>	_	
Time	Amount	Flow Rate		Temn	Conductivity	Turbidity	ORP		Depth to	
(24 hr)	Purged (gals)	(ml/min)	pH	(C)	(mmhos/cm)	(NTUs)	(mV)	(mg/L)	Water (ft TOC)	
1055	I	400	6.58	14.63	1.451	14.00	101.6	3.57	2825	
100	0,53	400	6.78	19.50	1.462	11.7	- 11. 4	1.30	23:28	
1135	1.07	1100	6.89	15,51	1.460	8.31	-21.2	0.91	28.28	
11.10	1.60	400	6.94	15.51	1.462	6.26	-32,7	0.59	28.29	
1115	2.14	400	6.94	15.56	1.463	2.47	- 35.9	0,46	28.28	
1120	2.67	6160	6.92	15.56	1.465	2.02	-37.2	0.45	28.28	
1125	3.21	hoo	6.91	15.57	1.466	1.67	-39.9	6.45	28.28	
					ok (airola ana) 1					
					ick (circle one) y		2			
SAMPLING Equipment Used: Same as above Other										
Sample	Tota	1	Tamp	Conductivity	Turbidity	000		Depth to		
Time	Purge	ed pH	(C)	(mmhos/cm)	(NTUs)	(mV)	(mg/L)	Water	Obs.	
(24 111)	(yais	6.91	15.57	1,466	167	-39.9	0.45	23,23		
	.		<u>່</u>	28				L		
FINAL DI	EPTH TO V	VATER (#TC): <u> </u>		TIME FINAL DE		[[(\$0			
SAMPLE	ID: AH	- 8A	· · · · ·	SAMPLE	ID FOR QC:	Nup-1				
PARAME	ETERS REC	QUESTED FO	OR ANALYS	SIS: <u>RSb</u> ,	Hs, Ba, Be, C	id, Cr, Lo, F	- Pb, Li, J	1, Mo, Se, 7	h, d Ra	
FERROL	JS IRON (m	ig/L):		IDW TO	TAL: <u>う.</u> え	<u>.</u>				
METER	MODEL No	: YSI 55	6 mps							
CHECKE	ED FLOW T	HROUGH CE	ELL FOR LE	EAKS: K C	OMMENTS:	NA				
•				(
		Такаг-		•				ר <i>ו</i> א ידי ריי		
		NAME	1	S A	IGNATURE			DATE	, ·	
PREPAR	ED:	Jonathen	. Huma	rst fu	TIM Her	MAN		8-18		
REVIEW	ED:							i		

	PID READING at WELL HEAD (ppm):										
DATE: _	1-9-18	\$	511E: ィタフ	<u>_k(8PU</u> 7		PID READING	at WELL HE	ייי (ppm): ייי		·	
PROJEC	T NUMBER	R:		V	VEATHER:	Yos, Smph	w, pacti-	(loun)	·		
WELL N	UMBER			٦	Ē	DEPTH TO WAT	ER (ft): <u>22</u> .	65			
M	J-10					5()			2	4 .	
PURGIN	G			10	IAL DEPTH (rt):			es):		
CASING	VOLUME	CALCUL	ATIO	N: ft	of water X in casing	gallons/ = foot	total gallon	s/casing vol	lume		
Equipme	ent Used: _B	edicated	l Blad	der Bump	Nondedicat	ed Bladder Pump	o Bailer O	ther		_	
Time (24 hr)	Amount Purged (gals)	Flow F (ml/m	Rate iin)	рН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	
1150	I I	400		6.62	14.22	1.126	96.9	28.4	4.64	22.65	
1(55	0.53	600		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	+6.49.15	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	5 2.67 400 6.41 14.56 1.128 6-0743.21 7.01 0.41 22.65										
12.20	3,21	400		6.40 14.55 1.130 4.43 6.7 0.35							
1225	3,74	460	6.41 14.52 1.130 3.75 7.0 0.32 22.								
				C	 ontinued on ba	ack (circle one) y	/es / no				
<u>SAMPLII</u>	SAMPLING Equipment Used: Same as above Other										
Sample Time (24 hr)	Tota Purge (gals	al ed 3)	рН	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 D	EPTH TO V	WATER	(ft TO	c): 20.0	25	TIME FINAL DI	EPTH TAKEN	1230	>		
SAMPLE	ID: <u>mu</u>	.10			SAMPLE	ID FOR QC:					
PARAMI	ETERS REG	QUESTE	D FC	R ANALY	SIS: <u>Sb,As</u>	, Bn, Bc, Cu,	Cr. to, F.	16, 01, 119	, mo, Se, T	h, Ra	
FERROL	JS IRON (n	ng/L):			IDW TO	DTAL: <u>5.74</u>					
METER	MODEL No	.: YSI	55	6 MPS							
CHECKE	ED FLOW T	THROUG	SH CE	LL FOR L	EAKS: 🕅 C	OMMENTS:	JA				
•••••	,- · · ·						· · · ·				
		NAM	ME		CO T	IGNATURE	The second secon		DATE		
PREPAF	RED: J	anth	n fl	genuso	- Apr	Hun Omm	en X	3.8	1.13		
REVIEW	/ED:				V						

DATE [,] 6.	DATE: 6-4-18 SITE: CCR BPU PID READING at WELL HEAD (ppm): NA									
	PROJECT NUMBER 88777 WEATHER 83°F PARTUY CLOUDS A AUM									
PROJEC		R: <u>88777</u> N	VEATHER:			C(0/13-1	CAU			
WELL	NUMB	ER: MU	-2A							
									2 4	
DEPTH	FO WATER	(ft): <u>(9, 9</u>	<u>*</u> TO	TAL DEPTH (fl): 31.68	WELL DI	AMETER (ir	nches):		
DEPTH 1		PUMP (ft):	<u>~</u>	DEPTH T	O TOP OF YSI (ft):	_ (for downh	ole DO mea	surement)	
PURGIN	<u>G</u>									
CASING	VOLUME (CALCULATIC	N: 1	ft of water in ca	asing X ga	allons/foot =	to	tal gallons/ca	asing volume	
Equipme	nt Used: '₯	PDedicated B	ladder Pun	np 🛛 Nonded	icated Bladder F	Pump 🛛 Bai	ler 🛛 Other	.		
Time	Amount	Flow Rate		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to	
(24 hr)	(gals)	(ml/min)	рн	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	
1170	I	500	6:72	14.91	A 891	35	18.3	3.12	19.95	
1135	७,५	506	6.79	14.82	852	7.5	12.2	2.43	19.95	
1140	1.2	<i>ऽरु</i> ८	6-79	14.83	846	6-1	311	2.98	19.95	
1145	1.0	500	680	14.79	\$843	5.2	-2.5	2.01	19.95	
1120	2.4	500	6.61	14.86	842	4.7	1.6	1.96	19.85	
			-							
			Cc	ntinued on ba	ck (circle one) y	es /(nd·)			1	
		Equipmo	ntilood: F	71 Sama as ab						
SAMPLIN	<u>vG</u>	Equipme	ni Usea. ၉							
Sample	Tota		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to	Oha	
(24 hr)	(gals	α ρη)	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	Obs.	
1155	2.4	6.81	14.35	842	4.7	1.6	1,96	19.95	•••••	
Ferrous I	ron (ma/l.).	NA	-							
							1705			
FINAL DI		$\mathbf{v} = \mathbf{r} (\mathbf{n} + 0)$	(): <u>[[[</u>]]		TIME FINAL DE					
SAMPLE	ID:	1W-LH / (, <u>ل)</u>	SAMPLE I	D FOR QC:	P4				
PARAME	TERS REC	DUESTED FC	R ANALYS	SIS: <u>Total 2</u> N. Lithun	ADIUM 226/2 MolyBunum	228, Chlon	NE, 5/0.04	LIDE, SULF	ATES	
IDW TOTAL: 2.4 grz Water Quality Instrument Model Number: 451 556 MPS										
			,	CI						
PREDAR		entr Scho	th	<u>5</u>		7		(-4-10)		
		nathon	Horman	, HIN				11-10		
KEVIEW	ED: <u>V</u> C		ILC: mourse	<u> </u>	m Hormen		0^	114.10		
				V						

and the second standards	an a	and a state of the second s		gyn hardonaeth Childen II - Ming naint Nediga	na series and a series of the ser	n yr ei arthologid ol gry i rygga		and the second		
DATE: <u>6</u>	DATE: <u>6-4-18</u> SITE: <u>CCR BPU</u> PID READING at WELL HEAD (ppm): <u>NA</u>									
PROJEC	CT NUMBE	R: <u>88777</u> V	VEATHER:	80°F, P,	anter dara	m, carm				
WELL	NUMB	ER: MW	-3							
DEPTH	TO WATER	t (ft):b	<u>ь</u> то-	ΓAL DEPTH (ft): 33.90	WELL DI	AMETER (in	iches):	("	
ПЕРТН.			_			(ff).	(for downh	ole DO mea	surement)	
		1 Olwin (119							Surementy	
CASING			N· 1	t of water in ca	asina X a	allons/foot =	tot	tal gallons/c:	asing volume	
Equipme	ent Used: 17	Í Dedicated B	ladder Pun	np 🗆 Nonded	icated Bladder F	Pump 🗆 Bail	er □ Other		aoing volume	
	Amount						1	1	Depth to	
Time (24 hr)	Purged (gals)	Flow Rate (ml/min)	pН	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Water (ft TOC)	
1045	I	JV	7.13	15:03	1156	6.6	5.7	4.31	22.63	
1050	Oib	SOG	7.18	15.01	1149	1.3	-2.6	3,00	22.62	
1205	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	
ILOS	2.4	500	7,18	189.193	1150	2.1	-28,1	2.81	22.42	
							6 9 			
							······			
				2						
				,						
			Co	ntinued on ba	ck (circle one) y	res /(no')				
<u>SAMPLII</u>	NG	Equipme	nt Used: 🗶	Same as abo	ove 🛛 Other		· · · ·			
Sample	Tota		Tanan	Conductivity	Turbidity		DO	Depth to		
Time (24 hr)	Purge (gals	ed pH	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	Water (ft TOC)	Obs.	
lug	24	7.18	14.13	1150	2.1	-28.1	2.81	22.62	<u> </u>	
Ferrous	Iron (mg/L):									
FINAL D	ЕРТН ТО V	VATER (ft TO	c): <u>22</u>	.62	TIME FINAL DE	EPTH TAKEN	:)		
SAMPLE	EID: Mh	-3/6W		SAMPLE	D FOR QC:					
PARAME	ETERS REC	QUESTED FC	R ANALYS	SIS: <u><u>LA 226</u> 1. 1. thurn</u>	1728, Chlon Baron	AL, FLUDAUS	A, SULFA	ies, ph.		
IDW TO	TAL: 2.9	Water (Quality Inst	rument Model	Number: Y	51 556	MPI			
		NAME		<u>SI</u>	GNATURE	-		DATE		
PREPAF	RED:	th Soluth			AV_	U		6-4-18		
REVIEW	/ED: /	un fler	~~ <u>~</u>	Jonat 1	ren Hermuns	~	6-	11-18		
	ľ			KT						

DATE: <u>6</u>	DATE: <u>6-4-18</u> SITE: <u>CCR BPU</u> PID READING at WELL HEAD (ppm): <u>NA</u>										
PROJEC	T NUMBER	R: <u>88777</u> V	VEATHER:	81	°F, MOSTL	1 CLOUDY	CACM				
WELL	NUMB	ER: MW	-4								
DEPTH	TO WATER	(ft): 19.3L	. TOT	TAL DEPTH (f	t): 31.86	WELL DI	AMETER (in	ches):			
DEPTH -		· PUMP (ff)·		DEPTH T	O TOP OF YSL(ft)· NA	(for downho	ole DO meas	surement)		
PURGIN	G	. enn (ny				<u> </u>			aromony		
CASING	 VOLUME (CALCULATIO	N: f	t of water in c	asing X ga	allons/foot = _	tot	al gallons/ca	sing volume		
Equipme	nt Used: 😰	Dedicated B	ladder Pum	np □ Nonded	licated Bladder F	ump □ Bail	er 🛛 Other				
Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pН	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)		
6945	I	500	6.92	13.15	1127	S.2	221	2.73	19.76		
0950	Orb	526	6.95	13.62	1077	4.7	-9,6	1.62	19.36		
0955	12	520	6.94	17.41	1075	4.3	- 13.1	1.59	19.36		
1000	1.0	500	6.94	13.47	10 11	3.2	-14-3	1.26	19.36		
1005											
								· · ·			
				· · ·							
			Co	ntinued on ba	ck (circle one) v						
SAMPLIN	<u>1G</u>	Equipmer	nt Used:	Same as abo	ove □ Other						
Sample	Tota		Tomp	Conductivity	Turbiditu		DO	Depth to			
Time (24 hr)	Purge	ed pH	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	Water	Obs.		
1005	1.8	6.94	13.47	1071	3.2	-14.3	1.56	19-36			
Ferrous I	ron (ma/l).	NA									
FINAL DI	EPTH TO V	VATER (ft TO	C): 1 Ŷ.	16	TIME FINAL DE	PTH TAKEN	1035				
SAMPLE	ID: Mu	-41000		SAMPLE	ID FOR QC:	Ms/Ms	> allat	nd			
PARAMETERS REQUESTED FOR ANALYSIS: Toll & 226/228 Chbrok Flourine, Sulfamer, 105											
וסא <u>י</u> IDW TOT	AL: 1.8	Water 0	Quality Instr	ument Model	Number: YS	1 556 m	1 PJ				
	····· <u> </u>			Q				ΠΔΤΕ			
PREPAR	ED: K	the Schutte		<u>.</u>	1/1/			6-4-18			
	ED: JAA	athen Hora	nansor	- Al	lun Hinnon,	 \	L.d.	-18			
	REVIEWED: Jorothum Hermanson - Multum Humann - 6.11-18										

a the second sec											
DATE: <u>6-</u>	DATE: <u>6-4-18</u> SITE: <u>CCR BPU</u> PID READING at WELL HEAD (ppm): <u>NA</u>										
PROJEC		R: <u>88777</u> \	VEATHER:	70°F	, Mostor C	Lospy 12	ALM	·			
WELL	NUMB	ER: MW	'-8A		•						
		(ft): 73. VL			A. 35-19		AMETED (in	(hos) ; 2^{h}	,		
			10					ches)			
DEPTH	IO IOP OF	PUMP (ft):		DEPTHT	O TOP OF YSI (ft): <u>09</u>	_ (for downho	ole DO meas	surement)		
PURGIN	<u>G</u>										
CASING	VOLUME		N: 1	ft of water in ca	asing X ga	allons/foot =	tot	al gallons/ca	sing volume		
Equipme	nt Used: 🗡	CDedicated B	ladder Pun	np 🗆 Nonded	icated Bladder F	Pump □ Bail	ler D Other				
Time	Amount	Flow Rate		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to		
(24 hr)	(aals)	(ml/min)	рп	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)		
0735	I	580	7001	13.15	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	73.1%		
6750	1.0	560	6.84	1341	1285	18	- 14.1	0.51.	23.19		
୦୮ୢଽଽ	214	500	6.83	13.31	1283	12	-14.5	6,23	23.18		
080) 3.0 500 6.84 13.28 1282 9.2 -14.6 0.23 23.18 No.(71 500 6.84 13.28 1282 9.2 -14.6 0.23 23.18											
0805 36 500 6.84 13.31 7282 7.4 J.M.9 0.22 23,18 0812 47 500 6.84 12.01 1281 47 11.3 6.70 72.16											
0810	4.2	500	6.86	13.01	1281	4.7	-14.3	0.20	23,15		
			-								
			Cc	ntinued on ba	ck (circle one) v	es / no			<u> </u>		
SAMPLIN	JG	Equipme	nt Used: D] Same as ab	ove □ Other				<u></u>		
	<u> </u>						· · · · ·	m			
Sample	Purge	d nH	Temp	Conductivity	Turbidity	ORP	D.O.	Depth to Water	Obs		
(24 hŗ)	(gals)	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	003.		
0815	4.2	6.85	13,01	1281	4.7	- 14.3	6.22	23.18			
Ferrous I	ron (mg/L):	NA									
FINAL DI	EPTH TO V	VATER (ft TC	C): <u>23 (</u>	9	TIME FINAL DE	EPTH TAKEN	: 0835				
SAMPLE	10: MW	-8A/6W		SAMPLE	ID FOR QC: ᠫ	007-1/60	J				
PARAME ୧୯୮,	PARAMETERS REQUESTED FOR ANALYSIS: <u>LA 226/228</u> Chloripe, flevenore, surface, 10)										
IDW TOT	IDW TOTAL: 4.2 Water Quality Instrument Model Number: 451 556 m PS										
				Q	GNATURE			DATE			
PREDAD	ED.	Katha 5	Eh. H.	<u>.</u>	MC		1	- 4-18			
	1		- 10 101				- <u> </u>	. 150			
REVIEW	ED: <u> </u>	nathon the	Marson	JuN	m ferrom	<u> </u>	6-11	-19			
				V							

DATE: <u>6-</u>	DATE: <u>6-4-18</u> SITE: <u>CCR BPU</u> PID READING at WELL HEAD (ppm): <u>NA</u>									
PROJEC	PROJECT NUMBER: <u>88777</u> WEATHER: <u>75°F</u> , Cloudy, Comm									
WELL	NUMBI	ER: M//	- 10						1	
DEPTH T	TO WATER	(ft): <u>17.5</u>	<u>3</u> тот	ſAL DEPTH (f	t): <u>29.64</u>	WELL DI	AMETER (in	ches):	£1	
DEPTH T		PUMP (ft):		DEPTH T	O TOP OF YSI (ft):	_ (for downho	ole DO meas	surement)	
PURGIN	G									
CASING	VOLUME (DN: f	t of water in ca	asing X ga	allons/foot = _	tot	al gallons/ca	ising volume	
Equipme	nt Used: 🎾	Dedicated E	Bladder Pum	np 🗆 Nonded	licated Bladder F	Pump □ Bail	er 🛛 Other			
Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pН	Temp (C)	Conductivity (mS/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	
6848	I	800	6,67	13.71	1286	87	21.2	0,52	17.03	
0850	4.0	500	6.61	13.63	1241	43	4.7	0.31	17.53	
0900	67	500	6.61	12.86	1238	34	-12.6	0,34	17.53	
- 100	1.8	560	6.61	13:53	1221		-15.1	A 17	17.53	
0901	20	500	6161	15.06	1226	/ 3	- 1870 15.G	617	14.5)	
0110	36	506	6.41	13.54	1203	62	-15.76	0.17	103	
0920	42	sOl	6.00	13 48	1122	8'. 1 414	-15,7	00	(2,17) (2,57)	
	., v		0.61	10.10	10 3	9,9	10.7			
			- -							
			Co	ntinued on ba	ck (circle one) y					
<u>SAMPLIN</u>	<u>IG</u>	Equipme	ent Used: 🎝	௴Same as ab	ove D Other				_	
Sample	Tota		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to		
(24 hr)	Purge (gals	ed pH	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	Obs.	
0925	<u> </u>	6.61	13.48	1223	Ч. Ч	-15.7-	0.17	17.53	-	
Ferrous I	ron (mg/L):	NA	/	、		<u> </u>	L			
FINAL DE	ΞΡΤΗ ΤΟ Μ	VATER (ft TC	DC): 17	,57	TIME FINAL DE	EPTH TAKEN	: 0935	5	· .	
SAMPLE	ID: <u>M</u>	1-10/6M	/	SAMPLE	ID FOR QC:					
PARAMETERS REQUESTED FOR ANALYSIS: Total Da 226/220, chlordy, florande, Suffies, 705										
IDW TOT	AL: 4.7	Water	Quality Instr	ument Model	Number: <u> 4</u> 51	556 MF	シ			
		NAME		S	IGNATURF			DATE		
PREPAR	ED: K	eith S.L.	sthe	<u> </u>	P		6	-4-18		
	$ED \cdot \frac{1}{1}$	Alarn Un.	AA GA ING A A		no llann	\sim	- <u> </u>	11-18		
	REVIEWED: Jonathin Hemanson John Herman 6-11-13									

DATE: _	10.3.18	SITE	: KIBPN	- Neneman	PID READING	G at WELL HE	EAD (ppm):		 Transformus grantes for your februar intelligent
PROJEC		R: <u>8877</u>	7 V	VEATHER:	70, 5.20 ,	nghs, p.	ally clou	<u>dy</u>	·
WELL N	UMBER			· ,		ED (#). 14	.a.c		
D.A.	1.20			L	JEPTH TO WAT	ER (II).	<u> </u>		
IV\	ll ^j dA		то	TAL DEPTH (ft): <u>31.67</u>	WELL DIAM	ETER (inch	es):	·
PURGIN	IG							•	
CASING	VOLUME	CALCULATIO	DN:ft	of water X	gallons/ = foot	total gallor	ns/casing vo	lume	
Equipme	ent Used: D	edicated Bla	dder Pump	Nondedicat	ed Bladder Pumi	o Bailer (Other		
	Amount			1					
Time (24 hr)	Purged (gals)	Flow Rate (ml/min)	pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Water (ft TOC)
5930	I	300	6.46	15.43	6.924	7.21	36.3	0.91	14.26
0135	0.40	300	6.77	14.74	0.912	4.67	32.6	0.26	14.26
0440	0.80	300	6.79	14.68	0.908	4.02	27.0	0.15	1426
0945	1.20	300	6.80	14.58	0.906	3.46	21.5	0.07	14.26
		· · · ·				· · · · · ·		•	
		^	Co	ontinued on ba	ack (circle one) y	res (no)			
SAMPLI	NG	Equipme	ent Used: &	Same as abov	re, Other		· · · · · · · · · · · · · · · · · · ·		
Sample Time (24 hr)	Tota Purge (gals	l ed pH	Temp (C)	Conductivity (mmhos/cm	y Turbidity) (NTUs)	.ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
950	1.20	6.90	14.58	0.906	3.46	21.5	0.07	14.26	
FINAL D	EPTH TO V	VATER (ft TO	DC): 014	.26	TIME FINAL DI		1: 095	5	
SAMPLE	EID: Mh	1-2A		SAMPLE	ID FOR QC:		· ·	· · · ·	
PARAMI	ETERS REC	QUESTED FO	OR ANALY	SIS: Meta	15, Chloside, F.	lowide, TD	S, t Radin	m	
FERROL	JS IRON (m	ng/L):	4	IDW TO	DTAL: 1.70	gal			
METER	MODEL No	.: YSI 556	MPS		· .	0			
CHECKE			ELL FOR LI	FAKS 17 O	OMMENTS ()	IA			
	-0 1 L (V V I			_,		1 [*] ³			
				, ,				ኮ ለ ተ ም	
	1		Leas	. /~	AGINATURE	44.44	10		
PREPAF	RED:0	nathan	runnas	on for	num Itam	www	10,0	>.18	
REVIEW	/ED:			V					

ATL: IVEATION: OTE: Destar particle FID REPORTS diverting of WELL TRAD (pptil). PROJECT NUMBER: $g8737$ WEATHER: $g60_{2}$, g_{2} , g_{2		10.7 10	רודד	11901.	- NIAGLARIA A			AD (nom).		
HOUSET NUMBER: UDU 111 WEATHER: UDU 700 UDU 110 Mevi-3 DEPTH TO WATER (ft): $12, 19$ Mevi-3 TOTAL DEPTH (ft): $34, 01$ Well DIAMETER (inches): 21 Addition ft of water X gallons/ = total gallons/casing volume in casing foot foot foot Sample digits Flow Rate pH Temp Conductivity Turbidity ORP 0.0. Weath to Column 24 hr) Gigits flow Rate pH Temp Conductivity Turbidity ORP 0.0. Weath to Column 215 0:40 300 6:67 14:90 1.241 3:42 33:4 1:415 1:7:19 0:60 0:50 300 6:67 14:02 1:252 2:36 0:142 1:7:19 0:60 0:50 300 6:67 14:02 1:242 2:40 5:8 0:142 17:14 1:50 1:40 3:50 0:46 14:19 1:242 2:40 5:8 0:142 17:14 1:50 <t< td=""><td>DATE:</td><td>10.2.0</td><td><u>. </u></td><td></td><td>VEATUED /</td><td>PID READING</td><td></td><td>- (ppm);</td><td></td><td></td></t<>	DATE:	10.2.0	<u>. </u>		VEATUED /	PID READING		- (ppm);		
VELL NUMBER DEPTH TO WATER (f): $12, 12$ MrN - 3 TOTAL DEPTH (f): 34.01 WELL DIAMETER (inches): 24 URGING TOTAL DEPTH (f): 34.01 WELL DIAMETER (inches): 24 CASING VOLUME CALCULATION:f of water Xgallons/ =total gallons/casing volume in casing foot total gallons/casing volume in casing foot Casing foot Mount Pump Pump Nondedicated Bladder Pump Bailer Other	PROJEC	TNUMBER	2: 00714	× V	VEATHER:	109, Smphw,	overcast			
Mrvi - 3 TOTAL DEPTH (ft): 34.01 WELL DIAMETER (inches): $2/$ PURGING TOTAL DEPTH (ft): 34.01 WELL DIAMETER (inches): $2/$ CASING VOLUME CALCULATION:ft of water Xgallons/ =total gallons/casing volume in casing foot total gallons/casing volume in casing foot Siguipment Used: Dedicated Bladder Pamp Nondedicated Bladder Pump Bailer Other	WELL N	UMBER			Ď	EPTH TO WATE	ER (ft): いつ	101		
TOTAL DEPTH (ft): 34.91 WELL DIAMETER (inches): 24 TOTAL DEPTH (ft): 34.91 WELL DIAMETER (inches): 24 DURGING AASING VOLUME CALCULATION:ft of water Xgallons/ =total gallons/casing volume in casing foot Guipment Used: Dedicated Bladder Pump Bailer Other	M	w-3		,						, •
Outcome Continued AASING VOLUME CALCULATION:f to for water Xgallons/ =total gallons/casing volume in casing foot Conductivity for the period of the per				То	TAL DEPTH (f	t): <u>39.01</u>	WELL DIAM	ETER (inche	es):	-
ASING VOLUME CALCULATION:	PURGIN	G		,		• .		•	,	
Equipment Used Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other Time (24 hr) Flow Rate (mg/h) pH Temp (C) Conductivity (mmhos/cm) Turbidity (NTUs) ORP (my/h) D.O. (mg/h) Depth to Water (ft TOC) 010 $\overline{3} \circ \overline{v}$ 6.641 141.4p 1.241 3.42 93.4 1.455 73.19 010 $\overline{3} \circ \overline{v}$ 6.641 141.4p 1.256 3.05 64.5 17.19 010 $\overline{3} \circ \overline{v}$ 6.641 141.4p 1.256 3.05 64.5 17.19 010 $\overline{3} \circ \overline{v}$ 6.67 $141.7C$ 1.2552 2.746 51.7 0.37 17.19 020 6.667 141.97 1.2452 2.40 55.8 6.19 17.19 0350 1.66 5.66 6.66 141.29 1.245 2.40 55.8 6.19 17.14 Continued on back (circle one) yes / 100 Total Time function pH Temp (C) Conductivity (mmhos/cm) $0RP$ $D.$	CASING	VOLUME	CALCULATIC	DN:f	t of water X in casing	gallons/ = foot	total gallor	s/casing vol	ume	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Equipme	nt Used: D	edicated Bla	dder Pump	Nondedicate	ed Bladder Pump	Bailer C	other		_
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	рН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1010	Ţ	300	6.64	14.90	1.291	3.92	83.9	1.45	17.19
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1015	0,00	300	6.70	14.70	1.256	3.05	64.5	0.70	17.19
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1090	0-30	300	6.67	14.07	1.252	2.76	51.7	0.37	17.19
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1030	1.20	300	6.66	14.19	1.247	2.64	53,0	0.22	17.19
Continued on back (circle one) yes / tO Sample Total Purged pH Temp Conductivity Turbidity ORP D.O. Depth to Sample Total pH Temp Conductivity Turbidity ORP D.O. Depth to Sample Total pH Temp Conductivity Turbidity ORP D.O. Mater (24 hr) (gals) pH Temp Conductivity Turbidity ORP D.O. Mater Obs. (335 [.60 G.66 I4.34 I.3445 Z.40 S3.8 O.19 I3.19 Temp INAL DEPTH TO WATER (ft TOC): 1 3.191 TIME FINAL DEPTH TAKEN: I0 35 Amater Intervalue Intervalue	1050	1.60	300	6.66	14.24	1.245	2.40	53.8	6.19	17.19
Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Continued on back (circle one) yes / $x \odot$ Sample Total Purged PH Temp Conductivity Turbidity ORP D.O. Depth to Sample Total PH Temp Conductivity Turbidity ORP D.O. Depth to (24 hr) (gals) PH Temp Conductivity Turbidity ORP D.O. Depth to Obs. (335 1.60 6.66 14.34 1.345 2.40 53.8 0.19 13.19							,		<u>'</u>	
Continued on back (circle one) yes / no Sample Total Purged pH Temp Conductivity Turbidity ORP D.O. Depth to Sample Total pH Temp Conductivity Turbidity ORP D.O. Mater (24 hr) (gals) pH Temp Conductivity Turbidity ORP D.O. Mether (24 hr) (gals) 6.66 14.344 1.3445 2.40 53.8 0.19 17.19 INAL DEPTH TO WATER (ft TOC): 1 7.19 TIME FINAL DEPTH TAKEN: 10 35 AMPLE ID: Mclass, flags, flags	i									
Continued on back (circle one) yes / nO Continued on back (circle one) yes / nO Equipment Used: Same as above Other Sample Total Purged pH Temp Conductivity Turbidity ORP D.O. Depth to Sample Total pH Temp Conductivity Turbidity ORP D.O. Water Obs. (24 hr) (gals) pH Temp Conductivity Turbidity ORP D.O. Water Obs. (24 hr) (gals) pH Temp Conductivity Turbidity ORP D.O. Water Obs. (24 hr) (gals) pH Temp Conductivity Turbidity ORP D.O. Water Obs. (24 hr) (gals) pH 1.94 1.94 2.40 S3.8 0.19 17.19 TIME FINAL DEPTH TAKEN: 10.35 MAPLE ID: M&-3 SAMPLE ID FOR QC:			<u></u>			·				
AMPLING Equipment Used: Same as above Other Sample Total pH Temp Conductivity Turbidity ORP D.O. Depth to Yater (gals) pH Temp Conductivity Turbidity ORP D.O. Water Obs. (24 hr) (gals) pH (C) (mmhos/cm) (NTUs) (mV) (mg/L) (ft TOC) (355 1.60 6.66 14.34 1.345 3.40 53.8 0.19 13.19 INAL DEPTH TO WATER (ft TOC): 13.191 TIME FINAL DEPTH TAKEN: 10.35 AMPLE ID: $M \omega$ -3 SAMPLE ID FOR QC: ARAMETERS REQUESTED FOR ANALYSIS: $Mela(s, Ghlos; h, Flow; $		I	. ·	C	 ontinued on ba	ck (circle one) y	es / 100>			
Sample Time (24 hr)Total Purged (gals)pHTemp (C)Conductivity (mmhos/cm)Turbidity (NTUs)ORP (mV)D.O. (mg/L)Depth to Water (ft TOC) 035 1.60 6.66 14.34 1.345 2.40 53.8 0.19 17.19 $ 035$ 1.60 6.66 14.34 1.345 2.40 53.8 0.19 17.19 $-$ INAL DEPTH TO WATER (ft TOC): 17.191 TIME FINAL DEPTH TAKEN: 10.35 CAMPLE ID: $MW-3$ SAMPLE ID FOR QC: $-$ PARAMETERS REQUESTED FOR ANALYSIS: $Metals, Chloride, Flow:ChlIDW TOTAL:1.60 gal$	<u>SAMPLIN</u>	<u>1G</u>	Equipme	nt Used:	Same as above	Other	······································	······································	· · · · · · · · · · · · · · · · · · ·	· · · · · ·
Time (24 hr)Purged (gals)pHTemp (C)Conductivity (mmhos/cm)Turbitity (NTUs)Other (mV)D.O. (mg/L)Water (ft TOC)Obs.0351.60 6.66 14.24 1.345 2.40 53.8 0.19 17.19 $-$ 0351.60 6.66 14.24 1.345 2.40 53.8 0.19 17.19 $-$ INAL DEPTH TO WATER (ft TOC): 17.19 TIME FINAL DEPTH TAKEN: 1035 AMPLE ID: MW-3MW-3SAMPLE ID FOR QC: Matale, the date, the formation of the date, the	Sample	Total		Tomp	Conductivity	Turbidity	ORP		Depth to	
035 1.60 6.66 14.24 1.345 2.40 53.8 0.19 17.19	Time (24 hr)	Purge (gals)	d pH)	(C)	(mmhos/cm)	(NTUs)	(mV)	(mg/L)	Water (ft TOC)	Obs.
INAL DEPTH TO WATER (ft TOC): 17.191 TIME FINAL DEPTH TAKEN: 1035 CAMPLE ID: MW-3 SAMPLE ID FOR QC:	1035	1.60	6.66	14.24	1.245	2.40	53.8	0.19	17.19	
AMPLE ID: <u>MW-3</u> SAMPLE ID FOR QC: ARAMETERS REQUESTED FOR ANALYSIS: <u>Metals</u> , <u>Chloride</u> , <u>Floreide</u> , ERROUS IRON (mg/L): IDW TOTAL: <u>1.60 gal</u>	FINAL DI		VATER (ft TC): 17	101	TIME FINAL DE	EPTH TAKEN	: 103	5	
ERROUS IRON (mg/L): IDW TOTAL: I.60 gal	SAMPLE	ID: <u>MW</u>	-3		SAMPLE	ID FOR QC:	-	•		
ERROUS IRON (mg/L): IDW TOTAL: I.60 gal	PARAME	TERS REC	UESTED FO	OR ANALY	SIS: Metals,	Chloride, Flor	neite,			
	FERROL	IS IRON (m	g/L):		IDW TO	TAL: 1.6	0 gal			
IETER MODEL No .: YSI MPS 556	METER I	MODEL No.	:YSI MPS	556			U			
HECKED FLOW THROUGH CELL FOR LEAKS: $\sqrt{1}$ COMMENTS: $\sqrt{1/4}$	CHECKE		HROUGH CI	ELL FOR L	EAKS: KT CO	omments:///	1A			
						·······	<u> </u>			
NAME SIGNATURE DATE			NAME		SI	GNATURE			DATE	
REPARED: Justine Human Attim Herman 10.2.19	PREPAR	ED: Jon	athen Hein	10051-0	Anthe	n Heuman		10.1	2.13	
ILLI AILED	REVIEW	ED:								
TELANED,	REVIEW	ED:			/				-	

DATE:	10.2.18	SITE	KCBPU	- Vencman	PID READING	i at WELL HE	AD (ppm):					
PROJEC	T NUMBEI	R: 8877	7 V	VEATHER:	705 5-10	W, pactly	(lond)					
WELL N	JMBER				1	1. 0	, -					
		·		D	EPTH TO WATE	ER (ft):	13,90	>				
M	W-by				u. 21 m			21				
<u>PURGIN</u>	G		10	TAL DEPTH (f	(): <u> </u>		EIER (Inche	es):	 -			
CASING	VOLUME	CALCULATIC	DN: ft	of water X in casing	gallons/ = foot	total gallor	ns/casing vo	lume				
Equipme	nt Used: D	edicated Blad	dder Pump	Nondedicate	d Bladder Pump	o Bailer C	Other					
Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	рН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)			
1055	055 I 300 6.74 15.28 1.126 2.36 116.1 1.60 13.90											
1100 6.40 300 6.73 14.37 1.070 1.19 116.2 0.48 13.90												
1105	103 0.90 300 6.78 14.30 1.038 1.24 113.6 0.23 13.90											
((10	1.20	300	6.79	14.26	1.023	1.03	1841.3	0.17	13.90			
1115	1.60	300	6.80	14.27	1.020	1.13	95.8	0.15	13.90			
					· .							
			Cc	ntinued on ba	ck (circle one) y	es / no						
SAMPLIN	<u>1G</u>	Equipme	nt Used:_8	Same as above	Other							
Sample Time (24 hr)	Tota Purge (gals	ll ed pH s)	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	.OŘP (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	4048846 4			
FINAL DE		VATER (ft TC	DC): 13	3.90	TIME FINAL DE	EPTH TAKEN	1: 112	0				
SAMPLE	ID:	J_4		SAMPLE	ID FOR QC:	پریستریکوریونونونونونونونونونونونونونونونونونونو						
PARAME	TERS REC	QUESTED FO	DR ANALYS	sis: <u>Metals</u>	Chlocide Flue	ride, Rada	m TDS					
FERROU	IS IRON (m	ng/L):	**************************************	IDW TO	TAL: 1.60 0	jal						
METER N	MODEL No	:: YS I 556	MPS									
CHECKE	D FLOW T	HROUGH CI	ELL FOR LI	Eaks: 🕅 Co		JIA						
				السير	<u></u>							
		NI A N A		0								
1 the last 1 the last 10 have												
PREPAR	ED:0	latinan t	Ucmanio	- pul	m t'ann	<u> </u>		·a.18				
REVIEW	ED:			<i>V</i>		<u></u>		· · · · · · · · · · · · · · · · · · ·				

here find the second second										
DATE:	10.3.18		SITE:	KLBPU	- Neurman	PID READING	at WELL HE	EAD (ppm):		
PROJEC		२: _८	38777	N	/EATHER:	705, 5-20,	nph,			
WELL N	UMBER				, D			Le	· .	
					Ų	EPTH TO WATE	=R (π): <u>1</u>			
Mr	J-8A					H. 26 JA 1		ETED (inche	\sim	1
PURGIN	G			10	IAL DEPTH (I	1). <u></u>				
CASING	VOLUME	CALC	ULATIO	N: ft	of water X in casing	gallons/ = foot	total gallor	ns/casing vol	ume	
Equipme	nt Used: D	edica	ated Blac	lder Pump	> Nondedicate	ed Bladder Pump	Bailer C	Other		
Time (24 hr)	Amount Purged (gals)	Flo [.] (m	w Rate Il/min)	рН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
0735	I	30	0	6.33	15.49	1.240	48.6	58.0	0.54	17.45
6740	0,40	30	0	6.78	14.91	1.237	25.4	5.0	0:30	17.45
0745	0.80	30	50	6.84	14.83	1-240	20.6	-25.0	0.36	17.45
0750	1.20	30	0	6.85	14.90	1.245	12.2	-46.5	0.34	17.45
6755	1.60	30	20	6.85	14,80	1.246	9.28	- 59.6	0.19	17.45
0800	2.10	30	0	6.85	14.77	1.247	7.46	-60.4	0.16	17.45
0805	2.40	3	00	6.86	14.80	1,247	4.22	-61.6	6,14	17.15
					· · · · · · · · · · · · · · · · · · ·	·				
				Cc	ntinued on ba	ck (circle one) y	es / 10	<u>.</u>		
SAMPLIN	NG	E	Equipmer	nt Used: S	ame as above	S Other				
Sample Time (24 hr)	Tota Purge (gals	l ed)	рН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
08.0	2.41	<u> </u>	6.86	14.80	1.2117	61.22	-61.6	0.14	17.45	
FINAL D	EPTH TO V	VATE	er (ft to	C):	1.45	TIME FINAL DE		l:		
SAMPLE	ID: MN	1- BG	+		SAMPLE		nw-821m	stmm.	8x/msD	
PARAME	ETERS REC	QUES	TED FC	R ANALYS	SIS: Mitule	North F	lowity T	DS, + Ra	diam	•
FERROL	JS IRON (m	ia/L):	بستین		IDW TO	таL: 2.40	921	Ŷ		
METED		. γς	1556	M DC			9			
			<u> </u>				$h \wedge$			
CHECKE	D FLOW T	нко	UGH CE	LL FOR LE	-AKS: [X] CO	JIMIVIENTS: //				
		<u>1</u>	NAME		SI	GNATURE		•	DATE	
PREPARED: Jonathan Hermann Julin Hamon 10.3.18										
REVIEW	ED:									
	· · · · ·					5 <u>,</u>				

DATE:	10.7.1g	·	SITE:	KCBPU	- Neuron o	PID READING	at WELL HE	AD (ppm): _			
PROJEC		R:	8777	N	/EATHER:	705, 5.201	iph S, pas	thy cloud	<u> </u>		
WELL N	JMBER							0			
				· ·	D	EPTH TO WATI	ER (ft): <u>)</u>			x	
MI	N-10					900			2	-	
PURGIN	G			TO	ГАL DEPTH (ft	:): 201.00	WELL DIAM	ETER (inche	es):		
CASING	- Volume (CALCU	ILATIO	N:ft	of water X	gallons/ =	total gallor	ns/casing vol	ume		
Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other											
Equipment Used: DecucatedBladderPump Bailer Other											
Time (24 hr)	Amount Purged (gals)	Flow (ml/i	Rate min)	pН	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	301	0	6.75	15.98	1. 184	32.0	-18.5	0.34	12.20	
0845	0.90	300	>	6.79	14.92	1.184	24.4	-42.9	0.24	12.20	
6886	1,20	305	· a	6.79	14.86	1.184	19.0	- 49.1	0.18	12.20	
0.855	1.60	300	0	6.79	14.84	1.185	15.7	-56.0	0.13	12.20	
0900	00.C	300		6.80	14.86	1.185	11.0	-58.1	6.13	12.20	
0905	2.46	300)	6.30	14.77	1.183	7.21	-61.6	0.11	12.20	
0910	2.80	300	>	6.80	101,79	1,182	4.53	-62.9	0.03	,2.20	
	<u>`</u>			Co	ntinued on ba	ck (circle one) y	es / D				
SAMPLIN	<u>1G</u>	Eq	luipmei	nt Used: S	ame as above	e Other					
Sample Time (24 hr)	Total Purge (gals	l d	pН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.	
0915	2.30	· (6.80	14.79	1.142	4.53	-62.9	0.08	12.20		
FINAL DI	EPTH TO W	VATER	t (ft TO	C): 13.30		TIME FINAL DE	EPTH TAKEN	l:0°	115		
SAMPLE	ID: Mn	1-10			SAMPLE I	D FOR QC:	Dup-1				
PARAME	TERS REG	QUEST	ED FC	RANALYS	SIS: Metal	s, Chloride, F	Tome de, TR	15, Radium	1		
FERROL	IS IRON (m	ig/L): _			IDW TO	TAL: <u>2.80</u>					
METER N	MODEL No.	: <u>Ys</u> :	I 551	6 mps		; ;	•				
CHECKĘ	D FLOW T	HROU	GH CE	LL FOR LE		DMMENTS: N	IA				
NAME <u>SIGNATURE</u> <u>DATE</u>											
PREPARED: Jonathan Hermanson Juntlin Hammen 10.3.18											
REVIEW	ED:				U						

1880 - ×

DATE: 10-1-18 SITE: 1/18 Pa-Norman PID READING at WELL HEAD (ppm): -												
DATE.		<u> </u>	N(19)									
PROJEC	T NUMBER	4: 30111	V\	/EATHER:	tor, S- do Mai	hs, oucles						
WELL N	UMBER	· · ·			DEPTH TO WAT	ER (ft): 13.	25					
M	N-13				00:0							
PURGIN	G		TO	TAL DEPTH ((ft): <u>55.98</u>	WELL DIAM	ETER (inche	es): <u>~</u>	· ·			
				ef weter V	aclienci m	total callor		umo				
CASING	VOLUME	JALGULATIC	m n	in casing	gallons/ ı		is/casing voi	ume				
Equipment Used: Dedicated Bladder Pump Nondedicated Bladder Pump Bailer Other												
Time (24 hr)Amount Purged (gals)Flow Rate 												
1000 I 100 5.14 20.88 0.626 25.4 132-0 2.46 12.25												
1005 6 .13 100 5.81 20.61 0.647 21.7 -83.8 1.97 12.25												
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												
1015 0.46 100 6.23 19.49 0.701 14.1 -99.4 0.81 12.25												
1010 0.53 100 6.86 19.20 0.712 10.7 -920 0.65 12.25												
1025	0.66	100	7.49	19.34	6.715	8.62	-95.3	0.66	12.25			
1030	0. 79	100	8.20	19.54	0.718	7.09	-97.5	6.64	12.25			
635	0,92	100	8.61	19.57	0.714	5.34	-100.4	0.59	12.25			
1040	1.05	100	6,65 Cr	ntinued on b	0.720	4.7>	-104.5	0.56	12.0>			
<u>SAMPLII</u>	NG	Equipme	nt Used:	Same as aboy	ve Other							
Sample Time (24 hr)	Tota Purge (gals	ll ed pH	Temp (C)	Conductivit (mmhos/cm	y Turbidity) (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.			
10 60	1.18	8.67	19.32	0.718	4.58	-110.5	J.56	12.25				
FINAL D	EPTH TO V	VATER (ft TC	C):	25	TIME FINAL DE	EPTH TAKEN	1:	2				
SAMPLE	EID: <u>MM -</u>	13		SAMPLE	ID FOR QC:	4277222870000000994						
PARAMI	ETERS REC	QUESTED FO	OR ANALYS	SIS: Metals	Radon, 10	S, Chlocide	Flouride					
FERROL	JS IRON (m	ng/L):		IDW T	DTAL: 1,180	jal			· ·			
METER	MODEL No	: VSI SSG	5 mps		·							
CHECKE	ĘD FLOW T	HROUGH CE	ELL FOR LI	EAKS: 🕅 C	COMMENTS:/	VIA						
				/								
<u>NAIVIE</u> <u>DATE</u>												
PREPAF	RED: <u>001</u>	ginan the	rmanson		w ture	w		1-18				
REVIEW	IFD.	: :		V								

WELL NUMBER

MW-B

1

Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	рН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1645	1.18	100	8.2	F9.32	6.718	4.58	-10:5	6.54	12.25
									·
									· · · · · · · · · · · · · · · · · · ·
				•	· · ·				
						•			
				•					
				· ·					
	· · ·								
				· · · · ·					

3

COMMENTS

DATE: _	10,1,18		KCBPU	-Neamm	PID READING	at WELL HI	EAD (ppm):		
PROJE		R: 8877	ν <u></u>	VEATHER:	703, 5-10 mg	h S-10,	overcont	- <u> </u>	
WELL N	UMBER				~		an et a		
				Ę	EPTH TO WAT	ER (ft):\$.5>		
M	4-14								•
PURGIN	IG		10	IAL DEPTH (f	t):	WELL DIAN	IETER (Inch	es):	
CASING	VOLUME (CALCULATIC	DN;f	t of water X in casing	gallons/ = foot	total gallo	ns/casing vo	lume	
Equipme	ent Used: D	edicated Bla	dder Pump	Nondedicate	ed Bladder Pum	o Bailer (Other		_
Time (24 hr)	Amount Purged (gals)	Flow Rate (ml/min)	pН	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)
1135	I	300	6.6	12.20	1.126	5,22	89.7	1.24	15.55
1140	0.40	300	6.6	17.18	1.127	2.23	79.5	1.04	15:55
1175	0.90	400	6.7	16.74	1.113	1.52	46.7	0.30	15.55
1190	6.20	300.	6.7	16.58		2.10	62.0	0.37	15.55
1155	1.10	300	6.7	16.49	1.110	1.95	60.4	0.26	15.55
1200	200	300	6.7	16.38	1.110	1.83	56.2	: 0.17	15.53
						-			
			Co	ontinued on ba	ck (circle one) y	res / ho			
<u>SAMPLII</u>	<u>NG</u>	Equipme	nt Used: 🖇	Same as above	e Other			-	ι.
Sample Time (24 hr)	Total Purge (gals)	d pH	Temp (C)	Conductivity (mmhos/cm)	Turbidity (NTUs)	.ORP (mV)	D.O. (mg/L)	Depth to Water (ft TOC)	Obs.
1205	A.00.	679	16.38	1.112	1.83	56.2	0.17	15.55	
FINAL D		ATER (ff TO	ア (C): / 〔	555	TIME FINAL DE	PTH TAKEN	1: 12-05	>	
		~14	2	SAMPLE I			· · · · · ·		
									······································
PARAME	ETERS REQ	UESTED FC	RANALYS	515: <u>_/vcora</u>	(J comon)	chiony	Floring	- (0)	
FERROU	IS IRON (m	g/L):		IDW TO	TAL: 2-50	gai			
METER I	MODEL No.:	YST SS	. MPS						
	D FLOW TH	HROUGH CE	ELL FOR LE	ЕАКЗ: 🞵 СС	DMMENTS: <u></u>	14			
SHECKĘ		NAME		SI	GNATURE			DATE	
JHECKĘ									
	ED. 1	- Alaska K	loop-runa-	14	the LINA	~	y - Ma	, 10	

DATE:	10.1.18	SITE	KOBP	u-vumm	PID READING	G at WELL HE	EAD (ppm):	40000-	· · ·	
PROJEC	TNUMBER	2: 3877	<u> </u>	VEATHER:	70, 5-10 N	1ph S, p	1 cl cards	-		
WELL N	JMBER				•	1				
				D	EPTH TO WAT	ER (ft): <u>15</u>	39			
M	W-15									
PURGIN	G		TO	TAL DEPTH (fl): 32.70	WELL DIAM	ETER (inche	es):	_	
			NI	of water V	collopo/ =	total gallo	-	umo		
CASING	VOLUME	JALGULATIC	JN II	in casing	gallons/ = foot	lotal gallot	is/casing voi	une		
Equipme	nt Used: 🗹	edicated Bla	dder Pump	Nondedicate	d Bladder Pum	o Bailer (Other		_	
	Amount			T	• •		1	<u> </u>	Depth to	
Time (24 br)	Purged	Flow Rate	. pH	Temp	Conductivity	Turbidity (NTUs)	ORP (m\/)	D.O.	Water	
	(gals)	2.00	10			1.67		1 714	(ft TOC)	
(25>	1	200	6.8	21.62	0.699	1.06	-119.0	1.19	12.07	
1040	0.40	300	6.3	26.65	10.696	1118	- 94.1	25	15.07	
1250	1.20	200	6.9	22.39	12.686	1.31	- 82.0	0.21	15.59	
12.65	1.60	300	6.9	22,418	0.696	1.25	- 82.9	0,18	15.39	
								:		
				· · · · · · · · · · · · · · · · · · ·	· · ·					
			C	ntinued on bac	ck (circle one)	/es / 10				
									· · · · · · · · · · · · · · · · · · ·	
SAMPLIN	<u>1G</u>	Equipme	ent Used: S	Same as above	Other	· · ·			· ·	
Sample	Tota		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to		
Time (24 hr)	Purge (gals	ed pH)	(C)	(mmhos/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	Obs.	
1300	1.60	6.4	22.43	0.636	1.25	-82.9	0.18	15.30		
)C)· (\$	34	TIME FINAL DI		J. /3	00		
						·	••••••			
SAMPLE	ID: <u>IVV</u>	- 12	······································	SAMPLEI	D FOR QC:			~ ^ ~		
PARAME	TERS REC	QUESTED FO	OR ANALYS	SIS: Mutals,	Radan, Chi	ocide, Flu	asile, &	TDS		
FERROL	IS IRON (m	ig/L):		IDW TO	TAL: 1.6	0 gal				
METER I	NODEL No.	: 161 586	MRS			0				
CHECKE	D FLOW T	HROUGH CI	ELL FOR LI	EAKS: 🕅 CO	DMMENTS:	NIA				
				7-1						
· .	· · · · ·			ହା	CNATURE					
	1			<u>51</u> / -	H L			DATE		
PREPARED: Jonathan Menurson / Mun Humm_ jon 18										
REVIEW	ED:			·····						

DATE:	11/20/18	SITE:	BPU - Near	man	PID READING at WELL HEAD (ppm): NA				
		- 00777			2E E / Darthy Cla	udu / Calm			
		00777							
			15 41		I WELL DIA	METER (inches):	2		
	TOTA	L DEPTH (ft):	15.41	-	DEPTH TO	TOP OF YSI (ff):	Ζ		
DEPT	ГН ТО ТОР (DF PUMP (ft):		-	(for downhole D	0 measurement)	*(<u>1. ***</u>		
<u>PURGING</u>				-					
CASING VOL	UME CALC	ULATION:							
	Height of V	Vater Column:	#VALUE!	-	Gallons per	Casing Volume:	#VALUE!		
Equipment II	Ga sod:	Dodicated Pla	0.1632	-					
	seu.	Deulcateu Dia							
Time	Amount	Elaur Data		Tomp	Conductivity	Turbiditu		DΟ	Depth to
Time	Purged	(ml/min)	pН	Temp	Conductivity	Turbidity	UKP	D.O.	Water
(24 hr)	gals	((C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)
11:35		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
11:40	0.00	250	6.6	14.77	0.908	9	-21.0 -24.7	0.83	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
					-				
					_				
	·								
· · ·									
	<u> </u>			Continued on	additional page	□Yes ☑No			
		Equipr	nont Llood:	Othor		······································			
Sample	Total		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to	
Time	Purged	рН	(\mathbf{C})	(mS/cm)	(NTUs)	(m\/)	(ma/L)	(ff TOC)	Obs.
(24 hr)	(gals)		(0)	(morom)	(11100)	((119/2)	(11100)	
12:05	1.66	6.7	14.81	0.908	6	-28.7	0.44	15.43	
FERROUS IF	RON:		mg/L						
			<u> </u>				12.09		
FINAL DEPT	HIUWAIE	R (π 100):	15.43			JEPTH TAKEN.	12:08		
SAMPLE ID:	MW-2A/GW	V			SAMF	LE ID FOR QC:			
						8268 chort list			
	(S REQUES	IED FOR ANA	LYSIS:		te 6860 √Fxnlo	sives 8330 short list		2	
ПНе	xavalent Chrom	ium 7195		⊡ Others	Total and Dissol	ved Arsenic			
		1] —					
IDW TOTAL:	1.66		Flow	Through Cell	Model Number:	YSI 556 MPS			
		NAME			SIGNATURE	-	,	DATE	
PREPARED:		Keith Schutte	د				//	27-18	ን
REVIEWED [.]			_			_			

a - prove the second seco	an matani isiya haqan daga ah		and the second second	and a second second second	a an	an endergen en en te beken en en en en	1999 - 1920 - 19	Automa a contra de la contra de la	
DATE: <u>11/20/18</u> SITE: <u>BPU - Nearman</u> PID READING at WELL								EAD (ppm):	NA
PROJECT N	UMBER:	88777		WEATHER:	35 F / Partly Clo	udy / Calm			
WELL NU	MBER:	MW-3							
	DEPTH T	O WATER (ft):	17.75		WELL DIA	METER (inches):	4		
	TOTA	L DEPTH (ft):	2,1,0	-	DEPTH TO	TOP OF YSI (ft):	-162.3	-	
DEPT		OF PUMP (ft):		-	(for downhole D	O measurement)	<u> </u>	•	
PURGING				-	V	•			
CASING VOL	UME CALC	ULATION:							
	Height of V	Vater Column:	#VALUE!		Gallons per	r Casing Volume:	#VALUE!		
	Ga	llons per foot:	0.6528	-					
Equipment U	sed:	Dedicated Bla	dder Pump						
<u> </u>									
Time	Amount	Flow Rate		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to
	Purged	(ml/min)	pН	Tomp	conducting			2.07	Water
(24 hr)	gals			(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)
10:45		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	-/5.1	0.34	17.78
11:05	1.33	250	0.0	14.5	1.149	4	-/8	0.32	17.78
11:10	1.00	250	0.0	14.47	1.15	4	-79.1	0.31	17.79
·	-								
· · · · · · · · · · · · · · · · · · ·									
				Continued on	additional page	□Yes ☑No			
L									
<u>SAMPLING</u>		Equipr	nent Used:	Other					
Sampla	Tatal		Temp	Conductivity	Turbidity	OPP	DO	Depth to	
Sample	Purged	nH	remp	Conductivity	Tarbiany	OIX	D.0.	Water	Obs
Time	(gals)	pri	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	0.00.
(24 hr)	(0)								
11:15	1.66	6.6	14.47	1.15	4	-79.1	0.31	17.79	
FERROUS IR	RON:		mg/L						
FINAL DEPTI	H TO WATE	R (ft TOC):	17.79		TIME FINAL [DEPTH TAKEN:	11:18		
SAMPLE ID:	MW-3/GW				SAMF	LE ID FOR QC:			
PARAMETERS REQUESTED FOR ANALYSIS: VOCs 8268 full list VOCs 8268 short list									
□RCRA Metals 6010B short list □Perchlorate 6860 ⊡Explosives 8330 short list □PCBs 8082									
He	xavalent Chrom	ium 7195		✓ Others	Total and Dissol	ved Arsenic			
	1.00	ŀ	Flow	Through Coll	Model Number				
IDW TOTAL:	1.00		FIUW					D • T =	
		NAME		100	SIGNATURE			DATE	
PREPARED:	1	Keith Schutte						27-18	
REVIEWED:									

		F	IELD GRO	DUNDWATI	ER SAMPLING	G REPORT			
DATE:	11/20/18	SITE:	BPU - Near	man		PID READING	at WELL H	EAD (ppm):	NA
PROJECT N	UMBER:	88777		WEATHER:	32 F / Partly Clo	udy / Calm			
	MBER:	 MW-4						-	
		0 \M/ATER (f+)	1/1 21		WELL DIA	METER (inches):	A		
	TOTA	L DEPTH (ft):	14.51	-	DEPTH TO	TOP OF YSI (ft):	4	-	
DEPT		OF PUMP (ft):		-	(for downhole D	0 measurement)		-	
PURGING		``.		-	v	,			
CASING VOL	UME CALC	ULATION:							
	Height of V	Water Column:	#VALUE!	-	Gallons per	Casing Volume:	#VALUE!		
	. Ga	llons per foot:	0.6528	-					
Equipment U	sed:	Dedicated Bla	dder Pump						
Time	Amount	Flow Rate		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to
(24 hr)	Purgea	(ml/min)	рн		(mS/cm)	(NTUs)	(m\/)	(ma/L)	
10:00	yais 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
						·····			
								<u></u>	
				Cantinuad an					
				Continued on	additional page				
SAMPLING		Equipr	nent Used:	Other					
Sample	Total		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to	
	Purged	рН	(()	(m0(am)		(m) ()	(100 m //)	Water	Obs.
(24 br)	(gals)		(0)	(ms/cm)	(INTOS)	(mv)	(mg/L)		
10:30	1.66	6.7	14.94	0.96	1	-53.5	0.82	14.32	
	20NI:		mg/l						
			14.22				10.22		
FINAL DEPTI	HIUWAIE	R (π 100):	14.32		HIME FINAL L	JEPTH TAKEN:	10:55		
SAMPLE ID:	MW-4/GW		-		SAMF	PLE ID FOR QC:			
PARAMETER	S REQUES	TED FOR ANA	I YSIS'	□ VOCs 826	8 full list 🗌 VOCs	8268 short list	TDS 160.	1	
RCRA Metals 6010B short list Perchlorate 6860						sives 8330 short list	— PCBs 808	2	
He	exavalent Chrom	ium 7195		⊡ Others	Total and Dissol	ved Arsenic			
IDW TOTAL: 1.66 Flow				Through Cell	Model Number:	YSI 556 MPS			
		<u>NAME</u>		-	SIGNATURE			DATE	
PREPARED: Keith Schutte					Z	_	11-2	27-18	3
REVIEWED:									

T.	FIELD GROUNDWATER SAMPLING REPORT									
DATE:	11/20/18	SITE:	BPU - Neari	man		PID READING	at WELL H	EAD (ppm):	NA	
PROJECT NU	JMBER:	88777		WEATHER:	41 F / Partly Clo	udy / Calm				
WELL NUM	/BER:	 MW-8A						-		
		0 WATER (ft).	18 7		WELL DIA	METER (inches):	2			
	TOTA	L DEPTH (ft):	10.7		DEPTH TO	TOP OF YSI (ft):	<u> </u>	-		
DEPT	H TO TOP (OF PUMP (ft):		•	(for downhole D	O measurement)		-		
PURGING		-		•						
CASING VOL	UME CALC	ULATION:								
	Height of V	Vater Column:	#VALUE!		Gallons per	r Casing Volume:	#VALUE!	1		
	Ga	llons per foot:	0.1632							
Equipment Us	sed:	Dedicated Bla	dder Pump							
Time	Amount	Eleve Dete		Tamp	Conductivity	Turbiditu			Depth to	
Ime	Purged	Flow Rate	pН	remp	Conductivity	ruibidity	UKP	D.O.	Water	
(24 hr)	gals	((C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	
13:05		250	6.8	14.86	1.2	97	-12.7	4.76	18.7	
13:10	0.33	250	6.7	15.55	1.218	50 50	1.1	2.11	18.7	
13.10	0.00	250	67	15.70	1 225	40	-77.4	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		Equipr	nent Used:	Other						
Sample	Total		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to		
	Purged	pН	(()	((()		() ((Water	Obs.	
lime (24 hr)	(gals)		(C)	(mS/cm)	(NTUS)	(mv)	(mg/L)	(π ΤΟΟ)		
13:50	2.66	6.6	15.77	1.206	9	-50.7	0.18	18.7		
						<u></u>				
	ON.		<u>111g/L</u>							
FINAL DEPTH	H TO WATE	R (ft TOC):	18.7		TIME FINAL [DEPTH TAKEN:	13:53			
SAMPLE ID:	MW-8A/GV	V			SAMF	PLE ID FOR QC:	DUP-1/GW			
	0.000					0000 at at 101				
PARAMETER	S REQUES		LYSIS:			8268 short list		1		
URC □Ho	RA Metals 601(vavalent Chrom	B short list			Tetel and Dissel	vod Arconio		2		
Li ne.				Duners	Total and Dissol	veu Arsenic	<u></u>			
IDW TOTAL:	<u>1.66</u>	-	Flow	Through Cell	Model Number:	YSI 556 MPS				
		NAME		4	SIGNATURE	_		DATE		
PREPARED:		Keith Schutte			A		11-	27-18	Ś	
REVIEWED:										

		F	IELD GRO	DUNDWATI	ER SAMPLIN	G REPORT			
DATE:	11/20/18	SITE:	BPU - Near	man		PID READING	i at WELL H	EAD (ppm):	NA
PROJECT N	UMBER:	88777		WEATHER:	38 F / Partly Clo	udy / Calm			
WELL NUM	MBER:	MW-10						•	
		O WATER (ft)	13 37		WELL DIA	METER (inches):	2		
	ТОТА	L DEPTH (ft):	13.57	-	DEPTH TO	TOP OF YSI (ft):	. 2	•	
DEPT		OF PUMP (ft):		-	(for downhole D	O measurement)			
<u>PURGING</u>				-					
CASING VOL	UME CALC	ULATION:							
	Height of \	Water Column:	#VALUE!	<u>-</u>	Gallons per	r Casing Volume:	#VALUE!		
	. Ga	Illons per foot:	0.1632	-					
Equipment U	sed:	Dedicated Bla	dder Pump						
	Amount			_					Depth to
Time	Purged	Flow Rate	pН	Temp	Conductivity	Turbidity	ORP	D.O.	Water
(24 hr)	gals	(((1)/(1)))		(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)
12:20	<u> </u>	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	15.40	1.21	10	-39	0.28	13.39
12:40	1.55	250	6.6	15.41	1.209	3 7	-38.7	0.20	13.39
12.40	1.00	200	0.0	10.00	1.200		-00.1	0.27	10.00
· · · ·					·				
			······································						
		ll		Continued on	additional page	☐Yes ☑No			
				Continued on	udditional page				
<u>SAMPLING</u>		Equipr	nent Used:	Other					
Sample	Tatal		Temn	Conductivity	Turbidity	ORP	DO	Depth to	
Oditiple	Purged	рН	romp	Conductivity	randianty		D.0.	Water	Obs.
Time	(gals)	p	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	
(24 nr)	1.66	6.6	15 29	1 206	7	29.7	0.27	13 39	
12.00	1.00	0.0	10.00	1.200		-50.1	0.27	10.00	
FERROUS IF	RON:		<u>mg/L</u>						
FINAL DEPTI	H TO WATE	R (ft TOC):	13.39		TIME FINAL [DEPTH TAKEN:	12:53		
					0.0.04				
SAMPLE ID:	MW-10/GV	V			SAME	LE ID FOR QC:	DUP-1/GW		
					8 full list □VOCs	8268 short list	TDS 160.		
	CRA Metals 6010	DB short list			e 6860 7 Explo	sives 8330 short list	PCBs 808	- 2	
				⊡ Others	Total and Dissol	ved Arsenic			
L				1					
IDW TOTAL: <u>1.66</u> Flo				Through Cell	YSI 556 MPS				
		NAME		/.	2 SIGNATURE	-	, 1	DATE	
PREPARED:		Keith Schutte			V/L		[]-1	27-18	5
REVIEWED:				ł					

FIELD GROUNDWATER SAMPLING REPORT										
DATE:	11/19/18	SITE:	BPU - Near	man	n PID READING at WELL HEAD (ppm): NA					
PROJECT NUMBER: 88777				WEATHER:	32 F / Partly Clo	udy / Calm		_		
WELL NUMBER: MW-13										
.	DEPTH T	O WATER (ft):	13.64		WELL DIA	METER (inches):	2			
	TOTA	L DEPTH (ft):		-	DEPTH TO	TOP OF YSI (ft):	33	-		
DEPT		OF PUMP (ft):		-	(for downhole D	O measurement)		-		
<u>PURGING</u>				-						
CASING VOL	UME CALC	ULATION:								
	Height of V	Water Column:	#VALUE!	-	Gallons pe	r Casing Volume:	#VALUE!			
	. Ga	llons per foot:	0.1632	-						
Equipment U	sed:	Dedicated Bla	dder Pump							
	Amount			I					Depth to	
Time	Purged	Flow Rate	pН	Temp	Conductivity	Turbidity	ORP	D.O.	Water	
(24 hr)	gals	((())(())))	_	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	
12:45	l	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	13.07	
13:40	2.00	250	6.901	14.17	0.64	19	-140.1	0.07	13.07	
13:40	2.35	250	6 981	14.00	0.636	15	-142.0	0.04	13.67	
13:50	3.66	250	6 979	14.07	0.636	13	-147.5	0.01	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				
		Equipr	nent Llsed	Other						
		Equipi							1	
Sample	Total		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to		
Time	Purged	pН	(Ω)	(mS/cm)	(NTLIe)	(m\/)	(ma/L)		Obs.	
(24 hr)	(gals)		(0)	(morom)	(1103)	(117)	(mg/c)	(11100)		
14:00	3.99	6.979	14.08	0.635	9	-146.8	0.8	13.67		
			mg/l							
FINAL DEPTI	H TO WATE	R (ft TOC):	13.67		TIME FINAL [DEPTH TAKEN:	14:05			
SAMPLE ID:	MW-13/GW	V			SAMF	PLE ID FOR QC:				
					8 full list 🗍 Vora	8268 short list		1		
	RA Metals 6010	B short list	L1010.		$re 6860$ \Box Fxplo	sives 8330 short list				
He	xavalent Chrom	ium 7195		⊡ Others	Total and Dissol	ved Arsenic		-		
	2.00	L	F law		Madel Number					
IDW TOTAL:	<u>3.99</u>		FIOW	r mough Cell	wouer number:	1 31 300 WIPS				
		NAME		SIGNATURE			DATE			
PREPARED:	to the second	Keith Schutte	· · · · · · · · · · · · · · · · · · ·		<u>~</u>		11-27-18			
REVIEWED.			ı							

FIELD GROUNDWATER SAMPLING REPORT									
DATE:	11/19/18	SITE:	BPU - Neari	man	apported production of a second of a second	PID READING	at WELL H	EAD (ppm):	NA
PROJECT NUMBER: 88777			WEATHER:	32 F / Partly Clo	udy / Calm				
WELL NUM	MBER:	MW-14							
L	DEPTH TO WATER /ft): 19.41			WELL DIA	METER (inches):	2			
	TOTA	L DEPTH (ft):		-	DEPTH TO	TOP OF YSI (ft):			
DEPT		OF PUMP (ft):		- ' -	(for downhole D	00 measurement)		•	
<u>PURGING</u>									
CASING VOL	UME CALC	ULATION:	#1/11/17		Collong nor		#\/^!!!!!!!		
	Height of v	llons per foot	#VALUE!		Gallons per	Casing volume:	#VALUE!		
Equipment U	sed:	Dedicated Bla	dder Pump						
		·····							
Time	Amount	Flow Rate		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to
(24 hr)	Purged	(ml/min)	рН	(0)	(mS/cm)	(NTLIs)	(m\/)	(ma/l)	(ft TOC)
15:45	l gais	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		Equipr	nent Used:	Other					
Sampla	T-4-1		Tomp	Conductivity	Turbidity	ORP	DO	Depth to	
Jampie	Purged	Ha	remp	Conductivity			D.O.	Water	Obs.
Time (24 hr)	(gals)		(C)	(mS/cm)	(NTUS)	(mV)	(mg/L)	(#100)	
(24 hr) 16:10	1.33	6.804	14.74	1.185	4	18.6	0.23	19.71	
FERROUS IR	N.		mg/l						
			10.72				10.10		
FINAL DEPTI	HIOWAIE	R (π TOC):	19.73			JEPTH TAKEN:	16:13		
SAMPLE ID:	MW-14/GW	/			SAMF	PLE ID FOR QC:			
	RA Metals 6010	B short list		Perchlorate 6860 Explosives 8330 short list			PCBs 808	2	
He	exavalent Chrom	ium 7195		⊡ Others	Total and Dissol	ved Arsenic			
	1 33		Flow	Through Cell	Model Number:	YSI 556 MPS			
		NAME		SIGNATURE			DATE		
PREPARED:	<u></u>	Keith Schutte		"/"			11-	61-18	·
REVIEWED:	u in state of the								

www.ee		- The State of the	na angla ang ang ang ang ang ang ang ang ang an			nggalaagilagialgen of Store Nederlandshaft An older	and the second	States and Sugar a String and String and and	na kana sa kata sa manakatan sa kata s
DATE: <u>11/19/18</u> SITE: <u>BPU - Nearman</u>					PID READING at WELL HEAD (ppm): NA				
PROJECT NUMBER: WEATHER:			32 F / Partly Clo	udy / Calm		-			
WELL NUM	IBER:	MW-15							
	DEPTH T	H TO WATER (ft): 18.85 WELL DIAMETER (inches):							
	TOTA	L DEPTH (ft):	20100	-	DEPTH TO	TOP OF YSI (ft):		-	
DEP1	DEPTH TO TOP OF PUMP (ff): (for downhole DO measure							-	
PURGING	PURGING								
CASING VOL	UME CALC	ULATION:							
	Height of V	Vater Column:	#VALUE!		Gallons per	r Casing Volume:	#VALUE!		
	Ga	llons per foot:	0.1632	-					
Equipment U	sed:	Dedicated Bla	dder Pump	-					
Time	Amount	Flow Rate		Temp	Conductivity	Turbidity	ORP	D.O.	Depth to
	Purged	(ml/min)	pН	1 omp		- and and y			Water
(24 hr)	gals	(,		(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)
16:25		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
				_					
				Cantinuad on	odditional name				
L									
<u>SAMPLING</u>		Equipr	nent Used:	Other					
Sample			Tomp	Conductivity	Turbidity	OPP	DO	Depth to	
Sample	l otal Purged	nH	remp	Conductivity	Turbidity	OKF	D.0.	Water	Obe
Time	(gals)	pn	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	005.
(24 hr)	(30)								
16:55	1.66	6.878	21.6	0.681	3	-55.1	0.34	18.89	
FERROUS IR	ON:		mg/L						
			10.00				16.50		
FINAL DEPTI	H TO WATE	R (ff TOC):	18.89	-		JEPTH TAKEN:	16:58		
SAMPLE ID:	MW-15/GW	/			SAMF	PLE ID FOR QC:	MS/MSD		
				_	_				
PARAMETER	S REQUES	TED FOR ANA	LYSIS:	UVOCs 82€	68 full list ∐VOCs	8268 short list	□TDS 160.	1	
	RA Metals 6010)B short list			te 6860 🗌 Explo	sives 8330 short list	PCBs 808	2	
L] He	xavalent Chrom	ium 7195		⊡ Others	Total and Dissol	ved Arsenic			
IDW TOTAL:	<u>1.66</u>		Flow	/ Through Cell	Model Number:	YSI 556 MPS			
		NAME			SIGNATURE			DATE	
		Kaith Caland		\square	61-		11-	27-19	3
PREPARED:		Keith Schutte			/		l ·		
REVIEWED:									

		F	IELD GRO	OUNDWATI		G REPORT			
DATE:	11/19/18	SITE:	BPU - Near	man		PID READING	at WELL H	EAD (ppm):	NA
PROJECT NUMBER: 88777			WEATHER:	32 F / Partly Clo	udy / Calm				
WELL NUM	MBER:	MW-16						-	
		O WATER (ft).	14 89		WELL DIA	METER (inches):	2		
	TOTA	L DEPTH (ft):	14.05	-	DEPTH TO	TOP OF YSI (ft):	-162.3	-	
DEPT		OF PUMP (ft):		-	(for downhole D	O measurement		-	
PURGING				-					
CASING VOL	UME CALC	ULATION:							
	Height of V	Water Column:	#VALUE!	-	Gallons pe	r Casing Volume:	#VALUE!		
	. Ga	llons per foot:	0.1632	-					
Equipment U	sed:	Nondedicated	Bladder Pu	mp					
	Amount	[Depth to
Time	Purged	Flow Rate	pН	Temp	Conductivity	Turbidity	ORP	D.O.	Water
(24 hr)	gals	(mi/min)	•	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)
14:05		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	1.00	250	0.003	13.72	1.002		-11.2	0.45	14.5
,									
<u> </u>				Continued on	additional page				
				Continued on					
<u>SAMPLING</u>		Equipr	nent Used:	Other					
Querta		<u> </u>	T		Truch i aliter	000	DO	Depth to	
Sample	Total	nLi	remp	Conductivity	Turbially	URP	D.O.	Water	Obe
Time	(gals)	рп	(C)	(mS/cm)	(NTUs)	(mV)	(mg/L)	(ft TOC)	003.
(24 hr)	,								
15:15	1.66	6.863	13.72	1.002	5	-77.2	0.45	14.9	
FERROUS IR	RON:		mg/L						
			44.0				45.40		
FINAL DEPTI	HIOWAIE	R (π 100):	14.9			JEPTH TAKEN:	15:18		
SAMPLE ID:	MW-16/GV	V			SAMF	PLE ID FOR QC:	Rinsate Bla	nk (15:40)	
	NS REQUES		LYSIS:			6 8268 SHOFT IIST		1	
	xavalent Chrom	195 Short list 195 Jum 7195			Total and Dissol	ved Arsenic		2	
	area one on on								
IDW TOTAL: <u>1.66</u> Flow Through Cell Model Number: <u>YSI 556 MPS</u>									
		<u>NAME</u>		SIGNATURE			DATE		
PREPARED:		Keith Schutte		1	R		11-1	27-18	

44 Thisday	68777	L.	Ille mason	45 3.9.18 88777 J. Hermoneon				
Tack Coni	unnul GW	noniventy	rt D.A. Prod	H: U.0/4 7.0/7 10.0/10				
1. 1. MIL: 323-	482 parti d	- Jui (- 10	o mbh w	601: 1.40911.409 Trib: 2. 81/40 12.41/10.0				
	, pany m			DO: 100.390 02P: 237.5				
0415 . 11(1.	c on site		بنو بنو چې د ۲۰۰۰ و	1655; Bain ANUMA MW-RA				
- 410: Day	in we grying			in the start in the second and the second and the second s				
10	WL	ID	Nois	Re Col (C (St Db (a He M a st D				
MIN-1B	22.65	39.01	Think Eape was Chusht Gor 70	Se, W, V, C, F, BD, CF, M, MO, SI, M, 120				
~w-7	25.72	49.56		1145! Accre at MU-10 to sell up				
MU-6	27.70	42.15		- (180: Pegin pusping Mu-10				
mmiz	24.13	31.20	·	1230 : Collect Mu-10) for Sb, AS, B+, Be, Ca, le, ca				
3-416	27.06			- E, Ro, Lr, Hy, Mo, Sr, Th, Ru				
PI-HC	28,17			1240: porice atmu-2A to set up				
CI-HC	26.35	<u> </u>		1248 Beyin priging MU-2A				
P2-41C	28.91	-		1325 : Collect VALL-ZA) For Sb, AS, Ba, Be, Ce, Co, Co,				
THI-LI	27.21		•	Ft, B, Cr, Hu, Mo, Sc, Th, Ra				
pr-cw	35.95	~		1335 : Arrive at ME-3				
T1-1-3	34.36	-		t340 : Beyin prograg MM.3				
TH-2	25.28	95.98		1415 : Collect muting, mon-3/0005 + mon-3/00000 (a.				
Mo - R. vel	20.82			Sb, As, Ba, Be, Ce, Cr, Co, FI, Pb, Ci, Hg, Mo, Sc, Th, Pm				
MW-11	29.50	30.54		- 1605 : Arrive at				
mm . 9	28.31	62.00		1610: Begin proging MW14				
MW- 8A	28.25	nnp		1645 : Collect June of for Sb, As, Ba, Br, (c, C, C, F', Pb, C,				
Mw - 10	22.65	pump		Harmo, Si, Thea				
MU-2A	14.88	pump		1655 : [lean up of cleck out will gourd.				
MW - 3	27.44	Jump		1700 : off-site to drop old samples at ESC				
mw - 4	24.34	pump		- Late entry: 1415 Out at coz, clack m/ Ende to				
1025 : Arry	re at Mr Br	to sollibrol	e and set up	Set if ty can boy a new one				

47 46 J. Yeimson B3777 3.B.B 1440: Officile to get more (02 1540: on size to contian so pling MM-3 3.9.18

62	K.Schutte 63
J. tle. manson)	J. Hermanson
Tusk: April Heler Adoutoring	Task: May tich Rending & Semircunneal Sumpling
weater: 505, 5-10 mpn w- priting cloudy	Weather: 803-905, 5-10 mph NE, pastly cloudy
posonnel: Sonathan Hermison	-personnel: Jonathan Hermanson + Keith Schutte
OB00: Acone onsite and deck in with ginned	.0755: J. Hermanson on-site to tell security
DEUS! Well out Key & get into from operated	K. Schutte on his way to learn HCW protocol.
MORINEI RENEI: \$29.0 Moaines temp: 50°F	-0825. 12. Schutte Stach in construction, on-site,
HLWI: 21.4M60 HLWZ: 10 MGPO	check in not gand & check out here
Influent temp: 92 Bareline temp: 9.1°C	Moliver! Molime Femp!
0820: Chukin not presimen bound	HCW1: HCW2
6875: Acrise at siew 2 bigin granjing ne lis	Influent temp! Ino buscline temp!
ID We Time Motes	· Chark in w) Nearmon gard
3-HC 24.95 0827	Arrive @ Hew + Degin ganging wells
PI-42 26.27 0830	IQ NL Time Morey
LI-HC 26.40 0872	<u>3-HL 25.55 0850</u>
PZ-4L 27.29 0834	PI-HC 2B.07 0B52
HENZ 47.90 0838 Prop 5 og	<u>_(1-Hc 28.41 0855</u>
inission reading 96.35	PZ-4C 30.28 0858
TH-3 32,49 0852	Hen-2 53.15 0905
<u>TH-Z2.62 0858</u>	(1:350Arcad , 85.47 0905
MO Rived 18.94 0854	74-3 25-26 0421
4cw-1 46.07 0849 prmp1+3 on	<u>11-2 20-28 0925</u>
(hisson reading 81.1	Mo P (18.72 0923
<u>14-4 25.20 0842</u>	<u>HCN-1 37.46 0917</u>
P2CN 34.24 6844	Caisson centry 40.6 0149
J-29 0965	<u>TH-11</u> 27.16 090n
Ogis : Check ont, actum kigs offersite the	16.50 0412

46 3.B.18 B3777 J.Yeimson 5-30-18 85 K.S.h.H. 140 - Office to get more (02 1400 Sepor C My-4 WE 19:5/7 70=-1540: on size to contian supling Mun-3 Temperature 850 F. TmpH wind at sw Time (1) PANNY CLOUPY. Flow= 500x1/hr. THET VOL DIT COND TEAR DO DEP THEB DTW 1405 J 6.96 1005 14.09 2.16 -4.1 14.3 19.48 MO 2.5 7.31 1063 14.70 1.72 - 12.6 7.6 19.48 1415 STO 7.15 1065 14.86 1.67 - 15.7 3.7 1248. 1420 7.5 7.10 1067 14.83 1,63 -17.1 Z.61948 1425 Colled MW-4/GW MS/NSD (Rd izc) 1955 Finn Suph D7W= 19.48 1505 shore no-3 (c) (w1 = 22,76 TIME VOL 2H CON TEMP DO GRA TURB DTW 1520 J 7.42 1146 15:47 4,12 -26.1 3.3 22.79 1528 2.5 7.21 1126 1538 3.56 -28.7 2.6 72.83 1530 50 7.26 1145 15.34 3.27 -223 2.3 T2.85 S 1535 7.5 7,18 /150 15,26 3,29 -224 2.6 2433 Q 1540 Colled MW-3/GW MS/nso retuil prograde 1600 Final Supple allebre WL 27.83 1610 Sit of @ MW-24 W- 20,21 / 19.86 5-30-08 TIME (b) PH COND FEMP TO OUP TURD DTW -1615 I 7.13 860 1555 4.12 541 11.6 19.97 1620 2.5 6.86 923 15.47 2.85 21.6 8.43 19.97 -not pay out

48 49 5-30118 SCHJ77E 0635 Orsch, cheek in C como suma MW-ZA confe Tune VOL PH CENO TRMP DO ORP TUNG DTW CAMBAME 451 - 4/17/10 DO=1001. 1625 50 6.79 821 15.34 2.21 17.5 5.6 19.98 HACK Jurhdung wher 201000 ORP= 237.1 1630 7.5 6.80 827 15,33 2.07 13.4 6.4 19.98 WEATHER: 79. F. MUSTLY CLOUPY, Chan of 1435 10,0 6.78 829 15.36 1-38 16.6 5.2 19.98 Ain. 1(41 12.5 6.79 828 15.21 1.82 7.5 4.8-19.98 6650 Set of C MW10 1645 15.0 6.79 830 15.26 1.79 3.1 4.4 19.98 # Flow: 500ml W1-7/8.07 5-31-18 = 17.81 1650 Collect MW-ZA/GW TIME FOL DH COND TEMP DO ORP TURB DTW 1658 Finin Super 102219.28 0655 7 6.75 1175 1367 RAT 27.6 278 17.8 1765 office 6700 25 6.64 1215 13.71 6.26 2.3 75.9 17.87 070550 6.62 1241 13.55 0.25 -12.6 33.7 17.83 0710 7,5 6.61 1245 13.69 6.25 -13.4 22.9 17.83 6715 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 16.9 17.83 0775 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 4.4 17.83 1736 collet men-10 + DUP-1 0755 Front collabres WL: 17.83 -0800 Set up e MW-84 W1-= 23.20 "531-13 Flow= 50 T.M. VOL por COND TEMP DO OLD TURB DTW 0805 I 6.67 1395 1396 1.75 16.1 OOR 23.20 0810 25 (85 1405 13.52 0.92 - 5.4 79\$ 7.3.2) 0813 60 6.93 1408 13.97 0.89 /6.3 54 73 20 0820 7.8 6.82 1411 13.95 6.87 769 47 2320 082 10,0 6.82 1413 14,21 0.87 -17.1 43 73.20

51 50 1C. Scallink 6-4-18 5-31-18 16 Schove 0700 07 sile O CCA BPU wells to Rosangle MW. 84 cont WEATHLY: CINNE OF RAIN. 20"F. MOSSING TIME VOL DH COND TEMP DO ORP TURB 07W ORP. clos By, calibate YSI 52 MPS - 4/7120 10010, 237.1-083- 17.5 6.81 142- 14.03 0.87 -17.8 21 23.20 0715 Set us e me - EN, calibria Top mar 201.10/50 0835 15 6.80 1424 14.06 0.87 -18.0 12 23.20 0840 17,5 6.30 14.23 14.03 0.36 -18.1 8.4 73.20 0815 celler mou-SA/GW + BUP-1/00 0845 20 6,30 14.73 14.14 0.86 -18.9 4.7 obro shore mano 2320 0850 colled MW-8A/GW 6925 collel mer/0/6in 0940 st up a mon 0855 Finsch celleling USL=23.20 1005 Wel mul / Gur 0915 offsch & Esc + Kell Born 1040 stop o MW-3 110 cellel MW-3/GW-1 1125 Set JP & MW-ZA 1155 cellet MW-ZA/GW 1220 office to ESC to and oil surply 19
52 9/4/2018 C. HOGLUNS K. Boker	C: West and 9/4/18 53								
Nearman Creek E(1APT Survey	* Nearnon Creeke EC/HPT Survey								
Tursday September 4, 2018	1430 Got cuble out of drill rods, had to cut								
Werkles, AM: Cloudy-outrust, 70'6-80's Gusty SW	wires on calle. Keith (13PM) on-site,								
PM: Mostly Cloudy - Osesaut, Bos,	1500 Plains repairing ont wires to cable,								
Persennel: Chris Hogland & Dax Baker	kein (OPN) off-site.								
Tusk: EC/INFT DIrect Sensing borings	1552 Fix winny for NPT/EC cable bentenite chip								
orro Land Truck	50-1 have used ~1/2 bag,								
0847 Deput BMcD	- 1555 Pack up & mobilize rig								
3940 Arriv on-site, maat Keith Brown	ibis officite								
w/ KCBPM, checkin @ contractor gate.									
0958 plains Env. On-site									
1035 Complete SOLD & Safety orientations									
Plains setury up at MW-ZA for									
HPT/EC. Call 14 5B-# SB-1.									
112 MW-ZA WLZ 16.14 broc									
1201 Start APT/ECOSB-1, u8' south of									
MW-ZA, Keim (KCDPU) off-site,									
1214 Partern Hydrostatic Test @ 20,60' Bas									
1224 Perform Hydrostalic Test @ 43.85' 1363	177								
1242 Perform Hydrostelic Teit @ 101' bys									
1362 Perform Aydroited. Test @ 146.35 B65									
1310 At 150' BUS, story last ZO' rod									
1321 Continue HPT/EC Pust @ 150'									
1327 Refusel = 159.85' 695 - Hard									
1400 Trip out rods - HIT/EC cuble stuck in well									
(ASt 10' section.									

K. Balan	D Bakers
Nerman (work SCIHPT Suns)	9/0118 Narman (ask, ECIHPT Sister
Wednesday Sentrumber 5th 2018	kas: Phillips to unstring rads to access damage
Weather: AM: Rainy 75°, wind Sw 5-15 mil	rod sections + re-string new rods
PM: Rainy 70°-80°s winds calm 0-5mph SW	1050: 3 rods bent
Personnel: Day Baker (BMCD)	1100: Off-site for lingthi
Jason Auernheimer (Plains Environmental Service Inc) 1200: D. Baker back on site
Task: ECIHPT direct sensing bornings	1205: Plains Environmental on-site
0700: On-site + sign in at contractor entrance	1210: Mobilize Geopolie to SB-5 location
0715: Heavy main delay	1230: Set-up at SB-5 location
0720: Sofety meeting + PTH of Plains cruites.	1300: Begin EUHPT survey @ SB-5 location
0730: Rain showers slow setury geoprobe ELINAT electronics.	1315: 12- Bouthy clastatic test @ 23.75'bgs
0740: Set-up at MW-11 locations	325: Perform Hydostetic test @ 76.41 bgs
0745: MW-11 water level; 18.8 to below casing opening	335: Perform Hydrostatic test @ 84.65 bys
0752: Plains set-up canopy for ELIHPT	1345: Trip-out du to error in recolings, possible
logging electronics for location SB-4	Lad franschuce : @ 100 bgs
OBUD: Begin ELIHIT SLOREY for at 513-4	1920: Bad Fransducer, replaced, re-calibratel
SB-4 approx 8ft SW of MW-11	1430: Continue SD-5
0825: Perform Hydrostatic test @ 23' bgs	1945: Referm Hydrastetic tost (2/101,55' bgs
0340: Perform Utyplie static test @ 76 15gs	1500: Perform Hydrostatic tot @ 151.95' bgs
0900: Perform Hydrospetic test@, 131 bys	(505 And A 151.95 bis end of hole @ SP-5
0920; Geopode stop to all mon drill stem. (2151 bos	1509: Bein to trip-out 5B-5 reds
0930: Flather S'B-4 again @ 151' bgs while 20' of orals	1540: SB-5 EC/HPT survey complet / Efill hele 41/2 bag honter the
0945: Perform Hydrostatis @ 171.65-1698	1541; Mobilize Greprobe & refill HPT water tenke
0950. Returnal (2)71.65 bgr - hard	1010: Set-up at MW-8A 1 for SB-@3 located ~16'NE
1000: Trip-out rods - Land domessed rods of	of MW-ZA
bittom ~ 201	1625: Besin EC/APT survey (2 SB-3
1030: End of SSY EC/HTT Rofiling how 4/2 bus brothing	1636 Perform Hydrostatic test @ 21.1 bys - verticity prosume

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D.Bler 57 P.B.L 915118 Weaman Creeks EC/HPT Same 9/6/17 Newsaw Ciach ECIHOT Survey 1640: Top out to check the sense function Thursday September 9th, 2018 Weather: Overcast foggy low 70's wind: calm (AM) 1650: Post-pone SB-3 ECIAPT Hill tommerous by of (PM) Overcest low 80's, wond: calm SW 0.5 mpt bad senser / connection Personal: D. Baker (13mcb) 1700: mehilize geoprebe back to stasing over for repairs 1750: DEcker + Plains environmental affire for day. Jasan A, Henry Chaines Enviro) Task. ELIHPT direct sensing borings 0700: D. Baker on site + channed in W security 0715: Plains environmental on-site / Perterin daily PTH 0720: Mobilize goprabet restring rocks with gaved E-line. 0942: Repairs complete # set up at MW-8A (SB-3 location 0995: WW8A writer terrel: 18.23' below carry opening 0958: Cather -SD-3 ECHAPT survey 1000: Perform Hickostate test @ 26.65' bgs 1015: Perform Hydrastatic test @ 57.45 655 10-12: Perform Hydrostatic test @ 976.7' bgs 1100: Perform Hydrostetic test @ 151. 3'bes SB-3 TD: 151.3'bgs 1105: Besh trip-out rads @ SB-3 1130: Complete trip-aut @ 5B-3 : 1135: Fill boring w/~1/2 berg bontonile plays \$ SB-3 Complete 1146: D. Buker & Plaine Envitanmental attasite for lunch 1210: D. Baker back on-site 1230: Plains Environmenter / back onsite

D. Asker 59 Q. Baker Nearman Coule ECIMPT Survey 916118 Neurman back ECIHPT Survey 1625: Refusal @ 140.25' bys - hand TD. 140.25'by 1235: Mubilize Scopabe to MW-10/SB-2 Locution 1630: Begin trip-out for SB-7 ECIHPT survey 1245: Set-up at SB-2 EC/HAFT Icention 1645: SB-7 trip-out complete 1250, MW-10: Where level - 12.80 bebu casing opening 1655: SB-7 Barhole filhed w/a/2 bay bestenite plugs 1305: Begin ELIHPT survey @ SB-2 Lucition 1315: Restar Hydrostatic test @ 26.051 5gs 1700: SB-7 EC/HPT survey complete 1705: organize + mebilize gapabe to location 58-le 1325: Perform Hydrastate test @ 96.05 bas to stort tommerow (9/7/12) 1350 : Perform Hydrostatiz Lest @ 106,0 bgs 1905: Perform Hydrostatic test @ 149.0 bas 1825: D.B. Kur aff-site /Plains enviros off-site 1800: Arrive at WHQ office (BMCD) to Refuse @ 1491.0' Les - hard TD: 149.0' bgs 1410: Begin trip-out for SB-2 F.4 HPT survey Offin BPS backpack unit & tablet 1415: cease trip-out due to grap abe fact sinking in soft much, contact keith CBPU) to get mil-road ties to stabilize gappabe. 19201 Plans environmented to jurd to obtain rail road tres. 01/6118 1940: continue trip-out @ SB-2 1500: SB-2 trip-out complete 1502: SB-2 bore-hove filled w/-1/2 bag bestenite phys 1005: SB-2 EC/HDT Shrvey complete 1506: Mubilize geopoloc + more to EC/HTT SB-7 location 1515: Set-up at ECTHPTSB-7 location 1520: Begin SB-7 ECHAPT Survey 1535: Perform Hydrostatic test @ 26.05' bgs 1600: Perform Hydrostufic test@ 91.05 bgs 1620: Perform Hydrostetic fist @ 140.25 655

9/6/18

D. Baker D. B. Ker 60 917118 Nerman Crock EC/HPT Survey Nearman Creek EGHPT Survey 917118 Friday September 7th 2018 0946: Mobilize geoprobe to Bestrente-Weather (AM): Overcest Trainy wind Sis 0-10mph For formspert to SB-2+SB-9 locations. · 1000; Geopribe Jacked site Bar Truck for (PM): Porsonnel: DiBalan (BMCD) transport 1005: Plains Environmental aff-site to set hand truck + Jason A. Henry (Plains Envire) check-out of hatel Task: ELIHAT direct sensing berings 0700: D. Baker + Plains environmental on-site 1105: Philips Environmental Back onste 0705: Sign-in at contractors security entrace of 10: Daily subty proving + PTA + electronic equipment 1/30: Geopolae loaded + handard the SB-8 location 1135: Let up @ 533-8 @ SB-la ECHAPT iscartion 1195: HPY calibration off 0720: Set-up canopy bl of rain for 1150: HPT calibration fixed 1210: Hydrag Hetrz fester 22 1200' Begin SB-8 ECHAPT Survey 1230: Reterminique test C-730'555 1310: Pextorm Hypostatiz test C 151.05 bes logging equipmit 6730: Set-up @ SB- 6 E4/APT location 0735: But up mobile 625 + Wifi hotspot 1320: Begin Thipart @ 5B-8 0746; BESIN ECHAPT Survey @ SB-Le 1350: Trip-art complete 5B-2/SB-870:151.05135 1355; Fill bore hole ista 1/2 bay bentonite plugs 0700: Perform Hydrostatic test @ 31 bgs 1400; SB-8 ECTHPT SWMY complete 0830: Perform Hydrostatic test @ 102,5 bgs BBS3: Perform Hydrostatic test @ 151.0' bgs 1405. Mobilite Geopolder + nove to 513-7 location 1415: Set-up at SB-9 0855: Plams environmental out of neb 1420: Calibrak HPT senser SB-6 TD: 151.0' bas 1425: Begin SB-9 EC/HPT survey 0900: Begin - trip-out @ 5B.6 0930: SB-le Trip-out complete 1930: Post-pone SB-9 ELIAPT due to bad reading Josen, A to Inspect E-line 0535 : SB-6 bookle filled w/~ 1/2 by 1440: Re-calibrated HPT sensor to check repairs Bratanite plugs 1445: Recallbration unsuccessful , inspection of US40: 5B-6 2</HPT swy complete probe, probe threads are worn, need replace

Baker 62 917/18 Norman Ercel- 54/HPT Survey 1510: Continue SB-98C/HPT survey 1575: Hydrastetiz test @ 28.6 bgs 1535: Perform Hydrostatic test @ 116.8'bgs 1400; Refusal @ 138.8545 hard 1605: Perform Hydrostatic test@ 138.85 bgs 1610: Begn trip-out 5B-9 1/035: Trip-out complete 1640: fill borchele w/ 12 berg bentente plags 1645: SB-9 ECHAPT SUrvey complete TD: 138.85 bys 1658; Mabilize geoprola back to traiter & claim equipment I pock up for weekend 1700: A. Bake- + Plains environmental affsite 91711g

9/10/18 Nearman Crech ECIHPT Survey Monelay September 10th 2018 Wenther (AM): Sunny, 70's-80's swind Suph Personnel: D. Balar (BMCD) Jasan M. Henry W. CPlains Environmenty Task: ELIMPT direct sensing borings 0800. D. Beles at WHQ (BMCD) to get truck + equipment for day 0950: D. Bele + Plans muchannelal ansite 1010: Arrive at SBIO location new KE police forget range. Spoke with Ross (Fring renge monager) 1020: Plains environmental inload sepache + strong rods for probe. 1040: Set-up at SB-10 1053: Begin SB-10 ELIHPT Survey 110: Perform Hydrostatic test @ 29.6' bas 1150: Reaform Hydrostatic test@ 95,2'655 1155: Refusel @ 95.2'bgs - hard 12031 Begin trip-out for 58-18 1220: SB-10 tripout complete, last rod has E-cable bind and will not come GOSE 1225: While bind Fixed + all rods back operational 1230: SB-10 ECIHPT survey complete 1 bote hale fillette TD: 98.2 b5s bas bontaille phys 12401 Plains Environmental off-site for lunch

1 Beker

	D. Baker	D. Baker
9/10/19 Nearman Creeke ECIMPT Survey		- 9/11/18 Nearman Creek 2014PT Survey
1315: Plains Environmental back-on-site		Tuesday September 11th 2018
1320: Mobilize Acopabe to 513-11 location		Weather (AMA) Sunny 70's wind < Simple Sed
1335: Set-up at 5B-11		(PM). Sunny 85° see wind 5-10 mph
1340: Begin SB-11 ECHAPT Survey		Personnel: D.B. Ker-CBMCD)
1355: Perform Hydrastatiz test @ 30.15 bgs		Jason A. J. Henry W. (Plains Environmentel)
1430: Perform Hydrastatic test @ 105.95'	695	Task: ECIHPT clirect sensing survey
Refusal @ 105.95' bys	• · · · · · · · · · · · · · · · · · · ·	0.730; D. Debar + Plains Enviro on-sik
1440: Begin - trip-out		0735; daily sufety PT19
1445: Plains environmental discours broken rock +	, cut	0740: Plains Enviros string new rocks + probe
E-line @ 30:0' bas		0820: Mabilize geopske to SB-12 lacertroy
1450: Jason A. ordered the pow fact of 12	ds	0850; Set-up at SB-12
and new ECHAPT probe		0855: Calibrate ELIHAT Servers
1515: SB-11 abandoned + plugged w/ 14 be	g bentonite	0900: Begin SB-12 EC/HPT Survey
plags.	<u>^^</u>	0923: Perform Hydrostatiz test @ 20.85 bgs
1/250: D. Baker + Plains Environmental 0	to-sik	09 : Pertoru Hydrostetic test @ 71.8 bas
		1010: Re-torm hydrostertiz test (a 129. 45 bg
		Return a C 129, 48 bgs ~ hurd
		1018: Begin SB-12 trip-out
		1050. Tripout complet @ 5B-12
		1053: Fill borehole w/1/2 bug bentrike plugs
		160: SB-12 EC/HPT Survey complete
5/9/2		1 10: 127, 45 635
		115: Mobilize Georgebe to DB-13 Iscation
		1125: Mains Environmental attesite for linch
		1200: Mains invironmental back on-site
		1205: Mobilitize support track to siz-13

D.B.b.	D. Baker
66	67
4/11/18 Newman Creek ELIHPT Survey	- <u>1/12/18 Neurman Creek EC/HAT Survey</u>
1210: Set-up at 5B-13	Wednesday September 12th 2018
1215: Laborate ECTHPT Senser	Weather: Sunny FO" calmismels (AMN)
1220; Begin SB-13 ECHAPT Survey	(PM) Sunny 85° Willer 5-10mph Sci
1235: Perform Hydrosphin test @	_ Personne(: D. Baker (BMLD)
1311: Perform Hydrastatiz test @ 142,5 6gs	Jason A. + Henry W. (Plains Environmental)
Refusal @ 1425455	Task: Direct Sensing ECIHAT survey
1320: Begin trip-out for SB-13	0700: D. Bake- + Plains Environmental on-site
1350: Complet SB-13 trip-out	0710: Move Geopole via hard truck from yard storese
1355: Fill borchoke w/1/2 bag bentenik plugs	to 5B-15 boring location
TD: 142.5 695	0715: Un-lood Geopolac + set-up equipment for
1406: Mabilize, Geopolae to 5B-14 Iscatton	ECIHPT lag
1410: Set-up (0), 5B-14	0725: Daily safety briefing + 8TA
1415: Latipate ELIHPT sensor	0740; Mubilize Gappine to SB-15 Icantion
1420: Begin SB-14 ECHAPT Survey	0750. set up at 5B-15
1435: Perform Hydrostatic test @ 34.6' bgs	0300: Celtibrate ECIHPT SUBSCT
1500: Porform Hydrostatic test @ 130, 4 bas	0310: Begin SB-15 ECIHAT Survey
Refrise 1 @ 130. 4'bqs	0820: Perform Hydrostatic test@ 26.1' bgs
1510: Beath SB-14 +-ip-out	0345; Perform Hydrostatic test @ 161, 85 brs
1545: SB-14 Tripert complete	Giver, Perform Hydrostatic test @ 132, 25 bis
1550: fill bore hole w/1/2 bag benjonit- plugs	Refusal @ 132.25' bis - hard
TD: 130.4 695	0905: Begin triproint for 510-15
1600: Mubilize Gooprope beck to hand trailer for lowly	0130: SB-15 trip-out complete
16151 Load Geopope & more hand buck / trailer to	0935' fill berehole w/~12 bag bentanite plugs
KCBPU yard for avernight storage	TD: 132.25' 643
1645: Sign-out PTA	0945: Mibilize geoprotee to have truck to change
1300: D. Baker & Plains Environmental off-site	ELIHAPT equipant for incline rock sampling

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D. Deker 69 D. Baker 68 9/18/18 Neurman Crocker Ec/4/05 Shrong 9/12/18 Nacrown Crock ELIHPT Survey Thursday Septemper 13th 2017 1000: Mobilize coopele + had buck to SB-9 for Weather: Surry 70° would : calm : CAM) Field QL of SBA EXITAT direct sensity log (PM) Sunny 80° und - 5-10mph SW 1015: Set-up at 5B-9A Personnel; D. Baker (BMCD) Locatorn 3 fect NW of SB-924/HPT Juson A. Harry W. CPlains Environmental, 1025: Begin SB-9A direct push sample Task: Field QC of ECIHPT log via direct push 1150: Brake for linch @ 40.0' bgs henel log D.Bele + Plans Environmental aff-site (FOD: D. Baker + Planks Environmental an-sofe 1250; D. B. Ker + Plains Environmental back on-site 0715: Duily sufety britf + PTA 1310: Contrine 5B-9A boring 0720: Sol-up to continue SB-9A 1705- Post-por SB-9A boring until tomunorow. 0735: Continue SB-9A borshole / hered log Dapth: 80ft bis 1735: D. Balar + Plains Environmental aff-site 635: 58-9A TO: 100A, He At recovered material 1040: fill bachele w/~1 bag bertonite plugs 1100: Sign-out PTA 1105: Lepy EC/APT files over onto thumbdome 1115: Clean + cryanize equipment 126: load Geoproke onto hand fruct 1153: D. Baker + Plans environmental affective 0 1220: Clean flest truch at corword \$8 1300: Arrive at WHG (BMCD) to unload and fire flast which m.

71 9,27.18 10-1-18 88777 J. Kemanson J. He manne Turk: September flow ganging Task: BA pond bu monincing Wenter: 705, 5-20 mph S, pully clarky - a recent Wente: 60, Emph SN, classy Pasonnel: Jonthan Hermanson Persongel: Jonatum trammour 0805: Acom onsize clack in al your 1000: Accine provide + chile m 0310: clack bore Loks to ensure fill is billing 41N1; 7.6 HCW2:24.7 0815: Begin ganging Monitoring relis pumps 6+7 pumpl mo eine en1;734.81 Mo eint compiles FD TO PL -PL. Notes 17.12 Influent: 23°C .m.w. - 🔗 👘 Bayeline: 22.5% 35.20 -BIOWA Queles Now typ 1015: Checkin wl gared MW-10 (1.92) 29.62 -1000: Meet al Keiter Brown MW- 15 15.33 32.70 -1030: Begin Ganging wells MW-141 15.65 33.27 Time Wores 14.5入 31.67 -20.07 MW-2A 8-3 1032 Lock Missing P-2 MN-3 17.26 22.37 34.01 -1036 14.03 32.00 -22.83 mw- (1 6-1 1040 12.25 33.48 -24.35 8.2 MN. 13 1044 4.45 HCW-2 1046 0415: End where levels Calsson Reading 93.05 Oq20: Port toyether of instal Mer-12 gump, cultivinte field iquipment TH.4 19.25 1150 6.97/7 10.07/10 82-1N 19.33 1153 OH: 4.0 /4 10.381,0 27.20 turs: 0.9000 HLW-1 100 (alson Reading 96.3 Con: 1.409/1.409 18.37 71-3 DD: 100.090 1110 MO River 13.00 1113 029: 237.5 1000 - Begin preying MN -13 14.81 TH-2 1116 17.90 1050: Collect Min. 3) for Metuls, Rudon, 105, Chloride track mw-9 1122 Atter Nursen 9.006 1140 Return keys & ottome -1110: Culk to kein Brown

88777 J. Herman 10.218 88777 J. + Ceimnson 10.1.18 1120: Acia @ MW. 14 to instal primp & reculiisante Task : BA Pond Groundwate monitoring Weather: 60, 5-10 mph w, overas+ PHI. Att in Iliviation would to be succeeded. KST realing Personed Junathan Humanson 40 pt at 3.00 . will continue _1 pt stick meter 0755: Asin on site of which in w) wereman gamed 135: Beyin prigny MN-14 1205: Collect Trim-14) for Metals, Inlocide, Flooride, rDS, + Badon 0805" Arin @ MW-3 to set up & cullisint cyn. primt 1225; Airly @ MW-15 to instal pamp 1235 . Begin jurging MW-14 03 10: PID not tuising on, changing battuis 1300% (611ut MW-13) for Metals (hioride, Fluoride, 105, & Radon loss not fix, call field caniton and al her silutora 1320 Arch @ MW- 8 to set up 0845; offite to pick up new PJD 1330: Bagin priging MW-S wanter orange Estate of prysing 2950: Onsize + @ MW-3 to set up & cullidente 1413 Collect MW-87, MW-8Alors, + MW-8Almso fu field equipment. Metals, Chloriste, Flusside, TDS, + andon. pH: 4.0/4 7.0/7 10.0/10 10.8/10 1435 Accire @ MW-10 to set up Enil: 0.73/0 1440: Boyta purging MW-10 WA: 1.409/1.409 1515: is lect mur-10 + Oupil) for Mehuls, church, Flowic, 102, Ruhn ORF: 237.5/ 237.5 1525: Set up Q MW.2A DO: 100.070 1530: Beyin purying MN-2A 10 10 : Beyin priging MW-3 1605 ' Lollect mw-24) for metals, chloride, Fluoride, 105, Ruba 1035 : Collect M.W-3] for Meters, Dudmm, (Maxike, Final, +703 1610 : clean up 1046: Set yp @ m ~-4 1615 : (het out w! Newman grand & off-stre 1055: Bey :- purymy MW-4 Justin Hannon 1120 : Collect MW-CD for Melais, Rudium, Chisike, Flowthey +705 \$130: (lean up & park wolars for las 1140: (but out w/ gound & offsire for Eab 10.1.18 Antun Hammen 10. d. 18

75J. recourses 33777 10.3.18 Tuok: BA pond GN sumpling weather: 70's, 5-20 mph S, purtley cloney Pasonnel: Junithan Hermanson 6705 Acom onsit & ekek in all yourd 0715: Accine @ MW-8A + begin Callideation pH: 4.014 7.017 10.01,0 \$ 769 turil: 0. 3410 10. 82/10 00:100.000 6n: 1.40911.401 02P: 237.5 0720: End calliscation 6735: Bgin zniying MW-SA 0810 : lollect MW-BA FAMW-8Alms & MW-8AMSD for Metals, (Alacide, Flourish, 105, + Ludium 0830 : Accie @ MW- 10 to cet up OB35: Bey'in punging MM-10 0915 : Lollet MW-10 + Dup-1) for Metals, (hloride, Flowish, 705, + Radinm 8925: Set ye MW-2A 0930 : Beyon proging MW-2A \$950: Collect Mr. 2A) Fr. Metaly, Chlor: Le, Flunishe, 705, & Acaim 1800: Clan up 1005 ! Check out of gand, off. site for las Jutin Hugun ". 3.18

7978 9-25-19 KCBPU Bolling MONDAY, OCTOBER 29,2018 88777 L. TURNER 1200 200 Alpha oney costs, plan com WEATHER: CLEAR TO PARTLY CLOUDY 50-70'F WITHD 5-15 SW. on open Boreheites TASK : Direct-PUSH GW + SOIL INVERTEGATEON. 1300 ALL byreholds covered applieda PERSONNEL: LEWES TURNER BID 16 Bollin, oller 0700 LOAD TRUK AND MEET W/CHREIH. HE GOT A WE METTER AND PH/COND. PRINT PAPERWORK 1353 Arrive at no verson 0030 TRUCK LAGES, GET ICE. OBST DEPART OFFICE TO SITE. PULLED OVER FUR PHONE CALLS. 0945 EPS CAUGO, PAT/BLASC: THEY HAD TRUCK ISSUES THES AM HAD TO RETURN TO SHOP TO SWAP EQUEPMENT TO DEFFERENT TRUCK THEY ARE FOREIENG AND LEANENG SHERTLY ETAMIAM 0945 4+JUTTY MOR CAUSS, GIVE KEITE H. 1005 AT NEARMAN POWER STATION, SILVI IN AT GALRA. 1015 CALLED KEITH BROWN, HE JLAT OWENDERD. WILL MEET IN Zo MIN. 1025 TALKTO GAS UTELETY, THEY HAVE TO BE PRESENT FOR DPGW-6. NOTIFY THEM OF EPS ARREVAL ~ IPM. THEY WELL RETURN. 1047 LOUKAT DECW 6, 1, AND 2 1112 TALKTO SHEARTFF RANCE. 1135 LOUKAT DPGW 7 AND 8 1205 Loncar Spen 3 1220 DPGW 2, 3, 6, 7, AND & WELL NEED CONFLETED REFORE RATIN TO MOREW DVI- TO ALLESS. 122 WNCH. 1250 BALK FROM LUNCH

81
10/29/13 B377 L. TUN 52
1600 EXTRACT RODS, ABANDON W/PDS BENTONDTE CHTPS/HYDRATE.
1610 LOAD GEOPROBE, HAS GOOLDH RODS TO BU SFUFRAL REFORE DECON.
1620 60 TO DPGW-8
1628 AT DPGU-& SETUP TEOBERIC. CENTER OF ROAD.
1630 BEGIN PROBIN, DOGW-8 DOGW-BUP/SSOI
1635 WHENT OPGW-8 (SSOI) 1-2' Arsenic Dup. 1
1640 [CULLEUT] PGW-8 / 5500 10-11' Arsenic
1650 AT 20' SAND HEAVED TO 14' BW TRIED TO CLEAR W/SANDLE
ALETATE SLEEPE DID NOT LORK. PULL AN ROOS AND PLACE
STEEL TIP TO GO BALK DOWN TO DO! KEITH OFFSITE.
1709 BALK DOWN TO DO PULLED LENTER U/TIPOT. APPROX
7' OF MATERIAL ENTERED RODS, UNABLE TO SAMPLE
BELOW 20'. PUL RODS AND PREPARE TO DP FOR
LATER.
1716 DREVE GLUSAMPLE SLAVEN TO 20' BLS.
1728 AT Jo' OPEN 4' DROP SURGED And PULLYD TO OPEN.
WE= 12.8 Bus pH= 6.7 TEMP= 18.9 Como= 1.370
1730 FELTER SAMPLE. PURLED SEVERAL TUBENE VOLIMES.
1735 COLLELT DEGW-8 /GW1 16-20' BLS FIRLD FILTER ARIENCE.
1736 PULL RODS AND ABANDON W/ POS BENTOMERE /HYDRATE.
1745 MOVE RIG TO DEGW-7 CENTER OF ROAD.
1751 BEGIN PROBING. DPGW-7
1752 COLLECT DPGW-7/SSON 1-2' ARJENIC.
1758 COLLELT DPGW-7/5502 9-10' ARSENTE.
1810 AT 25 " 8' OF SAME HEQUE UNABLE TO SAMPLE COWER.

82	83							
10/29/13 83777 L. TURNER	TUESDAY, OCTOBER 30, 2018 88777 C. TURIA							
1811 pull ROBS AND OFFIRE TO GL SAMPLE.	WEATHER: OVERCAST/RAIN JO-20.F WIND 5.15 JU							
1813 ADVANCE ROOS AND DROP SCREEN AT OFFICT LOCATION > as	TAIK ! DIRECT PUIH GW/SOIL INV.							
1817 AT DS' OPEN SURGEN AND LIFT 4 1 TO SAMPLE. 21-25'	pressonmel: LEWES TURNER							
WL= 11.32 pH= 6.9 TRAP= 17.8 COND= 1.120	0605 DEPART TO STTE							
1825 FILTER SAMPLE PURCED SEVERAL TUBERLE WELLES.	0650 AT STTE, WORK ON PAPERWORK. OALPH 4.0 7.0 10.0 Cons 44							
1835 COLLECT DEGW-7/GWON 21-25' FIELD FRITERED ARIENSE.	0733 JUN IN AT EAST LATE GO (HEULIN AT RANGE OK TO WARK.							
1839 PULL RODS AND ABANDON & BARENUS W/ BENTOMETE/HYDRATE.	0758 EPS AT SITE GET TRAZLER							
1957 PROF TRATICA W/ GESPROBE NEAR	OBIS SET UP AT OPGW-1							
1905 LOUK GATE. ADS OFFSITE RANGE.	OBIB START PROBING PROW-1 OFFSET I' WWREEWERY (2)							
1950 AT HOME, TRULLEN GARAGE	0831 COLLEGT DPGW-1 (SJOI) 1-2' ARSENIC.							
	0835 [WILEUT DAGW -1/5502] 8-9' ARJENTS.							
	0850 AT do' ~ 6' of stand HEAVS. ATTEMPT TO CLEAN							
	OUT L/ SLAGENE GOT ONE OUT NOW & SE HAAVE IN							
	RODS. Spille TO BREAN H. UNABLE TO SAMPLE DEEDGE							
· · · · · · · · · · · · · · · · · · ·	0900 prever RODS. ABANDON 6/BENTONETS.							
	0905 ADUANCE GW RODIANS 4' DROP - CRUIN TO 261 (12-26)							
	- 0910 AT 26' OPEN SCREEN ANDLEFT ROL TO DRDP.							
	WL= 10.32 pH= 8.0 TEMP: 17.1 COND: 0.850							
\\\\\\\\\	0915 PURCE SEVERAL TUBER VOLUMES THEN FIRED FILTER							
////	0935 [COLLALT DPGW-1/GWOI] 23-26' FIRLS FILTER ARUENZE.							
	0925 [LOUGIT DPGW-Dp/GLOI] DD-26 FIELD FILTER ARIFACC							
·	- 0930 pul RODS AND ABANDON W/ BENTINTE (HYDRATE							
	0946 LOAD RZG AND GO TO DPGW-3							
	0956 SET UP AT DPGW-3, DECON ALL ROBS/ SERTENS (4)							
	1013 BECIN PEDBING DPGW-3							

84	85
10/30/18 88777 L.TUNIA	10(22/18 B B CT L. TURNFR
1015 COLLECT (DPGL-3/SSO) 1-2' ARSENT	1300 LOAD REC ABAMDON BRENIS L/ MANTONETE
1019 COLLELT [DPGW-3/1102] 7.5-8.5 ARSENTI	1315 SETUP AT DPGW-J.
1019 CONELT [DPG-W-Dup / 5502] 75-8.5 ARSENZC	1318 BEGIN PROSING AT DPG5.
1023 AT 20' AND 7.5' OF SAND HEAVED IN RUD TRY	1319 COVET DPGW-5/5501 1-2' ARSINTO
TO LEAN FT OUT 9'IN ROD NOW. UNABLE TO CLEAR	1324 Concor DPGW-5/5502 9-10'
Stop SAMPLENC. READUL ALL BDJ.	1384 COLLELT DPGL -5/SSOZ MS/MSD 9-10 ARSENIC
1034 BENTN DREVENL SCREEN /ROOS AT OFFICT LOCATION FOR	1340 AT 25' - HEAVENG SAMO 7' UNABLE TO CLEAR.
GROUNDWATER	PULL RORD AND OFFIET FOR GROUND WATER.
1039 AT 26' OPEN SURGER AND RETRACT RODS 4' TO OPEN	1345 DRAVE RODS AND SERVEN TO Dig. BLS.
SAMPLE INTERVAL 22-26'BW. PURCE TUBING WILMED,	1350 AT 28 OPEN SCREEN AND put up 4' TO OPEN.
WL= 9.51 pH= 7.4 TEmp= 18.6 COND= 1.200	L= 11.46 pH=7,2 TEMP= 17.3 Comp= 1.330
1050 COLLECT DEGLI-3 /GWOID 22-26 SIELD FOLTER ARIENTI.	1355 purche TUBERL VOILING AND COLLENT FIELD FILTERED.
1055 PULL RODS AND ABANDON BOTH BORTHLS -/ BENTONETE	1400 COULELT DPGW-5/GWOID 24-28' FIFLD FITTEND HRUFNEL
AND HYDRATE	1405 PULL ROOS AND ADAN DON BORSTOCK. RATINING
1110 GO TO DEGU-6 SCT UP.	1410 GO TO DPGW-4
1140 BEGEN PROBING AT DEFU-6 SPOKE TO CHROSH WATER	1405 BEGIN PROBING DPGW-4
1142 COLLECT DPGW-6/SSOI 1-2' ARJENTI	1476 CONELS DPGW-4/SSOT 1-8' ARSENIC
1146 COLLEUT DPG-W-6/5502 15-16 ARIENTE.	1430 COLLENT DEGW-4/3502 10-11 ARJENEL
1200 AT 35' EXTRACT RODS AND ARANDON W/ BENTONETE.	1445 AT 25' HEAVENL JAND S' UNABLE TO CLEAR FROM
1204 DROVE RODI AND SCREEN TO 24'	BARREN, STOP SANDIENG, EKTRACT RODI AND
1220 AT 24' OPEN SLREEN AND LEFT ROOL 4' TO TROP.	ABAN DON BORING.
HAVE TO WATT FOR WATER.	1450 DRIVE GROUND MATER SAMPLER 4' DRUP SURREN 2028'
1836 WL= 18.18 pH = 7.4 TEAD= 18.1 COND=	1455 GREN SURFA LEFT 4. TO OPEN SURFA
1340 PURLE TUBING VOLUMES AND FIELD FILTER.	WL= 12.74 pt= 7.4 TEMP= 17.8 COND= 1290
1245 COURT DPGW-6 /GWOI TO-24' FILD FRITTA ARIENT.	1457 PURCE TUBING US LUMES FIELD FILTER SAMPLE

86		87
10/30/13 88777 L. TURNA		
1515 CONECT DPGW-Y/GWOI 24-378) ARSENTE FIRESFILTER		
1575 COLLECT DACK-A/GLOIMS/MJD 24-88		
1515 PULL RODI ARAMON BARTAR FAS DECON.		
1527 LOAD ROL/DELW.		
1545 EPS OFFITTS SIGN OUT GO to LAS.		
1605 AT PACE ESC DESPORT. THEY WILL PACK AND SHID.		
1600 COCS STONED PACE TAKES CUSTORY.		
1610 DEPART TO GREACE		
1638 AT KE OFFICE, UNWAD TRUCK.		
120 13		
	• The second	
		19-19-200-2010-0-0-4 maxim
		1

90	
11-19-18 6 Leword	91
0840 Lever office for Field Day	SCHOTTE SCHOTTE
1845 onste, weet w/ 1kgth Brown (11m)	
WWYTHER : 32°FZ Dave (1005)	Time Has 24. LOWD TEMP DO ORP TUNB D74
1145 Set is Co. Friday in the	1370 250/625 6.9310,642 14.08 9.96 -1500 28 13,67
i i i i i i i i i i i i i i i i i i i	1325 250/75 6480 0.642 14.21 0.90-149.3 26 (3.67
Well 13 DTW TO DIAMEN MILL TIME	1330 2507 P.o 6.982 0.641 14.15 0.86 -142.3 23 13.67
MW-15 18,41 Rung 2" 33,18 1118	1335 TSB 110.5 69810.640 14.17 0.87 -145.1 19 17.0
MW-19 20.15 Pump 2" 33.25 1022	1340 250/120 6.980 0.640 14.08 0.84 -142.9 15 13.02
131	1194 250/135 6.981 0.636 14.07 0.81 -1491 16 1267
17.63 Prap 4" (134)	1350 250/15 6:979 0.636 14.12 0.90 -147.5 13 1717
# MW-3 does not have 200-Lock on well	1385 250/14 6.979 0.635 14.03 0.80 -146.8 0 74 12/2
MW-4 1407- RUMY 4"	1406 role - Mun B/Glund C + 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
Kuth Brown des by to are as by light	Tor t-ssolver + June Lawas As.
MW-10 B27 RIAND -"	Drus Polling Smpty - 13.67
MW-8A 18.55 75 2"	1415 Sel up @ MW-16 (Non-reducted Bump)
MW-16 14.89 7 7 1002	TIME Flow VOL pH COND TEMP DO ONLY TURB DTW
MW-13 13.69 2:00 214 12/0	1445 350 J 7018 1.60 3 13.78 2.81 -42.3 19 14.80
33.13 1215-	1450 250 6.25 6.95 16 1.005 13.74 0.81 -62.3 13 14.94
BULLS CITIBRATE YSI MUTIMELA:	M55 200 26 6.810 1.00 13-76 067 -676 9 14 40
DO= 100% ORPS 11: 4.0/1.0/10.0	1500 750 3.75 6.863 1000 (380 0 50 -715 6 1120
(11409) CONDI TURE = 20/11 100/98 900/791	1505 250 50 6:35 1,002 1271 041 72
TIME Flow VOL PH COND TRIMP DO BRID TAB NO	1510 7.50 6.25 6.863 1602 12.22 648 222
1245 350 I 7,680 0,635 14,17 301 1112 30 345	1515 c. 1/2 1- 10 1/2 514 51 12 5 14.20
1300 250 1.25 7.121 0.634 13.51 2.92 71 8 42 001	100 concer MW-16/6W For Dushed + Total As
1305 150 2.50 6.487 0.627 1212 2.50 W2 2 65 121	The @ folling super = 14.90
310, 250 2-16 (.983 O.641 12 26 A.S. 10-1 03 13,66	1330 DELONN New - Reducted Pomps
1315 20 60 6.990 0.647. 4000	1540 collect Rousins BLANDIC
1010 100 510 0100 01010 19101 1121 - 1481 76 1367	

92	98					
.11=19-18 Sturre	1/20-18 K. Schutte					
Let JOC MW-14 200 DZW2 19.41	0815 ADDIVE & Mutheson GAS TO REF.M.					
TIME Flow YOU BY COND TEAD DO ORD FURB DTW	Cor TANK					
18 13 200 I 10.25 1110 14106 3.46 -19071 3 19.41	0900 Pull up never ice					
350 200 1.25 7.106 7.406 19.76 0.27 12.7 4 19.48	0915 Annire on-sile					
1355 250 250 6,802 1.186 14,78 0,25-15-3 4 125+	Withrows; 29°F, clean.					
1600 250 201 6.801 1.185 14.95 0.24 1111 1 1965	0930 Cello ruhe 75. Zo					
105 230 3-6 6.804 11105 14,14 0:03 10/0 4 11.11	PH= 9897 1-7 1 10.01 \$ PH DRIFTING					
HILL I MULLY	The station in the second second					
The CA A ALL CUM TEAR DD ORP TURE DTAIL	Sel- N C MW-4					
1625 250 -7 6.835 5.768 19.58 1.25 3.6 6 13:54	MW-4 65614.31					
1630 250 h25 6.872 0.674 21.87 0.51 - 1822 4 18.89	TIME Flow VOL DH CONN TEMP DO ORP TORB DTW					
1538 250 2.5 6.876 0.671 21.82 0.37 -421 4 18.83	1000 2000 I 6.8 0,944 14.27 2.60 -4.6 \$11 14.32					
1640 250 3.75 6.877 6.680 21.78 6,35 -57.2 3 12.00	1005 200 1.25 5.7 1.9.55 14.69 1.17 -44.8 4 14.32					
1645 250 5.0 6.877 0.681 21.56 0.34 -53.1 3 18.89	1010 250 2.5 6.7 C.959 14.84 1.01 -50.6 Z 14.32					
1650 250 6.25 6.878 0.68 21.60 0.34 -55.1 3 18.88.	1015 250 3.75 \$ 70.959 14.86 0.90 -54.1 2 14.32					
1555 collect mw-15/6W + MS/MSD (W1= 18.89)	1020 - Bour 5 G.7 C.960 14.91 O.86 - 53.1 1 MBZ					
1720 OFFS,75	1625 256 6,05 2.7 0.900 14.94 0.62 -53.5 1 14.32					
	1030 (the - MW-4/aw For As (Tot + Duschal)					
	Find DIL = 14.32					
	1038 ALAW C Mue 3					
	Lock has been alt. Fix huge on					
19 // //	well so sent new lock well fet					
· · · · · · · · · · · · · · · · · · ·						

94	95						
1-20-10 K. Setwork	11-20-18 K. Schutte						
MW-3 D/w=17.25	MW-10 cont.						
- TIME FLOW VOL PH COND TEMP 20 ORD 7.023 DILL	TIME Flow VOL pH WWO TEMP DO ORP TURB ATW						
1 1045 230 7 6.7 1.007 13.12 3.16 41.8 12 17.26	1235 250 3.75 6.6 1.210 15.46 0.20 -39.6 10 13.39						
1 1050 280 1.25 6.0 1.126 19.07 1.75 -38.3 0 17-79	1240 250 5 6.6 1.209 13.41 0.20 .39.4 9 13.39						
1 1033 256 2.3 6.6 1048 14.44 0.75 -71.4 S 17.90	1248 250 6-25 6-6 1.206 13.38 0 64-381 4 13.39						
- NOO 250 S.N 6.6 1.47 14.59 0.39 - 10.1 9 17.78	1250 Collect MW-10/64-1 + DUPX/64-1						
- 1105 050 50 050 1144 1150 050 - 18,0 4 11.13	D7W = 13.39						
1110 286 6.0 0.0 1.130 14.47 0.51 11.1 4 17.14	1300 Sel UP C MW-BA DTWE18.70						
1115 Collect MW-5/6W-1 For AS (WITHUSSUND)	TIME Flow WE pt COUR TEMP DO ORP ZURB DZW						
10 DIW-11-11	1305 250 Z 6.9 1,00 14.80 4.4 -12.1 11 18.10						
150 Set OP @ MW-ZA DTW-15.41	1310 BC 11B 6.7 1.20 B.SC 211 1.1 63 1010						
112 THE THIS VOL DU COM TEMP DO CITY TURB DTW	1315 AG 25 6.71,220 15116 101 -1110 - 10,10						
1155 20 2 11 0200 1410 135 1151 79 15.43 1140 750 175 66 mark 1478 127 57 1 27 1543	1320 250 6. + 1.005 1560 0.512011 10 16.70						
1145 75 75 66 AGAL 14 77 083 716 12 15 43	1220 000 (ac il 1221 1022 021 -39.0 01 19.70						
VIXE 260 27K 66 0000 14.70 0147 74.7 9 15,43	1330 630 64 65 1.231 13.13 0121 2468 16 12.78						
1155 ASK SIL GOT 0.909 14.79 0.45 -27.5 7 15:43	1555 200 115 610 1239 1011 019 - COL 12 1870						
11202 220 612 67 6909 14.81 0,44 -28.7 6 15.47	15-10 250 UN 66 1240 15.77 0118 - 50.7 9 18.70						
120 Collar MW-ZA/GW-1- For At (Dist zutal)	BTS Colled Mars- AA / Gurd For AS (Tot + Disc)						
Flue Anna K.43	DTW = 18.70						
- 1215 Set US & MW-10 117, 13,37	1400 Deell 10 and alexand						
TIME FLOW VIL ON COMP TEMP DE DAD TWA DIT	1410 OFFSITE FOR PAUE DROP-OFF						
1220 250 I 6.5 1.184 18.17 205 -1.2 70 13.39							
125 200 1.25 6.5 1.212 15:41 0.82 -27.2 70 13.24							
ha- 256 75 65 1.213 1552 0.39 -39. 12 :3.29	11-20-18						

Project Name KC-RQ() A1	POLLADIA A CC	ecit	Project Num	per s	8877	17			Boring Nu	umber	mw-	-15-	
Ground Elevation		Location	Kar	ah ilr			Page lof 2						
Air Monitoring Equipment	el Ur								Total Footage 30				
Drilling Type	Hole Size	ə	Overburder	Footage	• .	Bedroc	k Footag	je	No. of Samples			No. of Core Box	es
Direct Rich	2"/444		2	2									
Drilling Company	1		.		Dril	Driller(s) TONY Poul			~				
Drilling Big	KAZGE				Typ	e of	5-1 ee	_ (కెట	n.L	· · ·			
Ges op wh	e 7822	R			Sar	npler	V	Maci	(ocer				•
Date 9-20-18	То	9-2	0-18		Fiel	d Observ	/er(s)	ier,	n B	ollin			
Depth (feet)	Description	.*		Class	Blow Count	Recov.	Run/ Time	Sampl Desig	eBZ	PID (ppi BH	m) S	Remarks Water Leve	/ els
- <u>Silt vitor</u>	1×4/3, Du)								•			
	un Ma			2	-								
SILEY IEN	Ny day 5.	9×14		- <u></u>		4							
2	•					5							_
		-11											
3 - Sand, very E.	ento avasida	our	2										
- 91141 101	N y dong	5-14					:						4
4 - 50 200	IC'IL S	9.01.	a bour										-
- Silve to a	ed and sande	Q - 10	ie crail	1			1640				· .		_
		1	J* /	ſ									
6-SICt 110	yr 7, den	f, me	de										_
- Sircy No	in plastic, +.	(0 - 1 (2)	15			4		-					
7						5		-			. 1		_
												5.	_
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SAWD,	cine sound	1041	1 4										-
ourpile =	suse,		 										_
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				-									
BZ=Breathing Zone B	H=Bore Hole	S=Sample						<u> </u>	<u> </u>		05	1601 Form WC	

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								•		Boring Nu	mber	mw	-13
Project N	Name	ACBPU							•	Page	20	52	
Project N	Number <	18777						•		Date	9:20	,-13	· · · · · · · · · · · · · · · · · · ·
Depth						Blow		Run/	Sample		PID (ppm)	Remarks/
(feet)	Asite	Description	on		Class	Count	Recov.	Time	Desig.	BZ	BH	S.	Water Levels
15-	dang.	10053	en egron				-	1649					
16 -	- - - -	нина. 1	•	 	an se An An An		25						
177 -					н. 		50						
18 -	well	н., .											-
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10-				•	. –	·		Kuss	. .				
21-							20				- 11 a g e 		
72-	-						50						
23-	- - - -		·										
24- 		· · · · · · · · · · · · · · · · · · ·						1768					۶ ²
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29 -	five to	COrrer W	gravels										
30-													
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32											<u> </u>	<u>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </u>	· · -
3Z=Breath	ning Zone BH=	Bore Hole S=San	nple	BURN	15 🗶	M⊆D	ONN	IELL	і Пи		(\mathfrak{I})	010515 Fo	rm WCD-KC-2-:

				Drill	ing	Log		*t.		. 19		•
Project Name	2PU		Project Num	ber	88-	177	,		Boring Nu	mber N	1765-	14
Ground Elevation		Location	Ka	1 5a	< ()	h)	20		Page	100	5-2	
Air Monitoring Equipment	· La .	- I				<u> </u>			Total Foot	age ,	30	
Drilling Type	Hole Siz	ze	Overburder	n Footage		Bedroc	k Footag	e	No. d	of Samples		No. of Core Boxes
Bireed Rusy	8.70		2,	`		-						
Drilling Company	1- (1		Driller(s)								
Drilling Rig	+7EK 70			-	Ty	pe of mpler	Uny	Par	tter	Gre	<u>'9 Go</u>	od- <u>(</u>
Date Q 2 10	To	<u>877</u>			Fie	eld Observ	ver(s)	acro	<u>cus</u>			
1- 20-06	,	744	0-18				D . (Nov	nk	PID (ppm)		
Depth (feet)	Description			Class	Count	Hecov.	Time	Desig.	BZ	BH	S	Water Levels
= 51(7, 20	R gran	sh 6st	510-00				PIYI					. –
- HUY OF	Days S	>0ft				3	-					
	т (<u>)</u>		·			3						
												-
3 -Sut co	adela	18-11	03									
- Chil) 										
4 30tr, 10	ar, plas	lisiki	Jay,									
- SILT RGO	you gree	1	t. s. t.				BA A de					
5	our torpes	13 mo	1917		•		1910					
= CLAY,	en Sal	L Srugiz	hlias			4						-
6 TINYA3	Sons.	meln	self			6						
Meduple	itic "			· · · ·								· · · · · · · · · · · ·
7 SAUVIS	, my soul a	-megr	eins,									
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						5						
12	· .					-						
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13 - SAWD, M	redung	perely u	SUND,									
14 - Dury, 10	ose pood	my grou	NS ()									
BZ=Breathing Zone BI	H=Bore Hole	S=Sample	· · · · · · · · · · · · · · · · · · ·		\						05	1601 Form WCD-2-1

×		· .					Boring Nu	mber M	k2-14	
Project N	Name KCBPU						Page	Zof	-2	
Project N	Number 88777	-		· .	. •	<i>*.</i>	Date 🤇	7-2-	15	
Dopth			Blow		Run/	Sample		PID (ppm)		Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	BH	S	Water Levels
-	SAUND, 10 1/2 Sarry, meder						• •		ц	
15-	grand, poort grobel lave				-					·
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25	10-124 Cretompl.	-				· ·				
	greich of these			· .						
26-	atulal wer was pooly			1.5	4 · ·					· · · · · ·
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20-	E-DA Z-V							eteretereteretereteretereteretereterete	2 3 3 9 1 200 200 200 200 200 200 200 200 200 2	Description a substantial fields a first time instantials of substantials and the substantial of substantial of the substantial
	cers so logs								· ·	
31-										
32								•		

BZ=Breathing Zone BH=Bore Hole S=Sample

010515 Form WCD-KC-2-2



			Boring Nu	imber 🁔	WCw -	13				
Project Name	KCBPU					}	Page	2	of 2	5
Project Numb	er SSII7			- <u>r</u>			Date	9-26	18	
Depth	e e e e e e e e e e e e e e e e e e e		Blow		Run/	Sample		PID (ppm)		Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	вн	S	Water Level
	with the state of				• .					
5-6.1	TO TAKE	100 MF	ļ		<u>1949</u>	-				
	pring the grant									
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	an and the second							1 - 1		
M 35A	KUP, toyellasish brown									
	orres, wet bore funto				69153	-				
0 m	ed grand				- Contraction		6		,	
	er .									
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n-				5		-				
23-1-										· -
15A	WD, Sork gran 10 m. 41/1									
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>(=					1					
325										
Breathing Zo	one BH=Bore Hole S=Sample							(010515 Fo	rm WCD-KC

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Project Name Nearma	in Creek	Project Nun	^{nber} g	387	77			Boring Number DPGW	
Ground Elevation	Location	1	~					Page 1 of2	0
Air Monitoring Equipment	M							Total Footage	
Drilling Type	Hole Size	Overburde	n Footage	э	Bedro	ck Foota	age	No. of Samples	No. of Core Boxes
Direct-Push	3.75"	<i></i> 20)		\sim	A		3	NA
Drilling Company	ès				Driller(s)	Blas	se M	artin	
Drilling Rig 783	3 DT				Type of Sampler	Ac	otate	Skeve	
Date 10/30/18	To 10/	30/18			Field Obser	ver(s)	Henry	I Turner ST.	5
Depth (feet)	Description		Class	Blo Cou	ow Recov	Run/ Time	Samp Desig	lePID (ppm) · BZ BH S	Remarks/ Water Levels
Asphalt grave (o.4' 'ay, very dark gray.iel anp , nedwn to low , teacy.	brown plasticity,	ML	N	A	NA	DPGw SS01	~A - \	START OBIS DUAI-TUSE Offset XJ
2					215		1-2,		1000 recovers
3 4									
									0830
5 SAND, Arace 6 Firegrain, lo	s. 14, pale brinn (10) lose moist, pourly g	(R 6/3) (e&).	Sp						
- STIT, some cla 7 - Wet, medium	y, very dark groy G n plasticity, soft con	LEYI (JN) Withency.	ML						
SILTY SAND	very dork grus Gle	- <u> </u>					DPGN 5302 8-9'	-1	
uet, trace p	last-cay, soft		Sp						0835
11 SAMO. brown 10058, met, po	SAND. brown (104R 4/3) Finegram, loose, wet, pourly group)								mosster
13									
14 7									

BZ=Breathing Zone

BH=Bore Hole S=Sample



			Boring I	Number	DPGW-	· [
Project	Name Neurman Creek						Page	2 of	6	
Project	Number 88717						Date	10/30	1,3	
Depth (feet)	Description	Class	Blow		Run/	Sampl	e	PID (ppn	n)	
14	- Sand Jown (1048 1/2) Surger	Class		Reco		Desig	. BZ	ВН	S	Water Levels
	= lowe, wet iporty grades.	96	1019		/ / 4					BUNG
15 -	-						+			
	-									
10 _	-									
	-			5/5		-		-		
	-									
18 _										
19 _	SAND, brown (104R413) Toole, fire to	5.0								
-	medium grain, wet, pourly graved	>p								
<i>β</i> υ −										Obso Stop -
-	Bottom of Boring - SAND HEAVE.							*		
-										
						Doci				
-						GWOI				offset Boring
						99-96	1			for 6w
						Dup				-
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Project N	^{Name} Neorma	n Creek		Project Num	ber	887	77			Boring Number	N-2
Ground	Elevation		Location							Page OF D	i
Air Moni	toring Equipment	NA	<u> </u>							Total Footage 25	
D	rilling Type	Hole S	ize	Overburder	n Footage		Bedroo	k Footaç	je	No. of Samples	No. of Core Boxes
Direc	.t-Push	3.75		95	•		٢	UA		3	NA
Drilling C	Company EPS					Dri	iller(s)	Blase	Mo	rtin	
Drilling F	ig 7833	DT				Ty: Sa	pe of mpler	Aceta	te sh	eere	
Date	0/29/18	Tc	0 10/00	ñ/18		Fie	ld Obsen	/er(s)	Lewis	Turner J.F.	7
Depth (feet)		Description			Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ BH	Remarks/ S Water Levels
	SILT , trace	clay, very di	ark gray	ish brown	ML	M	•	NA		MA	START 1454 -
	1 - plastic, nedium to soft Consistency.								DPGW	2	Dux1-Tube
		· .			3.5/		5501				
2	traction co			P	3						
	CAND for		ļ								
3 -	(104R 5/6) f	ine ara: . 1	oose, da	np	Sp						
	pourly graded			•							
								•			
5				<u> </u>					DOLU		
	SILT, SONES	olastic, sof	gray (1 t consist	oyry,) Hencu	ML				SSOD		
6 _				-,.			3.5/		5-6		
	harrowski tilitilijion - Alfikjezio	The sound of the	the state of the second	- Course and a	-		/5				<u>v</u>
	SAND, trace	silt, pale	brown	(104R6/3)	_						moisture
8	Finegrain,	loose, dam	, to no ?	t to wet,	76						
	Porty graves).									
9 -											
											1457 =
	.0										
11 -	1										
							3.8/5				â
12 _											
-	12 - keremen very derkaran (cleve 36)										
	3 - Becomes Very Obrie gray (Gley 1 3/2)										
14			· .								

BZ=Breathing Zone BH=Bore Hole

S=Sample



			Boring N	Number ${\cal D}$	pgw-d	25 ²²² 0wm				
Project	Name Nearman Creek						Page	2 of 2	<u>}</u>	
Project	Number 8977		- <u>r</u>				Date /	0/29/18		
Depth (feet)	Description	Class	Blow	t Recov	Run/	Sample	BZ	PID (ppm	n) S	Remarks/ Water Levels
14	SAND, dark grayish brown (Lover 41.)	CA	MA		NA			NA	-	_
1	Fireto redium grain, losse, wet	sp								1500
12 -	-									
16 _	-									-
	-			Ч,						-
17 -	-			1/5						
	-									
18 -										
19	4									
20 -	trace shale fragment,	Statement and a state								1510 -
-	- , , , , , , , , , , , , , , , , , , ,					DPGW.	8			Offsite Boning
91 -						G-Wol				For GU
ן אר				5/5						
23 -										-
24 -										
-										ISUN STOR
<u> 35 –</u>										1013 014
-	Bottom of Boring - SAND HEAVE.									-
-										-
_										
-										
-										
-										
-										-
			i							



Project	Name Neorma	Project Nun	^{nber} 8	88777				Boring Number						
Ground	l Elevation		Location							Page	1 af a	<i>≻</i>		
Air Mor	nitoring Equipment	NA	I							Total Foota	^{age} 20			
	Drilling Type	Hole	e Size	Overburde	n Footage	,	Bedroo	ck Foota	ge	No. c	of Samples		No. of Core Box	es
Die	ect-Push	3.	<i>d5</i>	Sc)		N	A			3		MA	
Drilling	Company EPS						Driller(s)	Bla	se n	natio				
Drilling	Rig 7822	DT					Type of Sampler	Aca	h lo	Sleave	9			
Date	10/30/18	~ 1	To 10/3	0/18			Field Obser	ver(s)	Ler.	JREA LI TU		J-T	5	
Depth		Descript		,	Class	Blo	w Recov.	Run/	Sampl		PID (ppm)		Remarks	/ uls
	CLAY with S. 14	, very Jone	grayist bro	walion R3/5)CL		<u>~</u>	NA	Desig.	BZ	вп	3	START 101	1) –
	SELT, trace cl	ey brown	~ (104RY/3)	, Jano			14	,					Dual-Tube	
1	Non plaster,	soft cons	Stercy	, a	ML				DPGW SSOI	-3				
2				-			315		1-2'					_
	= SAND, trace silt, brown (104R4/3) fire = grain, lowe, damp, poorly grades.													
3			in given							2				
	-													_
4							- - 							
5	I mm dork sean	•			·			<u></u>					1015	<u> </u>
-	-									ŧ				
6 _													-	
							3.5/							
7							3							_
8									DPGW	-3				_
									5502	5'				-
9 _									Dip					-
													1018	
10	Becomes wet									<u></u>			moisture	
- - 11														
			·				4/5							
12 _														$\overline{-}$
13 -	SAND, trace ST	h fire t	-omesium e	ram	SP									
14 -	506~ (1041241	3) 10050,	ver, por	y gradel	-									
3Z=Breat	hina Zone 🛛 🛛 🛛 🛛 🖓	=Bore Hole	S=Sample									051	1601 Form WCE	J-2-1

BZ=Breathing Zone BH=Bore Hole



	Project Name Nearman (reck							umber	DPGW	-3
Project I	Name Nearman Creek						Page	2 01	<i>ډ</i> ک	
Project I	Number 88777					-	Date	10/30	/18	
Depth			Blow		Run/	Sample	,	PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	ВН	S	Water Levels
14 - 	SAND, trace silt, Fire to course, firegrand traces. Scourd (104R4/3), lowe, net, cellgrades	Sp	NA		Ma			NA		1020
17	Dark area bloud(104R3/1) 0.84			5/5						
(9 2										- - 9072 860/
	Botton of Boring. SAND HEAVE.					99-39 Dben	- 3			offset Boring - For fru -



Project Name	Project Num	roject Number 8877フ					Boring Number						
Ground Elevation		Location)						Page	1 of 2	\mathcal{F}		
Air Monitoring Equipment	MA								Total Foot	age ds			
Drilling Type	Hole	e Size	Overburder	n Footage		Bedroc	k Foota	ge	No.	of Samples		No. of Core Boxes	
Direct-push	3.3	d5 ''	<i>ə5</i>	s .		\sim	'A			3		\sim 4	
Drilling Company	_1	<u></u>			Dri	ller(s)	Blac	e ma	artin				
Drilling Rig	DT				Typ Sai	be of mpler	Acet	fete S	leeve				
Date 10/30/10		To ha/2	. <i>I. v.</i>		Fie	ld Observ	^{rer(s)} /	PLIC	Turne	- 1-	T7		
Depth (feet)	Descripti	ion		Class	Blow Count	Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm)	S	Remarks/ Water Levels	
- SEVE With	clay very	dark gray	rich brown		MA		NA			NA	L	START 1495	
(10yr 7/s)	dans, nei	Na plost	JE.7. y, Soft.	BNL		ə <i>1</i> 5		Орсы 5501 1-д'	9- Y			Dual Jube _	
4 - SEVT NEW - demp. Non 5	J' Sand Seam. SEVT Nerr dark grayish brown (104R31) danp. Non plastic , soft.											1436	
6 7 SAND, +ra finegrain 9 1 9	ce s.74 pa house, da	ile brown (np. pourly	10 YR 6/3) geaded.	sp		θŀ							
-2 - 10058, JAN) Finegras) Poorly g	ark grayist n , trace M roded Bewa	h brown edium wes wet	sp		3}5		ррсы- 550д 10-11 '	Y			moisture	

			Boring Number DPGW-Y							
Project I	Name Nearman Creek						Page	2082	•	
Project I	Number 88777				1		Date	10/30/18		
Depth	Description	Class	Blow	Deserv	Run/	Sample	P7	PID (ppm)) 	Remarks/
IV -	Can the sill a shirth how	Class	M		NA	Desig.		NA		
-	Lipus V/N Fine arous trace medium	SP								143
	long dalt and will									
-	i war wor , party graei									-
- 01										-
17 _				4/5						
-										
13 -										
			1	1						
9 _				ļ						
										1470
}• –										
- 16										
-				5/5						-
_ ۲										
ן אר										
-										
24 _						Decm	y			Boring Office #
-						66.01	,			for Gw
dr _						ms/m	<u>ده</u>			1445 STOP -
-	Bottom of Boring - SAND HEAVE.									-
-										
-										-
										-
-										-
-										-
_										
	1				-					



Project Name Nearmon Creek			Project Number 83777					Boring Number					
Ground Elevation Location									Page 1 of 2				
Air Monitoring Equipment									Total Footage				
Drilling Type Hole Size			Overburden Footage			Bedrock Footage			No. of Samples	No. of Core Bo	xes		
Direct-Push 3,85			25			NA			3 NA				
Drilling Company						Driller(s) Blace A			lartin.				
Drilling Rig 7833 DT						Type of Sampler	Ace	tate.	sleeve				
Date 10/30/18 To 10/30/				Field Observer(s)				Lei	Luis Turner JTZ				
Depth (feet)	Description			Class	Blc Cot	ow Recov.	Run/ Time	Samp Desig	e PID (ppm) BZ BH	Remarks S Water Leve	s/ els		
SILT with c (104R 3/2) 1 2 3 3 4 4 5 6 7	ley very dark danp , ned.un dork gray.il t. trace plost	grayin plastic brown ic.ity, w	ih brown i-ty, Soft. (wyr.3/2) ift.	ml	~/	A 2.5/5 315	NR	Dp62 5501 1-2'	9-5	START 131 DUAL . THBE	8		
8 9 SAND, trace brown (104R 10 10 11 12 13 13	41,), fineg	oun(ioy rain, l	RG 15) 2028, met	26		315-		Dec.w. Ssod 9-10' NS/MS	5	1320 V noisture			
14		0											

							Boring Number DPG5				
Project Name Nearman Creek							Page 2 of 2				
Project Number 88777						Date 10/30/18					
Depth			Blow		Run/	Sample	e	PID (ppr	n)		
(feet)	Description	Class	Count	Recov	: Time	Desig.	BZ	BH	S	Water Levels	_
19	SAND I tracesilt, pale brown (104R6/3)	sp	NA		NA			NA			
15 -	poorlygrades.				+					1324	-
											-
16 -	-									-	_
-					-						_
17 –				1/5						-	-
-	-										
¹ 8							2			-	
- 	SAND. Very dork gray (bley 1 3/2) fire	T A				ed at					1
' =	to coarse grain, loose, but, noderately	5(
20 -			****							1307	1
											_
21 -										-	-
-				5/2	1						
99 _	Finegrain			3						-	-
_		1									-
93 –										_	
-											
24 -	more gravel.					DOGLIN	٣			Offset Boring	-
						Gwol	,			1340 STOP	
25 -						09-00					
-	Bottom ut isoning - Heaving SAFD										
-											
-						-					
-											-
										_	
										· -	
										-	
-										-	-
-										-	
										-	


Project Name Near Man	Project Nur	iject Number						Boring Number						
Ground Elevation		Location								Page) of	: 3		
Air Monitoring Equipment	NA									Total Foo	otage 35			
Drilling Type	Hole Size	•	Overburde	en Footage	э	Be	droc	k Foota	ge	No.	of Samples		No. of Core Bo	xes
Direct-Push	3.25		35	5			~	YA-			3		NA	
Drilling Company						Driller(s		BIA_	se N	lartin				
Drilling Rig 7833 0	51					Type of Samplei		Acet	ste s	sleeve				
Date 10/30/18	То	10/3	0/18			Field Ob	serv	/er(s)	Len	istur	ner y	E-F-		
Depth (feet)	Description			Class	Bk	ow Re unt	cov.	Run/ Time	Sampl Desig	eBZ	PID (ppm)	S	Remarks Water Lev	s/ els
- CLAY with si	14. very derie	grayish	brown	CL	N	Ą		NĄ			NA		START UYC	, _
1 = (104R >12), 1 = plosticity, 1	= (loyr >12), damp, movements trace = plosticity. medium consistency								DPGW	-6				_
STIT Araia	- STUT, trace clay very dark granich								5501					-
2 brown (1041	brown (104R 312) damp. trace plastic.7.								1-0					
- Mesium con	medium consistency.													_
4														
							·						1142-	
5			-				_				999-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6		1198	
SELT, +race	clay, dark gro	y (IOYR	۲ <i>4</i>)	ML										
	ratic, melium	wasitea	cy.											
7							-							-
8														-
9														
_ SILT with all _ dame. medium	lay, brown (ioyr 4/3)	ML									1.11.72	
10	prestrent, me	io.va wa	Jistency -				_			54-750 ⁶			(143	
Stir with da	y, brown (10	4R.4/2) (an -			2 <								
12 pleatic.ty. da	plasticity, damp, medium (104123/2) medum					1.1								
	TING	UNJ-148 KC	ŋ.											
13	-													
14														4

BZ=Breathing Zone BH:





			Boring Number DPGW-6							
Project	Name Nearman (reck						Page	2 of	3	
Project	Number 83777				1		Date	10/30/18	;	
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm BH) S	Remarks/ Water Levels
14	SILVE, with clay, brown (10418413) and bery dark gray: sh brown (104123/3) dans medium al. with the medium consistence	ML	NA		NA			NA		1144
16 -				5/5		Орьш 5002 15-16	-6			
17 — 18 —	STUT with very fine Sand, Jark grayish brown (104R4/2) thoist to wet, nonplusts , soft wasistency.	ML			-					moisture
19 -	SAND with with Exercision , dark									1146
ð1 —	gravist brown (134R418) wet, loose, poorlygrades.	sp		\$1		*	DPGW-1 GW01 20-24'	6		Offset Boring For Gw.
93 -				75						
ач Эч										1148 -
35 - 26 -							<u> </u>			
- - -6				5/5	-					
28 29										
30	SILT with day and fire sand, very dark greenish grow (Gley 1 3/1), het, medium to high plasticity. Soft considency	ml		5/5-						15 <u>5</u> - - - -



			Boring Number DPG-W-6							
Project	Name Nearman (reek						Page	3 of	3	
Project	Number 88777						Date	10/30	/18	
Depth			Blow		Run/	Sampli	e	PID (ppm	1)	Remarks/
(feet)	Description	Class	Coun	t Recov	. Time	Desig.	BZ	BH	S	Water Levels
32	SILT, with clay and fine sand, very dark	m	NA	•	NA			NA		
33 -	to back all the large (Gley 13/1), wet medium			÷,				1		
				15						
34 _	-									-
	-					-				
35 -						<u> </u>				1200 STOP -
	Rother of Baring.					-				
					-					
]									
			ĺ							
	-									
-	-			3						
-						1				
	-									-
-										
-										-
								7		-
-										-
										-
-										-
										-
-										
-										
-										-
-							i			4
									· Particular in the second s	
-										-
										-



Project	Name Neorman	Project Num	^{iber} (387				Boring Number DPG W - 7					
Ground	Elevation		Location							Page	1 of 2		***
Air Mon	itoring Equipment	NA	I							Total Foo	tage 25		
C	Prilling Type	Hole Size	e	Overburde	n Footage	•	Bedroo	k Footaç	je	No.	of Samples	N	lo. of Core Boxes
Dire	kt-Push	3.25		25	-		٨	A			3		NA
Drilling (Company EP	S					Driller(s)	Blase	m	artin			
Drilling I	Rig 7837	201					Type of Sampler	aceta	te sh	ure			
Date	10/29/18	То	10/20	9/18			Field Observ	ver(s)	evis	Turi	ver FF	7	
Depth (feet)		Description		· /	Class	Blc	ow Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm) BH	S	Remarks/ Water Levels
	SEUT trace	clay , very da	rk gray	ish brown	mz	m	ə	MA			NA		START 1751
	(10 YR 3/2), U CONS: SHACY	soft					DPGW.	7/			Dual. Tube		
							2/_		501				
2	rown trace				15						- -		
	Fire grain ,	loose, damp,	yre 11) areded.	Sp								-	
3	3												-
													- -
													- - -
5_					<u></u>								
													-
6													
							31						-
/							-15						-
8 _	SAUD Laws (·// \ / .											
-	(10 YR 1/2)	Finearcin tr	in on	Vm.	50								-
9	louse, the 1	pourly graved	••••		75				-499D	ר			-
10	Ľ								9-10'				1758 -
				99110				in the second				-	
	becomes we	4.					415					/	noisture -
12 _													
													-
C_ 													
14 -													

BZ=Breathing Zone

BH=Bore Hole S=Sample



	<u></u>		Boring Number DPG-7							
Project	Name Nearman Creek						Page	2 of	д	
Project	Number 88777						Date	10/29	118	
Depth			Blow		Run/	Sample	,	PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	BH	S	Water Levels
14	SAND Arace silt, darlegray: h brown	sp	NA		NA			NA		-
15 -	(10 YR 1/2) fine grain, trace ned um									1801 -
	louse, dampto bet, poorly graded									1
16 -	-									
	7			5/5						-
17 -	-									
	-									-
18 -	-									
	-									-
19 -										
						1			4	
20 -	SAND, very dark gray (10 yR 3/1), fine									
	grain, 1003e, wet, poorty grade J.	56								-
31 -	Some arganic material.					Dor	-			OFFLEE boring-
	-			5/		Gwal	/			For GW.
98 -	-			75		91-25	}			
	-									-
93 –										
-	SAND, dark gray: th brown (104R412)	-								
94 -	fine to coarse sand, fire gravel, loose, wet,	sp								
-	well graded.									1810 STOP
<u> 22 –</u>										, , , , , , , , , , , , , , , , , , ,
-	BOTTOM OF BORING. SAND HEAVE.									
-										
-										
-	4									
-										-
			;							
-										-
										-
-										
-										-



Project	Name Neorm	^{ber} Ø	87-	77			Boring Number	Boring Number DPGW - B					
Ground	Elevation		Location							Page	of	<u></u>	
Air Mon	itoring Equipment	MĄ	l							Total Footage	20		
C	Drilling Type	Hole	Size	Overburder	n Footage	e l	Bedro	ock Foota	ge	No. of Sa	mples	No. of Core Bo	xes
Die	ect-Push	3.83	5	20			i	NA		3		NA	
Drilling		S					Driller(s)	Bla	se N	lartin			
Drilling I	Rig 788	9DT					Type of Sampler	Acete	k sle	eve			
Date	10/29/18		TO 10/2	ค/เ ช			Field Obse	^{rver(s)} L	_ewis=	Turner t	45		
Depth (feet)		Descriptio	on.		Class	Blo	ow Recov	. Run/ Time	Sampl Desig	e PIC BZ) (ppm) BH	Remark S Water Lev	(s/ /els
	Stit, trace Cl	ay, very d	ark gray;	sh brown	me	N	4	NA		~	A	START 16	30
	1 (loyr3b), damp. trave plasticity, nedium 1 considency.								DPGW	-8		Ducl-Tube	·
-							2.5/5	-	1628				
2	2								Dup				
	Fine grain, louse, damp, pourly graded												
	3												
4													
												1633	-
5													
6													
							2,						
7 —							3/5						
8 													_
9 _													_
							-					1635	
10 _	1			ŀ					DpGu-	8			
	SAND, traces: It, dark gray: sh brown								10-11,				
	- (104R912) fire grain trace medium, - lowe, wet, poorly graves.						5.4					A. 3. 7. 1	
12	indel met 1	HOOLIN BLM	6) ·				5.5/5		:			moisture V	
- ₇₁	3												
14 -													

BZ=Breathing Zone

BH=Bore Hole S=Sample

			Boring Number DPGW-8							
Project	Name Nearman Creek						Page	2 of 2	*	
Project	Number 88777			Signation of the second se			Date /	0/29/18		
Depth			Blow		Run/	Sample		PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	BH	S	Water Levels
	SAND, trace silt idark grayish brown	Sp	NA					NA		
15 -	(10 YR Y/2) Fine grain, frace newirm,									1640 -
-	house, wet, poorly groded.									
16 _						DPGes	8			offset boing -
-			1	5/		16-22	F			For GU.
17 _				13						
18 -										
										-
19 _										
										1650 5000 -
- co		<u></u>								
· -	Bottom of Boring , SAND HEAVE.									
_										-
						:				-
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			Drill	ling	g Log						
Project Name	LANA CALLA	Project Num	^{ber} \triangleleft	8.7	177			Boring Nur	mber M	w-16	
Ground Elevation	Locatio	on K	C I C					Page	101	7	•
Air Monitoring Equipment	I		Same (- See					Total Foota	age		
Drilling Type	Hole Size	Overburder	n Footage		Bedroc	k Footaç	je	No. c	of Samples		No. of Core Boxes
Divert Push	Ъ. "										
Drilling Company) i_l(. L			Driller(s)	<u></u>) 15 1 + 2			1
Drilling Rig	le 7822	ØT			Type of Sampler	m	1 dx.ar	and and	<u> </u>	5	<u> </u>
Date 11-15-18	To	15-13			Field Observ	ver(s)	Key	n Bo	In		
Depth (feet)	escription		Class	Blo	w Recov.	Run/ Time	Sampl	e	PID (ppm)	S	Remarks/ Water Levels
$= \frac{2}{100}$	2 0 eng (300 2 0 eng (300 3 0 eng (100 3 0 eng (100) 10 yr - 11 plus 1.1 some si L1, 10	4, mas 54 8+ Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand, 2 Stand Stand			25 0347 3:14 0347 14 0347 14	0944 944 944 944 944 944 944 944 944 944				05	

			-				Boring	Numb	er M.(N-16	
Project N	lame KCBPU NERMAN CALL	- /(Page	1	69-		
Project N	lumber \$\$777	42					Date	11-	157	б	
Depth	Descision	Class	Blow	Recov.	Run/	Sample		F	PID (ppm)	6	Remarks/
(leet)	Description	• •	Count		Time	Desig.	DZ	-	БЦ	3	-
	MUG + (ALL ALL BONES LI TOYLY				1.1						=
15-				and the second se	c94						
$ (\omega =$		8 T									
-				4							·
				5							-
\'/_	EIL+, true ane sand, wet soft,			-							
18-											
	- B x a 										
19-	SKUD WILL	• .									
	Switz mill greek										=
·30 [−]	Time " usarsup grave "i, wet										
21-	SHUP his tometing and in										
`=	wet, 10050 7 + train)										
$ _{22}$	chorevel, from			2							
	·			3							
125-											
24_								۰,			
_							1				
75-											
		ć									
26-											
				3							
21_				1							
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28-											
29-											
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30-					075						
	EOB 301657										
31-											
	7										_
3-	۷ (
B7-Broot	hing Zono BH-Boro Holo S-Sample		2							05160	Form WCD-KC-2-2

McDonnell

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Z:\CLIENTS\ENS\KCBPU\88777_CCRGWMON\STUDIES\MODELING\MW CAD FILES\MW 13 CONSTRUCTION DIAGRAM.DWG





Z:\CLIENTS\ENS\KCBPU\88777_CCRGWMON\STUDIES\MODELING\MW CAD FILES\MW 15 CONSTRUCTION DIAGRAM.DWG



Z:\CLIENTS\ENS\KCBPU\88777_CCRGWMON\STUDIES\MODELING\MW CAD FILES\MW 16 CONSTRUCTION DIAGRAM.DWG

Well Development Form

Page 🗋 of 🚬

Project Name:	KBPU	Nearn	Non Creek	Project N	umber:	: SW File Number:				Well Name:	MW-13
Project Inform	ation		States and			Elevation of	f Piezome	ter			
Facility Name:	Nex (1	van G	eell		-	Ground Surf	ace Eleva	tion (GS):			
Location:	· · · · · · · · · · · · · · · · · · ·	N		E		Top of Casir	ng Elevatio	on (TOC):		:	
Location in Dec	imal Degrees:	LatDD:		LongDD:		Measuring F	oint Eleva	ation (MP):			
Well Informatio	n					Well Volum	e Calcula	tion			
Date Drilled:		9-20-1	Ъ								
Borehole Depth	:: 3	2		feet from							
Casing Depth:	N. N	2015		feet from							
Depth to Top o	f Screen:	25.5		feet from							
Depth to Bottor	n of Screen:	30.5		feet from				-			
Filter Top Dept	h:	$\frac{\chi}{2}$		feet from					-		
Filter Bottom D	epth:	32		_teet from							
Length of Casir	ng Screened:		<u> </u>	teet		1 well volun	ne (gallons) :	= intial height	of water column	(ft) x 0.0408 x (c	asing diameter (in)) ²
Type of Format	ion Screened:	<u></u>	<u>, </u>			inti	al height of	water column	(ft) = total depth	(ft) - intial depth	to water (ft)
Development	Vietnod			Duilling M	411						
Equipment:		Dell			ethoas:					•	· · · · · · · · · · · · · · · · · · ·
Surge		Dall	02/011								
Anna		Fump	16 VOH								
Observations	During Developr	nent									
	<u> </u>	Depth to	Total	Fluid Re	moved	Temp.	pН	S.C.	Tubidity	Fluid Appea	rance and Remarks
Date	Time	Water* (ft)	Depth* (ft)	Gallons	Total	(degrees F)	(units)	(mS/cm)	(NTU)	(colo	r, odor, etc.)
3-21-18	1242	14.09	33.33		50	16.7	7.9	790	000	tub	Gen
	1245				540	16.4	7.4	780	562	1.	ordira
	1249				10 15	16.3	69	286	93	Ci.	sdy
	1252				1520	16.5	6.6	750	000	10,6.2	r Gran
	1256				20	IS.S	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	(0.8	740	312		
	1308				45	15.7	6.8	800	225		
	1311				50	15.3	6.9	800	313		
	1313				65	15.9	69	790	98		
	é notea lo Remarks					I	=			<u> </u>	

.

Well Development Form (Continuation)

Page <u>Z</u>of <u>Z</u>

Project Nam	e:			Project I	Number:				Piezon	eter Number: Mw-13
Observation	s During Well	Development								
		Depth to	Total	Fluid Re	emoved	Temp.	pН	S.C.		Fluid Appearance and Remarks
Date	Time	Water* (ft)	Depth* (ft)	Gallons	Total	(degrees F)	(units)	(µS/cm)	1-10:0,20	నాƳturbidity, color, odor, etc.)
9-21-15	1314		- 		66	15.8	6-9	790	102 1	
	13/6				65	15.6	6.9	500	253	
	1319		····		70	15.7	6.9	500	(~	
t	1320) e	elipment	complet	<u>~</u>					
					<u> </u>					
					· · · · · · · · · · · · · · · · · · ·					
							·			
									:	
							4			:
										:
					L					
			····· ···							

*from TOC unles otherwise noted in Remarks

091294 Form WCI OP6-2

Well Development Form

Page <u></u>of <u></u>

Project Name: KCBPU Proj					Project Number: SW File Number: Well Name: Mu				Well Name: Mu)-i4	
Project Inform	ation					Elevation o	f Piezome	ter		
Facility Name:	N armor	, Cree	IL			Ground Sur	face Eleva	tion (GS):		
Location:		N		E		Top of Casi	ng Elevatio	on (TOC):		
Location in Dec	cimal Degrees:	LatDD:		LongDD:		Measuring F	Point Eleva	tion (MP):		
Well Informatio	n					Well Volum	ie Calcula	tion		
Date Drilled:	9-	20-18								
Borehole Depti	n:	31		feet from						
Casing Depth:		30		feet from						
Depth to Top o	f Screen:	25		feet from						
Depth to Bottor	n of Screen:	<u> </u>	MIRLA. I	feet from						
Filter Top Dept	h:	BU		feet from						
Filter Bottom D	epth:	31		feet from						
Length of Casi	ng Screened:	5		feet		1 well volur	me (gallons) :	= intial height	of water columr	$(ft) \times 0.0408 \times (casing diameter (in))^2$
Type of Forma	tion Screened:	<u> </u>	<u>w</u>			int	tial height of	water column	(ft) = total depth	n (ft) - intial depth to water (ft)
Development	Method									
Equipment:	1			Drilling Me	thods:				····	
Surge	\sim	Bail								
Airlift		Pump	12-021(
		<u> </u>								
Observations	During Developr	nent Dooth to	Tatal		moved	Tomn			Tubiditu	Fluid Appendix and Demoks
Data	Time	Weter* (ft)	i Ulai Donth* (ff)	Collons	Total	(dogroop E)	µ⊓ (unite)	3.U. (mS/om)		(aclast order and Remarks
	0 4 7 1		Deptil (11)	Galions	i Utai					
4-21-10	1310	X131	52151		6			100	<u> </u>	- CIDIO OLUM
	1446					16-9	1.9	120	<u> </u>	
	1513				10	16-7	69	1770	<u>001</u>	
 −−−− −−−−	150				·	16.5	10.9	172	nor	
	1557				25	160	6.8	120	<u> </u>	
	1517				20	15.4	6.7	1720	891	+ 1 + 1 (20) + c
	1957				34	15-4	6.7	1220	255	Charles bran
	المعن			-	40	15.6	6.7	1210	28	
	1602		*******		45	15.6	6.7	17.72	182	
	1605				oż	16.2	6.7	1210	32	un
1	1607				<u>55</u>	15.9	6.7	12-20	19	Ciem
					60	16.1	6.6	1210	16	<u> </u>

Well Development Fo	orm (Continuation)

Page ____ of ____

Project Nam	e:			Project I	Number:				Piezometer Number:
Observation	s During Well	Development				and the second			
		Depth to	Total	Fluid Re	emoved	Temp.	pН	S.C.	Fluid Appearance and Remarks
Date	Time	Water* (ft)	Depth* (ft)	Gallons	Total	(degrees F)	(units)	(µS/cm)	(turbidity, color, odor, etc.)
· · · · · · · · · · · · · · · · · · ·									
	· · · · · · · · · · · · · · · · · · ·								
									· · · · · · · · · · · · · · · · · · ·
									:
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*from TOC unles otherwise noted in Remarks

091294 Form WCI OP6-2

Well Development Form

Project Name	: KOPO	Project Nu	umber:		SW File N	lumber:		Well Name: MW 45					
Project Inform	nation	ay a sa ta s				Elevation of Piezometer							
Facility Name:	Nearm	an Crec	Ж			Ground Surface Elevation (GS):							
Location:		Ν		E		Top of Casing Elevation (TOC):							
Location in De	cimal Degrees:	LatDD:		LongDD:		Measuring Point Elevation (MP):							
Well Informatio	'n	利用する。			1000	Well Volum	ie Calcula	tion					
Date Drilled:	9-20-11	9-21-18											
Borehole Dept	h:		31	feet from									
Casing Depth:			30	feet from									
Depth to Top o	of Screen:		25	feet from									
Depth to Botto	m of Screen:		30	feet from									
Filter Top Dept	th:		21	feet from									
Filter Bottom D	epth:		<u>(S)</u>	feet from									
Length of Casi	ng Screened:		5	feet		1 well volur	ne (gallons)	= intial height	of water column	$(ft) \times 0.0408 \times (casing diameter (in))^2$			
Type of Forma	tion Screened:		Son	入		int	tial height of	water column	(ft) = total depth	(ft) - intial depth to water (ft)			
Development	Method			1997 (P. 1997) 1997 - 1997 (P. 1997)		1999			13 F 3.3				
Equipment:				Drilling Me	thods:								
Surge	~	Bail											
Airlift		Pump	12-6-17										
								·					
Observations	During Developr	nent	机合体的现象										
		Depth to	Total	Fluid Re	moved	Temp.	рН	S.C.	Tubidity	Fluid Appearance and Remark			
Date	Time	Water* (ft)	Depth* (ft)	Gallons	Total	(degrees F)	(units)	(mS/cm)	(NTU)	(color, odor, etc.)			
9-2-118	0933	16.97	32.58		I	28.7	8.5	800	900				
	8935				-5	22.6	ר.9	618	001				
	0938				10	224	7.8	500	Oon				
	0940				15	22.6	2.8	800	ÐS4				
	0943				20	22.6	7.5	820	DOK				
	0945				55	224	7.4	\$৩৩	767				
	0948				30	22.6	7.3	850	156				
	0290	ļ			35	225	7.3	500	92.1				
	0953				70	22.5	7.3	502	75.2				
	0855		****		T6	22.5	7.3	790	136				
	6928				50	224	7.3	790	584.1				
	(200)				55	22.5	7.3	780	58.N				
	ł			L		1	1	1					

from TOC unles otherwise noted in Remarks

Well Development Form (Continuation)

Page	<u>2</u> of <u>2</u>

Project Nam	e:			Project I	Number:	· · · · · · · · · · · · · · · · · · ·			Piezometer Number: Mw-15		
Observation	s During Well	Development)		
		Depth to	Total	Fluid Re	emoved	Temp.	pН	S.C.	FIÚ	id Appearance and Remarks	
Date	Time	Water* (ft)	Depth* (ft)	Gallons	Total	(degrees F)	(units)	(µS/cm)	Trib. My	turbidity, color, odor, etc.)	
9-25-18	1003				لعن	27.5	7.3	790	46,5	×	
	1205				67	22.50	7.3	200	36.2		
	1003				70	225	7,4	780	23,1		
	1011				25	22.5	7.4	290	12,4		
										i	
										•	
			-								

*from TOC unles otherwise noted in Remarks

091294 Form WCI OP6-2

Well Development Form

Page 1 of 1

Project Name:	KCBPU	Newing G	ræil	Project Nu	umber:	85,777	SW File N	lumber:		Well Name:	mw-llo		
Project Inform	ation			13100		Elevation o	f Piezome	ter					
Facility Name:						Ground Sur	face Eleva	tion (GS):					
Location:		Ν		E		Top of Casing Elevation (TOC):							
Location in Dec	cimal Degrees:	LatDD:		LongDD:		Measuring Point Elevation (MP):							
Well Informatio	n	13 2333				Well Volume Calculation							
Date Drilled:	11-15-18	_											
Borehole Depth	<u>n: 30</u>			feet from									
Casing Depth:	30			feet from									
Depth to Top o	f Screen: 25			feet from									
Depth to Bottor	n of Screen: 33	2		feet from									
Filter Top Dept	h: 22	_		feet from									
Filter Bottom D	epth: 31	<u> </u>		feet from									
Length of Casi	ng Screened:	-	E.	feet		1 well volur	me (gallons)	= intial height	of water column	(ft) x 0.0408 x (c	asing diameter (in)) ²		
Type of Forma	tion Screened:		Sand			int	tial height of	water column	(ft) = total depth	(ft) - intial depth	to water (ft)		
Development	Method	Sold Fight						19123					
Equipment:		r		Drilling Me	thods:								
Surge	<u> </u>	Bail											
Airlift		Pump	12 0017		· · · ·								
										of Sector Sec			
Observations	During Developn	nent					, .						
		Depth to	I otal		moved	Temp.	pH	S.C.	lubidity	Fluid Appear	ance and Remarks		
Date	lime	vvater^ (π)	Deptn ^{\circ} (ft)	Gallons	lotal	(degrees ⊢)	(units)	(mS/cm)	(NTU)	(COIO	r, odor, etc.)		
11-16-18	0840	14.76	52.51	<u>Ö</u>	10	16,2	10.5	1.31.5	GOV	Vendro	by Growy		
	0844			-5 -5	$\frac{3}{10}$	15.1		1320	652	+U162	2 Grow		
	0043			8	19	19.0	7,9	1515	$-\frac{4(s)}{2(s)}$	Jude	of Gran		
	0355			<u> </u>		19.5	1.5		182		» or brown		
	0050 09.0			5	52		71	1315	121	Clov			
	0 (00			- <u>~</u> D - C	<u> </u>		7	1315	126	<u> </u>	rar		
· · · · · · · · · · · · · · · · · · ·	0404			0	- 98	14.4		1210	<u> </u>	<u> </u>			
	0103			0 4		144		1315	64		~~~		
	0916			D D	1 7 2	144	7.1	1310	<u> </u>		<u></u>		
	092	<u> </u>	-		40	145	-		23				
·····	·						# 1 h	12121			~		

from TOC unles otherwise notes in Remarks

Well Development Form (Continuation)

Page of _	
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Project Nam	e:			Project	Number:				Piezometer Number:		
Observation	s During Well	Development									
		Depth to	Total	Fluid Re	emoved	Temp.	pН	S.C.	Fluid Appearance and Remarks		
Date	Time	Water* (ft)	Depth* (ft)	Gallons Total		(degrees F)	(units)	(µS/cm)	(turbidity, color, odor, etc.)		
								÷.,			
	· · · · · · · · · · · · · · · · · · ·										
									: :		
			-								
						I					

*from TOC unles otherwise noted in Remarks

091294 Form WCI OP6-2

Project Name Nearma	Project Nun	^{nber} g	387	77			Boring Number			
Ground Elevation	Location	1	~					Page 1 of 2		
Air Monitoring Equipment							Total Footage			
Drilling Type	Hole Size	Overburde	n Footage	э	Bedro	ck Foota	age	No. of Samples	No. of Core Boxes	
Direct-Push)		\sim	A		3	NA			
Drilling Company	Drilling Company						se M	artin		
Drilling Rig 783	3 DT				Type of Sampler	Ac	otate	Skeve		
Date 10/30/18	To 10/	30/18			Field Obser	ver(s)	Henry	I Turner ST.	5	
Depth (feet)	Description		Class	Blo Cou	ow Recov	Run/ Time	Samp Desig	lePID (ppm) · BZ BH S	Remarks/ Water Levels	
Asphalt grave (o.4' 'ay, very dark gray.iel anp , nedwn to low , teacy.	brown plasticity,	ML	N	A	NA	DPGw SS01	~A - \	START OBIS DUAI-TUSE Offset XJ	
2					215		1-2,		1000 recovers	
3 4										
									0830	
5 SAND, Arace 6 Firegrain, lo	s. 14, pale brinn (10) lose moist, pourly g	(R 6/3) (e&).	Sp							
- STIT, some cla 7 - Wet, medium	y, very dark groy G n plasticity, soft con	LEYI (JN) Withency.	ML							
SILTY SAND	very dork grus Gle	- <u> </u>					DPGN 5302 8-9'	-1		
uet, trace p	lest-cay, soft		Sp						0835	
11 SAMO. brown 10058, met, po	n (IDYR 4/3) Firegr urly grobe)	em,	sp						mosster	
	v				4/5-					
13										
14 7										

BZ=Breathing Zone

BH=Bore Hole S=Sample



							Boring I	Number	DPGW-	· [
Project	Name Neurman Creek						Page	2 of	6	
Project	Number 88717						Date	10/30	1,3	
Depth (feet)	Description	Class	Blow		Run/	Sampl	e	PID (ppn	n)	
14	- Sand Jown (1048 1/2) Surger	Class		Reco		Desig	. BZ	ВН	S	Water Levels
	= lowe, wet iporty grades.	92	1019		/ / 4					BUNG
15 -	-						+			
	-									
10 _	-									
	-			5/5		-		-		
	-									
18 _										
19 _	SAND, brown (104R413) Toole, fire to	5.0								
-	medium grain, wet, pourly graved	>p								
<i>β</i> υ −										Obso Stop -
-	Bottom of Boring - SAND HEAVE.							*		
-										
						Doci				
-						GWOI				offset Boring
						99-96	1			for 6w -
						Dup				-
-										-
-										-
-										
		1	-							
-										-
_										-
										-
_				•						
-										
										-
_										
		1						Í		-



Project Name Nearman Creek Project Number 8								8777 Boring Number DPGW-み					
Ground	Elevation		Location					i					
Air Moni	toring Equipment	NA	<u> </u>						Total Footage 25				
D	rilling Type	Hole S	ize	Overburder	n Footage		Bedroo	k Footaç	je	No. of Samples No. of Core B			
Direct-Push 3.25 25							٢	UA		3	NA		
Drilling Company							iller(s)	Blase	Mo	rtin			
Drilling F	^{Rig} 7877	DT				Ty: Sa	pe of mpler	Aceta	te sh	eere			
Date	0/29/18	Tc	0 10/00	ñ/18		Fie	ld Obsen	/er(s)	Lewis	Turner J.F.	7		
Depth (feet)		Description			Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ BH	Remarks/ S Water Levels		
	SILT , trace	clay, very di	ark gray	ish brown	ML	MA	•	NA		MA	START 1454 -		
	(104R 5/2), plastic, red	uamp, trace p : um to soft	lesticity + Consiste	to non ncu.					DPGW	2	Dux1-Tube		
			·	· .			3.5/		5501				
2	traction co	lie				P	3						
	CAND for	cell yelle e	d hour		ļ								
3 -	(104R 5/6) f	ine ara: . 1	oose, da	np	Sp								
	pourly graded			•									
								•					
5				<u> </u>					DOLU				
	SILT, SONES	olastic, sof	gray (1 t consist	oyry,) Hencu	ML				SSOD				
6 _				-,.			3.5/		5-6				
	harrowski tilitilijion - Alfikjezio	The sound of the low sector of the sound of the	the state of the second	- Course and a	-		/5				<u>v</u>		
	SAND, trace	silt, pale	brown	(104R6/3)	_						moisture		
8	Finegrain,	loose, dam	, to no ?	t to wet,	76								
	Porty graves).											
9 -													
											1457 =		
11 -													
							3.8/5				â		
12 _													
-	keeping 1	ren dere un	en (cria	(136)									
	Stored a	, gr	1 2 2)										
14						· .							

BZ=Breathing Zone BH=Bore Hole

S=Sample



			Boring N	Number ${\cal D}$	pgw-d	25 ²²² 0wm				
Project	Name Nearman Creek						Page	2 of 2	<u>}</u>	
Project	Number 8977		- <u>r</u>				Date /	0/29/18		
Depth (feet)	Description	Class	Blow	t Recov	Run/	Sample	e BZ	PID (ppm	n) S	Remarks/ Water Levels
14	SAND, dark grayish brown (Lover 41.)	CA	MA		NA			NA	-	_
1	Fireto redium grain, losse, wet	sp								1500
12 -	-									
16 _	-									-
	-			Ч,						-
17 -	-			1/5						
	-									
18 -										
19	4									
20 -	trace shale fragment,	Statement and a state								1510 -
-	- , , , , , , , , , , , , , , , , , , ,					DPGW.	8			Offsite Boning
91 -						G-Wol				For GU
ן אר				5/5						
23 -										-
24 -										
-										ISUN STOR
<u> 35 –</u>										1013 014
-	Bottom of Boring - SAND HEAVE.									-
-										-
_										
-										
-										
-										
-										-
			i							



Project	oject Name Neorman Creek Projec				^{nber} 8	87	רק'			Boring Nu	^{mber} D	966	-3	
Ground	l Elevation		Location							Page	1 af a	<i>≻</i>		
Air Mor	nitoring Equipment	NA	I							Total Foota	^{age} 20			
	Drilling Type	Hole	e Size	Overburde	n Footage	,	Bedroo	ck Foota	ge	No. c	of Samples		No. of Core Box	es
Die	ect-Push	3.	<i>d5</i>	Sc)		N	A			3		MA	
Drilling	Company EPS						Driller(s)	Bla	se n	natio				
Drilling	Rig 7822	DT					Type of Sampler	Aca	h lo	Sleave	9			
Date	10/30/18	~ 1	To 10/3	0/18			Field Obser	ver(s)	Ler.	JREA LI TU		J-T	5	
Depth		Descript		,	Class	Blo	w Recov.	Run/	Sampl		PID (ppm)		Remarks	/ uls
	CLAY with S. 14	, very Jone	grayist bro	walion R3/5)CL		<u>~</u>	NA	Desig.	BZ	вп	3	START 101	1) –
	SELT, trace cl	ey brown	~ (104R4/3)	, Jano			14	,					Dual-Tube	
1	Non plaster,	soft cons	Stercy	, a	ML				DPGW SSOI	-3				
2	2 - SAND, trace sitt, brown (10484/2) Fro						315		1-2'					_
	SAND, trace sitt, brown (104R4/3) find grain, love, damp, poorly grades.													
3								2						
	-													_
4							- - 							
5	I mm dork sean	•			·			<u></u>					1015	<u> </u>
-	-									ŧ				
6 _													-	
							3.5/							
7							3							_
8									DPGW	-3				_
0 1									5502	5'				-
9 _									Dip					-
													1018	
10	Becomes wet									<u></u>			moisture	
- - 11														
							4/5							
12 _														$\overline{-}$
13 -	SAND, trace ST	h fire t	-omesium e	ram	SP									
14 -	506~ (1041641	3) 10050,	ver, por	y gradel	-									
3Z=Breat	hina Zone 🛛 🛛 🛛 🛛 🖓	=Bore Hole	S=Sample									051	1601 Form WCE	J-2-1

BZ=Breathing Zone BH=Bore Hole



			Boring N	umber	DPGW	-3				
Project I	Name Nearman Creek						Page	2 01	<i>ډ</i> ک	
Project I	Number 88777					-	Date	10/30	/18	
Depth			Blow		Run/	Sample	,	PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	ВН	S	Water Levels
14 - 	SAND, trace silt, Fire to course, firegrand traces. Scoun (104R4/3), lowe, net, cellgrades	Sp	NA		Ma			NA		1020
17	Dark area bloud(104R3/1) 0.84			5/5						
(9 2										- - 9072 860/
	Botton of Boring. SAND HEAVE.					99-39 Dben	- 3			offset Boring - For fru -



Project Name	Project Name Project N				<u>777</u>)			Boring Nu	ımber T	26h	1-Y-1
Ground Elevation		Location)						Page	1 of 2	\mathcal{F}	
Air Monitoring Equipment	MA								Total Foot	age ds		
Drilling Type	Hole	e Size	Overburder	n Footage		Bedroc	k Foota	ge	No.	of Samples		No. of Core Boxes
Direct-push	3.3	d5 ''	<i>ə5</i>	s .		\sim	'A			3		\sim 4
Drilling Company	_1	<u></u>			Dri	ller(s)	Blac	e ma	rtia			
Drilling Rig	DT				Typ Sai	be of mpler	Acet	fete S	leeve			
Date 10/30/10		To ha/2	. <i>I. v.</i>		Fie	ld Observ	^{rer(s)} /	PLIC	Turne	- 1-	T7	
Depth (feet)	Descripti	ion		Class	Blow Count	Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm)	S	Remarks/ Water Levels
- SEVE With	clay very	dark gray	rich brown		MA		NA			NA	L	START 1495
(10yr 7/s)	dans, nei	Na plost	JE.7. y, Soft.	BNL		ə <i>15</i>		Орсы 5501 1-д'	9- Y			Dual Jube _
4 - SEVT NEW - demp. Non 5	J' SENJ SEEM. SEVT NERY JEIK grayish brown (104R3/J) JENP. NON Plastic , soft.											1436
6 7 SAND, +ra finegrain 9 1 9	ce s.74 pa house, da	ile brown (np. pourly	10 YR 6/3) geaded.	sp		θŀ						
-2 - 10058, JAN	SAMD, trace silt, Jark grayish brown (10 yR 4/2) Fine grain, trace medium 10050, Janp. poorly grobed Bewnes Wet					3}5		ррсы- 550д 10-11 '	Y			moisture

			Boring N	lumber 🏌	xp6w-1	Y				
Project I	Name Nearman Creek						Page	2082	•	
Project I	Number 88777				1		Date	10/30/18		
Depth	Description	Class	Blow	Deserv	Run/	Sample	P7	PID (ppm)) 	Remarks/
IV -	Can the sill a shirth how	Class	M		NA	Desig.		NA		
-	Lipus V/N Fine arous trace medium	SP								143
	long dalt and will									
-	i war wor , party graei									-
- 01										-
17 _				4/5						
-										
13 -										
			1	1						
9				ļ						
										1470
}• –										
- 16										
-				5/5						-
_ ۲										
ן אר										
-										
24 _						DPGw.	y			Boring Office #
-						66.01	,			for Gw
dr _						ms/m	<u>ده</u>			1445 STOP -
-	Bottom of Boring - SAND HEAVE.									-
-										
-										-
										-
-										-
-										-
_										
	1				-					



Project Name Near ma	Project Num	^{iber} 8	87	77			Boring Number	~ 5			
Ground Elevation		Location							Page / of 2		
Air Monitoring Equipment	MA	<u> </u>							Total Footage		
Drilling Type	Hole Size		Overburder	n Footage	•	Bedroo	k Foota	ge	No. of Samples	No. of Core Bo	xes
Direct-Push	3,85		Ə5	-		\sim	A		3	NA	
Drilling Company						Driller(s)	Bla	æ N	lartin.		
Drilling Rig)T					Type of Sampler	Ace	tate -	sleeve		
Date 10/30/18	То	(0	130/100			Field Obsen	/er(s)	Lei	is Turner for	17	
Depth (feet)	Description			Class	Blc Cou	ow Recov.	Run/ Time	Sampl Desig	e PID (ppm) BZ BH	Remarks S Water ⁻ Lev	s/ rels
SILT with d (104R 3/2) d 1 2 SILT , Very damp to moist 4 5 6 7	lanp , ned.un lanp , ned.un Oork gray.il t. trave plast	grayin plastic brown ic.ity, su	th brown 2-77, Soft. (wyr.3/2) oft.	mL	N	A 2.5% 315	NA	Dp64 5501 1-2'	-5	START 13. DUAL . TWOE	
8 9 SAND, trace brown (104A 10 poorly grive) 11 12 13	s.H. pole br 41,), fineg	own(ioy rain, 1	re615) sose, met	26		315		Dector SS02 9-10' NS/MS	5	1320 Noisture	
14	×										

			Boring	Number	DPGw.	5					
Project	Name Nearmon Creek						Page	2 of 2			
Project	Number 88777						Date	10/30/1	8		
Depth			Blow		Run/	Sample	e	PID (ppr	n)		
(feet)	Description	Class	Count	Recov	: Time	Desig.	BZ	BH	S	Water Levels	_
19	SAND I tracesilt, pale brown (104R6/3)	sp	NA		NA			NA			
15 -	poorlygrades.				+					1324	-
											-
16 -	-									-	_
-					-						_
17 –				1/5						-	-
-	-										
¹ 8							2			-	
- 	SAND. Very dork gray (bley 1 3/2) fire	T A				ed at					1
' :	to coarse grain, loose, but, moderately	>(
20 -										1307	1
											_
21 -										-	-
-				5/2	1					,	
99 _	Finegrain			3						-	-
_		1									-
93 –										-	
-											
24 -	more gravel.					DOGLIN	٣			Offset Boring	-
						Gwol	,			1340 STOP	
25 -						09-00					
-	Bottom ut isoning - Heaving SAFD										
-											
-						-					
-										-	-
										· -	
										-	
-										-	-
-										-	
										-	



Project Name Near Man	roject Name Project					77				Boring N	lumber	P 6-40 -	6	
Ground Elevation		Location								Page) of	: 3		
Air Monitoring Equipment	NA									Total Foo	otage 35			
Drilling Type	Hole Size	•	Overburde	en Footage	э	Be	droc	k Foota	ge	No.	of Samples		No. of Core Bo	xes
Direct-Push	3.25		35	5			~	YA-			3		NA	
Drilling Company						Driller(s		BIA_	se N	lartin				
Drilling Rig 7833 0	51					Type of Samplei		Acet	ste s	sleeve				
Date 10/30/18	То	10/3	0/18			Field Ob	serv	/er(s)	Len	istur	ner y	E-F-		
Depth (feet)	Description			Class	Bk	ow Re unt	cov.	Run/ Time	Sampl Desig	eBZ	PID (ppm)	S	Remarks Water Lev	s/ els
- CLAY with si	14. very derie	grayish	brown	CL	N	Ą		NĄ			NA		START UYC	, _
1 = (104R >12), 1 = plosticity, 1	- (loyr >10), damp, medium to trace - plosticity. medium consistency								DPGW	-6				_
STIT Araia	Stur, trace clay very dark gray:sh					31			5501					-
2 brown (1041	brown (104R 3/2) damp. trace play bicit					-19			1-0					
- Mesium con	- Medium consistency .													_
4														
							·						1142-	
5			-				_				999-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6		1198	
SELT, +race	clay, dark gro	y (IOYR	۲ <i>4</i>)	ML										
	ratic, melium	wasitea	cy.											
7							-							-
8														-
9														
_ SILT with all _ dame. medium	lay, brown (ioyr 4/3)	ML									1.11.72	
10	prestrent, me	io.va wa	Jistency -				_			54-750 ⁶			(143	
Stir with da	Stur with day, brown (104R412) and					2 <								
12 pleatic.ty. da	plasticity, dang, rediver (104RZIS) medun					1.1								_
13	-													
14														4

BZ=Breathing Zone BH:





			Boring N	umber	DAGM	- 6				
Project	Name Nearman (reck						Page	2 of	3	
Project	Number 83777				1		Date	10/30/18	;	
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm BH) S	Remarks/ Water Levels
14	SILVE, with clay, brown (104R413) and bery dark gray: sh brown (104R3/3) dans medium al. which medium consistence	ML	NA		NA			NA		1144
16 -				5/5		Орьш 5002 15-16	-6			
17 — 18 —	STUT with very fine Sand, Jark grayish brown (104R4/2) thoist to wet, nonplasti , soft wasistency.	ML			-					moisture
19 -	SAND with with Exercision , dark									1146
ð1 —	gravist brown (13418418) wet, loose, poorlygrades.	sp		\$1		*	DPGW-1 GW01 20-24'	6		Offset Boring For Gw.
93 -				75						
ач Эч										1148 -
20 -							<u> </u>			
- - -6				5/5	-					
28 29										
30	SILT with day and fire sand, very dark greenish grow (Gley 1 3/1), het, medium to high plasticity. Soft considency	ml		5/5-						15 <u>5</u> - - - -



			Boring N	lumber Di	>6w-6					
Project	Name Nearman (reek						Page	3 of	3	
Project	Number 88777						Date	10/30	/18	
Depth			Blow		Run/	Sampli	e	PID (ppm	1)	Remarks/
(feet)	Description	Class	Coun	t Recov	. Time	Desig.	BZ	BH	S	Water Levels
32	SILT, with clay and fine sand, very dark	m	NA	•	NA			NA		
33 -	to back all the large (Gley 13/1), wet medium			÷,				1		
				15						
34 _	-									-
	-					-				
35 -						<u> </u>				1200 STOP -
	Rother of Baring.					-				
					-					
]									
			ĺ							
	-									
-	-			3						
-						1				
	-									-
-										
-										-
								7		-
-										-
										-
-										-
										-
-										
-										
-										-
-							i			4
									· variation of the second s	
-										-
										-



Project	Name Neorman	Project Num	^{iber} (387				Boring N	umber DP(5W -	>		
Ground	Elevation		Location							Page	1 of 2		***
Air Mon	itoring Equipment	NA	I							Total Foo	tage 25		
C	Prilling Type	Hole Size	e	Overburde	n Footage	•	Bedroo	k Footaç	je	No.	of Samples	N	lo. of Core Boxes
Dire	kt-Push	3.25		25	-		٨	A			3		NA
Drilling (Company EP	S					Driller(s)	Blase	m	artin			
Drilling I	Rig 7837	201					Type of Sampler	aceta	te sh	ure			
Date	10/29/18	То	10/20	9/18			Field Observ	ver(s)	evis	Turi	ver FF	7	
Depth (feet)		Description		· /	Class	Blc	ow Recov.	Run/ Time	Sample Desig.	BZ	PID (ppm) BH	S	Remarks/ Water Levels
	SEUT trace	clay , very da	rk gray	ish brown	mz	m	ə	MA			NA		START 1751
	$ = \frac{1}{2} (10 \text{ Ve}^{3/3}), \text{Janp}, \text{ frace plasticity, soft} $ $ = \frac{1}{2} (2005) \text{ consistency}. $								DPGw.	7/			Dual. Tube
							2/_		501				
2	2 - JAND, trace silt, pale brown (loye 4)						15						- -
	fire grain, loose, damp, poorly graded												-
3	- The grain prose, bunp, provely graded												-
													-
													- - -
5_					<u></u>								
													-
6													
							31						-
/							-15						-
8 _	SAUD Laws (·// \ / .	 • h										
-	(10 YR 1/2)	Finearcin tr	in on	Vm.	50								-
9	louse, the 1	pourly graved	••••		75				-499D	ר			-
10	Ľ								9-10'				1758 -
								in the second				-	
	becomes wet.						415					/	noisture -
12 _													
													-
C_ 													
14 -													

BZ=Breathing Zone

BH=Bore Hole S=Sample



	<u></u>		Boring N	umber	DPGW-	7				
Project	Name Nearman Creek						Page	2 of	д	
Project	Number 88777						Date	10/29	118	
Depth			Blow		Run/	Sample	,	PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	BH	S	Water Levels
14	SAND Arace silt, darlegray: h brown	sp	NA		NA			NA		-
15 -	(10 YR 1/2) fine grain, trace ned um									1801 -
	louse, dampto bet, poorly graded									1
16 -	-									
	7			5/5						-
17 -	-									
	-									-
18 -	-									
	-									-
19 -										
						1			4	
20 -	SAND, very dark gray (10 yR 3/1), fine									
	grain, 1003e, wet, poorty grade J.	56								-
31 -	Some arganic material.					Dor	-			OFFLEE boring-
	-			5/		Gwal	/			For GW.
98 -	-			75		91-25	}			
	-									-
93 -										
-	SAND, dark gray: th brown (104R412)	-								
94 -	fine to coarse sand, fire gravel, loose, wet,	sp								
-	well graded.									1810 STOP
<u> 22 –</u>										, , , , , , , , , , , , , , , , , , ,
-	BOTTOM OF BORING. SAND HEAVE.									
-										
-										
-	4									
-										-
 -			;							
-										-
										-
-										
-										-


Drilling Log

Project	Name Neorm	an Creek		Project Num	^{ber} Ø	87-	77			Boring Number DPGW - 8			
Ground	Elevation		Location							Page	of	<u></u>	
Air Mon	itoring Equipment	MĄ	l							Total Footage	20		
C	Drilling Type	Hole	Size	Overburder	n Footage	e l	Bedro	ock Foota	ge	No. of Sa	mples	No. of Core Bo	xes
Die	ect-Push	3.83	5	20			i	NA		3		NA	
Drilling		S					Driller(s) Blase Martin						
Drilling I	Rig 788	9DT					Type of Sampler	Acete	k sle	eve			
Date 10/29/18							Field Obse	^{rver(s)} L	_ewis=	Turner t	45		
Depth (feet)		Descriptio	on.		Class	Blo	ow Recov	. Run/ Time	Sampl Desig	e PIC BZ) (ppm) BH	Remark S Water Lev	(s/ /els
	Stit, trace Cl	ay, very d	ark gray;	sh brown	me	N	4	NA		~	A	START 16	30
	(104R512),	danp, tra	e plastici	ty, nedium					DPGW	-8		Ducl-Tube	·
-							2.5/5	-	1628				
2	SAND . Frace	silt, pal	e horma (1040 41)					Dup				
	Fine grain,	loose, da	np, pour	ly graded.	sp								
4													
												1633	-
5													
6													
							2,						
7 —							3/5						
8 													_
9 _													_
							-					1635	
10 _	1			ŀ					DpGu-	8			
	SAND, trace	s: 1t, dark	gray: sh br	vwn	50				10-11,				
	(104R412) (fire grain t	Irace medin	~,			5.4					A. 3. 7. 1	
12	indel met 1	HOOLIN BLM	6) ·				5.5/5		:			moisture V	
- ₇₇													
14 -													

BZ=Breathing Zone

BH=Bore Hole S=Sample

051601 Form WCD-2-1

Drilling Log Continuation

		Boring Number DPGW-8								
Project	Name Nearman Creek						Page	2 of 2	*	
Project	Number 88777			Signation of the second se			Date /	0/29/18		
Depth			Blow		Run/	Sample		PID (ppm)	Remarks/
(feet)	Description	Class	Count	Recov.	Time	Desig.	BZ	BH	S	Water Levels
	SAND, trace silt idark grayish brown	Sp	NA					NA		
15 -	(10 YR Y/2) Fine grain, frace newirm,									1640 -
-	house, wet, poorly groded.									
16 _						DPGes	8			offset boing -
-			1	5/		16-20	F			For GU.
17 _				13						
18 -										
										-
19 _										
										1650 5000 -
- co		<u></u>								
· -	Bottom of Boring , SAND HEAVE.									
_										-
						:				-
-										-
-										-
-										
-										
-										-
-										
-				Í						-
-										
-										
_										· -
										-
_										-
-										-
-										-
4										-
-1										



APPENDIX C – ANALYTICAL REPORTS AND DATA VALIDATION



ANALYTICAL REPORT

March 30, 2018

Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number:

Description:

L976513 03/10/2018 62801 BPU Nearman groundwater

Report To:

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

Entire Report Reviewed By:

Linde Cashman

Linda Cashman Technical Service Representative

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

TABLE OF CONTENTS

*	
¹ Cp	
² Tc	
³ Ss	
⁴Cn	
⁵Sr	
⁶ Qc	

GI

A

Sc

Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	4
Sr: Sample Results	5
MW-2A L976513-01	5
MW-3 L976513-02	6
MW-4 L976513-03	7
MW-8A L976513-04	8
MW-10 L976513-05	9
DUP 1 L976513-06	10
Qc: Quality Control Summary	11
Radiochemistry by Method 904	11
Radiochemistry by Method SM7500Ra B M	12
GI: Glossary of Terms	13
Al: Accreditations & Locations	14
Sc: Sample Chain of Custody	15

SDG: L976513 DATE/TIME: 03/30/18 16:58 PAGE: 2 of 15

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

*

Ср

Тс

Ss

Cn

Sr

Qc

GI

ΆI

Sc

			Collected by	Collected date/time	Received date/time
MW-2A L976513-01 Non-Potable Water			Juliatilali H.	03/08/18 13:25	US/ IU/ IO UO.45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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 SM/500Ra B M	WG1083701	I	03/15/18 09:28	03/21/18 14.26	RGI
			Collected by	Collected date/time	Received date/time
MW-3 L976513-02 Non-Potable Water			Jonathan H.	03/08/18 14:15	03/10/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/time
MM/ 4 LOZCE12 02 New Detable Water			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
			Collected by	Collected date/time	Received date/time
MW-8A L976513-04 Non-Potable Water			Jonathan H.	03/08/18 11:30	03/10/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/time
MW-10 L976513-05 Non-Potable Water			Jonathan H.	03/08/18 12:30	03/10/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/time
DUP1 L976513-06 Non-Potable Water			Jonathan H.	03/08/18 00:00	03/10/18 08:45
Method	Batch	Dilution	Prenaration	Analysis	Analyst
meanou	Datch	Dilution	date/time	date/time	Analyst
	WG1086807	1	03/20/18 11:18	03/28/18 11:40	JMR
Radiochemistry by Method 904	1101000001				
Radiochemistry by Method 904 Radiochemistry by Method Calculation	WG1083701	1	03/15/18 09:28	03/28/18 11:40	JMR

PROJECT: 62801 BPU Nearman SDG: L976513 DATE/TIME: 03/30/18 16:58

CASE NARRATIVE

*

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All 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.

inde 1

Linda Cashman Technical Service Representative

ACCOUNT: Kansas City Board of Public Utilities PROJECT: 62801 BPU Nearman SDG: L976513 DATE/TIME: 03/30/18 16:58 PAGE: 4 of 15

SAMPLE RESULTS - 01

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Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/L		+/-	pCi/L	date / time		2
RADIUM-228	0.544		0.430	0.289	03/23/2018 13:35	WG1086807	Tc
Radiochemistry by	/ Method Calcu	llation					³ Ss
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		⁴ Cn
Combined Radium	0.864		0.646	0.457	03/23/2018 13:35	WG1083701	CI
Radiochemistry by	/ Method SM75	500Ra B M					⁵ Sr
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		ိုင္ရင
RADIUM-226	0.320		0.216	0.168	03/21/2018 14:26	WG1083701	

SAMPLE RESULTS - 02

*

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Radiochemistry by Method 904

Collected date/time: 03/08/18 14:15

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	ľ
Analyte	pCi/L		+ / -	pCi/L	date / time		2
RADIUM-228	0.797		0.531	0.332	03/23/2018 13:35	WG1086807	
Radiochemistry by	Method Calcu	ulation					3
Radiochemistry by	Method Calcu Result	ulation Qualifier	Uncertainty	MDA	Analysis Date	Batch	3
Radiochemistry by	/ Method Calcu Result pCi/I	ulation <u>Qualifier</u>	Uncertainty + / -	MDA pCi/l	Analysis Date date / time	Batch	4

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	

RADIUM-226

SAMPLE RESULTS - 03

ONE LAB. NATIONWIDE.

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Radiochemistry by Method 904

0.168

Collected date/time: 03/08/18 16:45

Rudioeneniistry b	y method bor						
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/L		+/-	pCi/L	date / time		2
RADIUM-228	-0.0883		0.443	0.31	03/23/2018 13:35	WG1086807	ŤT(
Radiochemistry by	y Method Calcı	ulation					³ Ss
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		4
Combined Radium	0.168		0.651	0.603	03/23/2018 13:35	WG1083701	C
Radiochemistry by	y Method SM75	500Ra B M					⁵ Si
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	6
Analyte	pCi/l		+ / -	pCi/l	date / time		°Q ∣°Q

0.293

03/21/2018 14:26

WG1083701

0.208

SDG: L976513

Collected date/time: 03/08/18 11:30

SAMPLE RESULTS - 04 L976513

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Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/L		+/-	pCi/L	date / time		2
RADIUM-228	0.527		0.518	0.399	03/23/2018 13:35	<u>WG1086807</u>	² T(
Radiochemistry by	Method Calcu	ulation					³ Ss
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		⁴
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	

ACCOUNT: Kansas City Board of Public Utilities

SAMPLE RESULTS - 05

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Radiochemistry by Method 904

Collected date/time: 03/08/18 12:30

Redioenenistry by							
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/L		+/-	pCi/L	date / time		2
RADIUM-228	0.0276		0.321	0.516	03/28/2018 11:40	WG1086807	T
Radiochemistry by	/ Method Calcu	Ilation					³ S
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		4
Combined Radium	0.102		0.481	0.781	03/28/2018 11:40	WG1083701	
Radiochemistry by	/ Method SM75	500Ra B M	I				⁵ S
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	6
Analyte	pCi/l		+/-	pCi/l	date / time		ຶິດ
RADIUM-226	0.0745		0.160	0.265	03/21/2018 14:26	WG1083701	

Collected date/time: 03/08/18 00:00

SAMPLE RESULTS - 06 L976513

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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	y Method Calcu	Ilation					
	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	y Method SM75	ooRa 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	

WG1086807

Radiochemistry by Method 904

QUALITY CONTROL SUMMARY

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Method Blank (MB)

	10)			^{1}Cn
(MB) R3297387-1 03/2	3/18 13:35			Ср
	MB Result	MB Qualifier	MB MDA	2
Analyte	pCi/L		pCi/L	Tc
Radium-228	-0.220		0.247	
				³ Ss

L977057-01 Original Sample (OS) • Duplicate (DUP)

Original	I Result DUP Result	Dilution	DUP RPD	DUP RER	DUP Qualifier	Limite	DLIP PEP Limit
Analyta nCi/l						Limits	
Analyte point	pCi/L		%			%	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				
	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	pCi/L	pCi/L	%	%	
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) R3	3297387-3 03/	′23/18 13:35 • (N	MSD) R329738	7-4 03/23/18 1	3:35							
	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	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

QUALITY CONTROL SUMMARY

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Method Blank (MB)

Method Dialir				
(MB) R3295787-1	03/21/18 14:26			
	MB Result	MB Qualifier	MB MDA	2
Analyte	pCi/l		pCi/l	Tc
Radium-226	0.0466		0.0558	
				³ Ss

L976513-02 Original Sample (OS) • Duplicate (DUP)

(US) L976513-02 03/21/18	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) R3	295787-3 03/	21/18 14:26 • (N	1SD) R3295787	7-4 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

GLOSSARY OF TERMS

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Τс

Ss

Cn

Sr

*Q*c

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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 resul 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.

SDG: L976513

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
Alaska	17-026	Nevada
Arizona	AZ0612	New Hampshire
Arkansas	88-0469	New Jersey–NELAP
California	2932	New Mexico ¹
Colorado	TN00003	New York
Connecticut	PH-0197	North Carolina
Florida	E87487	North Carolina ¹
Georgia	NELAP	North Carolina ³
Georgia ¹	923	North Dakota
Idaho	TN00003	Ohio-VAP
Illinois	200008	Oklahoma
Indiana	C-TN-01	Oregon
lowa	364	Pennsylvania
Kansas	E-10277	Rhode Island
Kentucky ¹⁶	90010	South Carolina
Kentucky ²	16	South Dakota
Louisiana	AI30792	Tennessee ¹⁴
Louisiana ¹	LA180010	Texas
Maine	TN0002	Texas ⁵
Maryland	324	Utah
Massachusetts	M-TN003	Vermont
Michigan	9958	Virginia
Minnesota	047-999-395	Washington
Mississippi	TN00003	West Virginia
Missouri	340	Wisconsin
Montana	CERT0086	Wyoming

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 ¹⁴	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	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

Kansas City Board of Public Utilities

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.



62801 BPU Nearman

L976513

PAGE: 14 of 15

03/30/18 16:58

Τс Ss Cn Sr Qc Gl AI

Sc

Charles Doord of			Billing Into	irmation:				-	Analysis	s / Contai	ainer / Preserva	tive		Chain of	f Custody	Page of
Kansas City Board of 300 N 65th Street Kansas City, KS 66102	Public Ut	ilities	Ingrid Sc 300 N 6 Kansas	stzler 5th Street City, KS 6610	12	Pres Chk	12								k F	SC
Report to: Ingrid Setzler	200		Email To: isetzler@	bou.com;bhoye	@burnsmcd.com	kbrown		11				177		12065 Le/	ebanon Rd	Barren of President
Project Description: groundwater			AL	City/State Collected:	(in the second s			11						Phone: 615 Phone: 615-7	et, TN 3712 5-758-5858 00-767-5859 -758-5859	
Phone: 913-573-9806 Fax:	Client Project	# J Nearman	l	Lab Project # KCKAN02-I	MW NEARMA	N		11						L# [971	0513
Collected by (print): Jonathan flemmara	Site/Facility ID	5#		P.O. #			03							Acctnur	m: KCK/	8 ANO2
Juliected by (signature): Julium Auron Immediately Packed on Ice N Y X	Rush? (L: Same Da Next Da Two Da Three D	ab MUST Be f ay Five t ky 5 Day ky 10 D Day	Notified) Jay / (Rad Only) ay (Rad Only)	Quote # Date Re	esults Needed	No.	DPE-Add HN							Templati Prelogin TSR: 650 PB2	e:T1333 n: P6431 No - Linda	197 090 Cashman
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	JL-HC							Shipped	Ma: Fed	IEX Ground
MW-2A	bal	GW	-	3. 8.18	1325	3	x								1	-al
MW-3	6105	GW	-	3.818	1415	3	x								-	67
MW-4	biab	GW	-	3, 8.18	1645	3	x								-	67
MW-8A	Grab	GW	-	3.8.18	1130	3	X						-	+		64
MW-10	bras	GW	-	3. 4.18	1230	3	X							+		09
DUP 1	Grab	GW	-	3.8.18	-	3	X							+		
		GW				3	X		-			$ \rightarrow $	-			04
MATRIX SPIKE	6.5	GW	-	3.8.18	1415	3	x					$ \rightarrow $		+	-	
MATRIX SPIKE DUP	6124	GW	- '	3.8.19	1415	3	x									02
Matrix: /S - Soil AIR - Air F - Filter 3W - Groundwater B - Bioassay WW - WasteWater	Remarks:								рН Flov		Temp		S COC Seal COC Sign Bottles	ample Recei Present/In hed/Accuraty Arrive int	ntact: e: act:	KILLER Y
W - Drinking Water JT - Other	Samples retorn	ied via: dExCour	ier	7	racking # (6051	242	6 692	1436	157.	26946	Ì	Correct r Sufficie	nt volume s	d: ent: licable	NX-
elinquished by : (Signature)		Date: 3.8.18	Tir ľ	ne: R/	eceived by: (Signa	Hu	l	1	Trip Blan	ik Receiv	HCL/N	Леон	Preservat	tion Correc	t/Check	ed: Zr _N
elinquished by : (Signature)		Date:	Tir	ne: Rg	ecoived by: (Signa	iture)			Temp:	7 mi	Bottles Repeir	ved:	if preservat	tion required t	by Login:	Date/Time
elinquished by : (Signature)	/	Date:	Tir	ne: Rí	eceived for lab by	: (Signatu	re)		Date: 3/(0	he	Time:		Hold:		1	Condition: NCF / OK



ANALYTICAL REPORT

EAL TIME DATA ACCESS

Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number:

Description:

L976517 03/10/2018 BPU Nearman Ck CCR groundwater

Report To:

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

Entire Report Reviewed By:

Linde Cashman

Linda Cashman Technical Service Representative

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

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IWIDE.	₩
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	² Tc
	³ Ss
	⁴ Cn
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	⁹ Sc

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SDG: L976517

DATE/TIME: 03/20/18 16:21

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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MW-2A L976517-01 GW			Collected by Jonathan H.	Collected date/time 03/08/18 13:25	Received date/time 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	ΙΔΤ
	Weiteberge	I	03/13/10 17:00	03/11/10 21:13	
MW-3 1976517-02 GW			Collected by Jonathan H.	Collected date/time 03/08/18 14:15	Received date/time 03/10/18 08:45
101-5 2570317-02 800					
fethod	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Vet Chemistry by Method 9056A	WG1083269	1	03/11/18 13:35	03/11/18 13:35	DR
fercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 08:55	ABL
letals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 22:35	TRB
Actals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 20:59	LAT
Actals (ICPMS) by Method 6020	WC1085050	1	03/15/10 17:00	02/16/10 15:46	
ietais (ICFMS) by method 6020	WG1085000	I	03/10/16 07.36	03/10/18 13:40	LAT
			Collected by	Collected date/time	Received date/tim
VW-4 L976517-03 GW			Jonathan H.	03/08/18 16:45	03/10/18 08:45
lethod	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Vot Chamistry by Mathed ODECA	WC100000	1	02/11/10 14-20	02/11/10 14-20	חח
Vet Chemistry by Method 9056A	WG1083269		03/11/18 14:29	03/11/18 14:29	DR
lercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:04	ABL
Ietals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:21	TRB
Ietals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:19	LAT
MW-8A L976517-04 GW			Collected by Jonathan H.	Collected date/time 03/08/18 11:30	Received date/time 03/10/18 08:45
Ashad	Datab	Dilution	Droporotion	Analysis	Analyst
lenou	Balch	Dilution	Preparation	Andiysis	Analyst
			date/time	date/time	
Vet Chemistry by Method 9056A	WG1083269	1	03/11/18 14:42	03/11/18 14:42	DR
lercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:11	ABL
letals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:29	TRB
letals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:23	LAT
letals (ICPMS) by Method 6020	WG1085060	1	03/16/18 07:58	03/16/18 16:19	LAT
			Collected by Jonathan H.	Collected date/time 03/08/18 12:30	Received date/tim 03/10/18 08:45
	_				
lethod	Batch	Dilution	Preparation	Analysis	Analyst
let Chamber In Mathe 100504	1110100000	4			22
Vet Cnemistry by Method 9056A	WG1083269	1	03/11/18 14:55	03/11/18 14:55	DR
lercury by Method 7470A	WG1083197	1	03/12/18 01:34	03/13/18 09:13	ABL
letals (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:32	TRB
letals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:37	LAT
			Collected by	Collected date/time	Received date/tim
DUP-1 L976517-06 GW			Jonathan H.	03/08/18 00:00	03/10/18 08:45
lethod	Batch	Dilution	Preparation	Analysis	Analyst
Vot Chamistry by Mathed ODECA	WICIABOOCA	1			חח
	WG1083269	1	03/11/18 15:09	02/12/10 02 12	DK
nercury by Method 7470A	wG1083197	1	03/12/18 01:34	03/13/18 09:16	ABL
netais (ICP) by Method 6010B	WG1083089	1	03/10/18 14:55	03/12/18 23:34	IRB
Aetals (ICPMS) by Method 6020	WG1083098	1	03/13/18 17:08	03/14/18 21:40	LAT
ACCOUNT:	PROJECT:		SDG:	DATE/TIME:	
Kansas City Board of Public Utilities	BPU Nearman Ck CCR		L976517	03/20/18 16:21	

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

DUP-1 L976517-06 GW			Collected by Jonathan H.	Collected date/time 03/08/18 00:00	Received date/time 03/10/18 08:45	¹ Cp
Method	Batch	Dilution	Preparation	Analysis	Analyst	
			date/time	date/time		^{2}Tc
Metals (ICPMS) by Method 6020	WG1085060	1	03/16/18 07:58	03/16/18 16:24	LAT	10

³Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
⁰Sc

*

Ср

ACCOUNT: Kansas City Board of Public Utilities

SDG: L976517

DATE/TIME: 03/20/18 16:21

CASE NARRATIVE

*

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All 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.

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Linda Cashman Technical Service Representative

SDG: L976517

SAMPLE RESULTS - 01

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Wet Chemistry by Method 9056A

wet enemistry i	by method bobby	`					
	Result	Qualifier	RDL	Dilution	Analysis	Batch	Ср
Analyte	mg/l		mg/l		date / time		2
Fluoride	0.166		0.100	1	03/11/2018 12:55	WG1083269	Tc
Mercury by Met	hod 7470A						³ Ss
	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		4 Cn
Mercury	ND		0.000200	1	03/13/2018 09:02	WG1083197	

Metals (ICP) by Method 6010B

	Result	Qualifier	RDI	Dilution	Analysis	Batch	
Analyte	mg/l	duamer	mg/l	2.101.011	date / time	<u></u>	6
Barium	0.184		0.00500	1	03/12/2018 23:19	WG1083089	
Beryllium	ND		0.00200	1	03/12/2018 23:19	WG1083089	7
Cadmium	ND		0.00200	1	03/12/2018 23:19	WG1083089	
Chromium	ND		0.0100	1	03/12/2018 23:19	WG1083089	8
Cobalt	ND		0.0100	1	03/12/2018 23:19	WG1083089	Ĭ
_ithium	0.0372		0.0150	1	03/12/2018 23:19	WG1083089	
Molybdenum	ND		0.00500	1	03/12/2018 23:19	WG1083089	9
Selenium	ND		0.0100	1	03/12/2018 23:19	WG1083089	`

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

Collected date/time: 03/08/18 14:15

SAMPLE RESULTS - 02

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Wet Chemistry by Method 9056A

mg/l 0.100 1 PDI Dilution	date / time 03/11/2018 13:35	WG1083269	
0.100 1	03/11/2018 13:35	WG1083269	
PDI Dilution			
	Analysis	Batch	
mg/l	date / time		
0.000200 1	03/13/2018 08:55	WG1083197	
().000200 1	0.000200 1 03/13/2018 08:55	0.000200 1 03/13/2018 08:55 <u>WG1083197</u>

	Result	Qualifier	RDL	Dilution	Analysis	Batch	6
Analyte	mg/l		mg/l		date / time		[°] Qc
Barium	0.164		0.00500	1	03/12/2018 22:35	WG1083089	
Beryllium	ND		0.00200	1	03/12/2018 22:35	WG1083089	7 Gl
Cadmium	ND		0.00200	1	03/12/2018 22:35	WG1083089	0
Chromium	ND		0.0100	1	03/12/2018 22:35	WG1083089	8
Cobalt	ND		0.0100	1	03/12/2018 22:35	WG1083089	A
Lithium	0.0608		0.0150	1	03/12/2018 22:35	WG1083089	
Molybdenum	ND		0.00500	1	03/12/2018 22:35	WG1083089	9 50
Selenium	ND		0.0100	1	03/12/2018 22:35	WG1083089	50

	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

IVI VV - 4 Collected date/time: 03/08/18 16:45

SAMPLE RESULTS - 03

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Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Fluoride	0.132		0.100	1	03/11/2018 14:29	WG1083269
Mercury by Met	hod 7470A	0		Dilution	Angelasia	Datab
	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	03/13/2018 09:04	WG1083197
Metals (ICP) by	Method 6010B					
	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyta	ma/l		ma/l		data / timo	

Analyte	mg/l	mg/l		date / time		°Qc
Barium	0.135	0.00500	1	03/12/2018 23:21	WG1083089	
Beryllium	ND	0.00200	1	03/12/2018 23:21	WG1083089	⁷ Gl
Cadmium	ND	0.00200	1	03/12/2018 23:21	WG1083089	0
Chromium	ND	0.0100	1	03/12/2018 23:21	WG1083089	8
Cobalt	ND	0.0100	1	03/12/2018 23:21	WG1083089	A
Lithium	0.0458	0.0150	1	03/12/2018 23:21	WG1083089	
Molybdenum	ND	0.00500	1	03/12/2018 23:21	WG1083089	9 2 2
Selenium	ND	0.0100	1	03/12/2018 23:21	WG1083089	50

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

Collected date/time: 03/08/18 11:30

SAMPLE RESULTS - 04

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Wet Chemistry by Method 9056A

wet chemistry	by Method 5050P	~					
	Result	Qualifier	RDL	Dilution	Analysis	<u>Batch</u>	
Analyte	mg/l		mg/l		date / time		2
Fluoride	0.348		0.100	1	03/11/2018 14:42	WG1083269	² To
Mercury by Met	thod 7470A						³ Ss
	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		4
Mercury	ND		0.000200	1	03/13/2018 09:11	WG1083197	
Metals (ICP) by	Method 6010B						⁵ Sr
	Result	Qualifier	RDL	Dilution	Analysis	Batch	6
Analyte	ma/l		ma/l		date / time		ດໍໄ

Analyte	mg/l	mg/l		date / time		QC
Barium	0.0657	0.00500	1	03/12/2018 23:29	WG1083089	
Beryllium	ND	0.00200	1	03/12/2018 23:29	WG1083089	7 Gl
Cadmium	ND	0.00200	1	03/12/2018 23:29	WG1083089	
Chromium	ND	0.0100	1	03/12/2018 23:29	WG1083089	8
Cobalt	ND	0.0100	1	03/12/2018 23:29	WG1083089	Ă
Lithium	0.0290	0.0150	1	03/12/2018 23:29	WG1083089	
Molybdenum	0.00833	0.00500	1	03/12/2018 23:29	WG1083089	9 50
Selenium	ND	0.0100	1	03/12/2018 23:29	WG1083089	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

Analyte

Barium

Beryllium

Cadmium

Chromium

Cobalt

Lithium

Molybdenum

Selenium

SAMPLE RESULTS - 05

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Qc

Gl

AI

Sc

Wet Chemistry by Method 9056A

Collected date/time: 03/08/18 12:30

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		2
Fluoride	0.164		0.100	1	03/11/2018 14:55	WG1083269	
Mercury by Me	thod 7470A						3
	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		4
Mercury	ND		0.000200	1	03/13/2018 09:13	WG1083197	
Metals (ICP) by	Method 6010B						5

date / time

03/12/2018 23:32

03/12/2018 23:32

03/12/2018 23:32

03/12/2018 23:32

03/12/2018 23:32

03/12/2018 23:32

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WG1083089

WG1083089

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WG1083089

WG1083089

WG1083089

WG1083089

WG1083089

mg/l

0.00500

0.00200

0.00200

0.0100

0.0100

0.0150

0.00500

0.0100

1

1

1

1

1

1

1

1

mg/l

ND

ND

ND

ND

ND

ND

0.0418

0.0993

	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

Collected date/time: 03/08/18 00:00

SAMPLE RESULTS - 06 L976517

⁵Sr

Wet Chemistry by Method 9056A

Net one model social t								
	Result	Qualifier	RDL	Dilution	Analysis	Batch		
Analyte	mg/l		mg/l		date / time			2
Fluoride	0.347		0.100	1	03/11/2018 15:09	WG1083269		Tc
Mercury by Meth	od 7470A							³ Ss

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		⁴ Cn
Mercury	ND		0.000200	1	03/13/2018 09:16	WG1083197	CII

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch	6
Analyte	mg/l		mg/l		date / time		ĬQ
Barium	0.0650		0.00500	1	03/12/2018 23:34	WG1083089	
Beryllium	ND		0.00200	1	03/12/2018 23:34	WG1083089	7
Cadmium	ND		0.00200	1	03/12/2018 23:34	WG1083089	
Chromium	ND		0.0100	1	03/12/2018 23:34	WG1083089	8
Cobalt	ND		0.0100	1	03/12/2018 23:34	WG1083089	ĬA
Lithium	0.0281		0.0150	1	03/12/2018 23:34	WG1083089	
Molybdenum	0.00816		0.00500	1	03/12/2018 23:34	WG1083089	9
Selenium	ND		0.0100	1	03/12/2018 23:34	WG1083089	50

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

WG1083269

Wet Chemistry by Method 9056A

QUALITY CONTROL SUMMARY L976517-01,02,03,04,05,06

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Method Blank (MB)

(MB) R3292556-1 03/11/1	8 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 1	DS) L976517-02 03/11/18 13:35 • (DUP) R3292556-4 03/11/18 13:48									
Original Result DUP Result Dilution DUP RPD <u>DUP Qualifier</u>						DUP RPD Limits				
Analyte	mg/l	mg/l		%		%				
Fluoride	0.134	0.152	1	12.7		15				

L976547-02 Original Sample (OS) • Duplicate (DUP)

L976547-02 Origin	hal Sample	(OS) • Dup	olicate (DUP)			GI
(OS) L976547-02 03/11/18	8 16:56 • (DUP) I	R3292556-7 (03/11/18 17:	10			
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	⁸ Al
Analyte	mg/l	mg/l		%		%	
Fluoride	0.242	0.234	1	3.20		15	⁹ Sc

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

(LCS) R3292556-2 03/11/18	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 1	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 1)S) 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 <u>MS Qualifier</u>											
Analyte	mg/l	mg/l	mg/l	%		%					
Fluoride	5.00	0.242	5.76	110	1	80.0-120					

ACCOUNT:	PROJECT:	SDG:	DATE/TIME:	PAGE:
Kansas City Board of Public Utilities	BPU Nearman Ck CCR	L976517	03/20/18 16:21	12 of 19

WG1083197

Mercury by Method 7470A

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3292726-1 03	3/13/18 08:49			
	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	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												
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	%	%	%			%	%		
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												
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	%	%		%			%	%
Mercury	0.00300	ND	0.00309	0.00317	103	106	1	75.0-125			2.53	20

Metals (ICP) by Method 6010B

QUALITY CONTROL SUMMARY

Method Blank (MB)

(MB) R3292612-1 0	3/12/18 22:27
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	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	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 03/12/1	.CS) R3292612-2 03/12/18 22:30 • (LCSD) R3292612-3 03/12/18 22:32									
	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	1.05	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

	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	0.164	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

ACCOUNT:	
Kansas City Board of Public Utilities	

PROJECT: BPU Nearman Ck CCR SDG: L976517 DATE/TIME: 03/20/18 16:21 PAGE: 14 of 19 Tc Ss Cn

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Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3293327-1 03/14/18 20:48

(MD) 1(3233327 1 03	14/10/20.40				
	MB Result	MB Qualifier	MB MDL	MB RDL	2
Analyte	mg/l		mg/l	mg/l	Tc
Antimony	U		0.000754	0.00200	
Arsenic	U		0.000250	0.00200	³ SS
Lead	0.00379		0.000240	0.00200	
Thallium	U		0.000190	0.00200	4
					Cn

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										
	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	%	%	%			%	%
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)

DS) L976517-02 03/14/18 20:59 • (MS) R3293327-5 03/14/18 21:07 • (MSD) R3293327-6 03/14/18 21:11												
	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	%	%		%			%	%
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

WG1085060

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3293982-1 03/16/18 15:32						
	MB Result	MB Qualifier	MB MDL	MB RDL		
Analyte	mg/l		mg/l	mg/l		
Lead	U		0.000240	0.00200		

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

(LCS) R3293982-2 03/16/1	8 15:36 • (LCSE	D) R3293982-3	03/16/18 15:41							
	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	%	%	%			%	%
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												
	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	%	%		%			%	%
Lead	0.0500	ND	0.0494	0.0497	98.8	99.3	1	75.0-125			0.548	20

DATE/TIME: 03/20/18 16:21

GLOSSARY OF TERMS

*

Τс

Ss

Cn

Sr

*Q*c

GI

AI

Sc

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

MDI	Method Detection Limit
ND	Not detected at the Penorting Limit (or MDL where applicable)
RDI	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.

SDG: L976517

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
Alaska	17-026	Nevada
Arizona	AZ0612	New Hampshire
Arkansas	88-0469	New Jersev–NELAP
California	2932	New Mexico ¹
Colorado	TN00003	New York
Connecticut	PH-0197	North Carolina
Florida	E87487	North Carolina ¹
Georgia	NELAP	North Carolina ³
Georgia ¹	923	North Dakota
Idaho	TN00003	Ohio-VAP
Illinois	200008	Oklahoma
Indiana	C-TN-01	Oregon
lowa	364	Pennsylvania
Kansas	E-10277	Rhode Island
Kentucky ¹⁶	90010	South Carolina
Kentucky ²	16	South Dakota
Louisiana	Al30792	Tennessee ¹⁴
Louisiana ¹	LA180010	Texas
Maine	TN0002	Texas ⁵
Maryland	324	Utah
Massachusetts	M-TN003	Vermont
Michigan	9958	Virginia
Minnesota	047-999-395	Washington
Mississippi	TN00003	West Virginia
Missouri	340	Wisconsin
Montana	CERT0086	Wyoming

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 ¹⁴	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	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

Kansas City Board of Public Utilities

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.



BPU Nearman Ck CCR

L976517

PAGE: 18 of 19

03/20/18 16:21

Τс Ss Cn Sr Qc Gl AI Sc
	AND A DOMESTICS	S. H	Billing Information:			Analysis / Container / Preservative							0	hain of Custody	Pageof	
Kansas City Board of 300 N 65th Street Kansas City, KS 66102	Public Ut	Public Utilities Attn: Ellen Bouse 300 N 65th St Kansas City, KS 6610		02	Pres Chk	1000	0	N CLARK						×.	ESC	
Report to: Ingrid Setzler	Email To: isetzler@bpu		opu.com;kbrow	n@bpu.com;bhoye	@turn				1				13 M	- 2065 Lebanon Rd Aount Juliet, TN 37		
Project Description: groundwater	C		City/State Collected:		T								pt pt Fa	hone: 615-758-58 hone: 800-767-58 ax: 615-758-5859		
Phone: 913-573-9806 Fax: 913-573-9838	Client Project BPU Nearn	ient Project # Lab Pro PU Nearman Ck CCR KCKA!		Lab Project # KCKAN02-	MW NEARMAN	ic	Pres	03	N. S.F.					L	# 1976 F17	517
Collected by (print): Jondhan Heemanson	Site/Facility ID	cility ID # P.O. #		P.O. #			DPE-No	PE-HNG						A	cetnum: KCK	(AN02
Collected by (signature): Jutton Junann Immediately Packed on Ice N Y X	Rush? (L Same Di Next Da Two Day Three D	ab MUST Be ay Five I y S Day y 10 Da ay	Notified) Day (Rad Only) ay (Rad Only)	Quote # Date F	lesults Needed	No.	de 125mlHI	Is 250mlHDF						Ti P T: P	emplate: T11 relogin: P64 SR: 650 - Lind B: 3 5	1656 3105 a Cashman
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	Fluori	Meta				1		SI	hipped Via: Fi	edEX Ground
MW-2A	bens	GW	-	3.8.18	1325	2	x	X	-							-01
MW-3	biab	GW	-	3.8.18	1415	2	Х	X				100		- 5	1000	07
MW-4	bruk	GW	-	3.8.18	1645	2	X	X								03
MW-8A	Grub	GW	-	3.8.18	1130	2	x	X				1		-	and set	04
MW-10	Grab	GW	-	3.8.18	1230	2	X	X	27	10.3		6				05
DUP-1	Ganb	GW	-	3.8.13	-	2	х	X	20							06
		GW			1	2	х	X								
MATRIX SPIKE	Grab	GW	-	3.8.18	1415	2	X	X	1			236				02
MATRIX SPIKE DUP	Grub	GW	-	3.8.19	1415	2	X	х								00
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater	Remarks:									pH	Te	mp	COC Se COC Si Bottle	Sample al Pres gned/Ac s arriv	Receipt Cr ent/Intact curate: e intact:	
DW - Drinking Water Samples returned via: 		rfed via: dExCou	rier		Tracking #	60	951	2426	692	4.6	957	:6946	Suffic	t bottl ient vo	es used: lume sent: (f Applicab	
Relinquished by : (Signature) Date: T J.H. Drown 3.8, 18		ime: 17 1 5	Received by: (Signa		hu	il	Tri	p BlaHk Re	ceived:	Yes (N) HCL/MeoH	Preser	vation	apace: Correct/Che	acked: $\mathbf{A} = \mathbf{N}$		
Reinquished by : (Signature)		Date:	T	'ime:	Received by: (Signa	iture)			Te	mp:	°C B	ottles Received:	If preser	rvation re	equired by Log	gin: Date/Time
Relinquished by : (Signature)		Date:	T	îme:	Received for lab by	(Signat	ure)		Da	te:	T	me:	Hold:		19.07	Condition:

16



ANALYTICAL REPORT



Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number:

Description:

L998977 06/05/2018 62801 BPU Nearman groundwater

Report To:

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

Entire Report Reviewed By:

Linde Cashmen

Linda Cashman Technical Service Representative

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

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² Tc	
³ Ss	
⁴ Cn	
⁵ Sr	
⁶ Qc	
⁷ Gl	

ΆI

Sc

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SDG: L998977

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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MW-2A L998977-01 Non-Potable Water			Collected by KS	Collected date/time 06/04/18 11:55	Received date/time 06/05/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/time
MW-3 L998977-02 Non-Potable Water			KS	06/04/18 11:10	06/05/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/time
MW-4 L998977-03 Non-Potable Water			KS	06/04/18 10:05	06/05/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
Dadia akamista, ku Mathad 004	WC1120441	1			DDE
Radiochemistry by Method Solaulation	WG1120441 WC1110517	1	06/06/18 12:14	06/19/18 16:29	RRE
Padiochemistry by Method SM7500Pa R M	WG1119517 WG1119517	1	06/06/18 09:06	06/07/18 17:36	RRE
	WGIII321/	I	00/00/18 09.00	00/07/18 17:30	KOI
			Collected by	Collected date/time	Received date/time
MW-8A L998977-04 Non-Potable Water			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
			Collected by	Collected date/time	Received date/time
MW-10 L998977-05 Non-Potable Water			KS	06/04/18 09:25	06/05/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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	RGI
			Collected by	Collected date/time	Received date/time
DUP1 L998977-06 Non-Potable Water			KS	06/04/18 00:00	06/05/18 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
		1	06/06/18 12.14	06/19/18 10:00	RRE
Radiochemistry by Method 904	WG1120441	1	00/00/10 12.11	00/10/10 10:00	
Radiochemistry by Method 904 Radiochemistry by Method Calculation	WG1120441 WG1119517	1	06/06/18 09:06	06/19/18 10:00	RRE

PROJECT: 62801 BPU Nearman SDG: L998977 DATE/TIME: 06/27/18 17:07

CASE NARRATIVE

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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.

inde 1

Linda Cashman Technical Service Representative



SDG: L998977 DATE/TIME: 06/27/18 17:07 PAGE: 4 of 15 RADIUM-226

SAMPLE RESULTS - 01

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Gl

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Radiochemistry by Method 904

0.0919

Rediochemistry by method both							
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Ср
Analyte	pCi/L		+/-	pCi/L	date / time		2
RADIUM-228	-0.0648		0.877	1.49	06/19/2018 10:00	WG1120441	² Tc
Radiochemistry by	y Method Calcu	llation					³ Ss
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		⁴ Cp
Combined Radium	0.0919		0.992	1.64	06/19/2018 10:00	WG1119517	
Radiochemistry by	y Method SM75	500Ra B M	l				⁵ Sr
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	G
Analyte	pCi/l		+ / -	pCi/l	date / time		ိQင

0.151

06/07/2018 17:36

WG1119517

0.115

SDG: L998977

Collected date/time: 06/04/18 11:10

SAMPLE RESULTS - 02 L998977

Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/L		+ / -	pCi/L	date / time	
RADIUM-228	-0.172		0.612	1.33	06/19/2018 10:00	WG1120441
Radiochemistry by	/ Method Calcu	ulation				
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.169		0.819	1.62	06/19/2018 10:00	WG1119517

Result Qualifier Uncertainty MDA Analysis Date Batch Analyte pCi/l +/pCi/l date / time RADIUM-226 0.169 0.207 0.29 06/07/2018 17:36 WG1119517

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al

Sc

RADIUM-226

SAMPLE RESULTS - 03

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Gl

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Sc

Radiochemistry by Method 904

0.149

Collected date/time: 06/04/18 10:05

Radio enemistry by							
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Ср
Analyte	pCi/L		+ / -	pCi/L	date / time		2
RADIUM-228	-1.26		0.845	0.564	06/19/2018 16:29	WG1120441	Tc
Radiochemistry by	y Method Calcu	ulation					³ Ss
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+ / -	pCi/l	date / time		⁴ Cp
Combined Radium	0.149		1.06	0.876	06/19/2018 16:29	WG1119517	CI
Radiochemistry by	y Method SM75	500Ra B M	1				⁵Sr
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	6
Analyte	pCi/l		+/-	pCi/l	date / time		ိရင

0.312

06/07/2018 17:36

WG1119517

0.218

SDG: L998977

SAMPLE RESULTS - 04 L998977

GI

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Sc

Radiochemistry by Method 904

Collected date/time: 06/04/18 08:15

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/L		+/-	pCi/L	date / time		2
RADIUM-228	1.17		0.805	1.38	06/19/2018 10:00	WG1120441	²٦
Radiochemistry by	/ Method Calcu Pocult	Jation	Uncortainty	MDA	Analysis Dato	Patch	3
Analyte	pCi/l	Qualifier	+ / -	pCi/l	date / time	Batch	4
Combined Radium	1.32		0.977	1.61	06/19/2018 10:00	WG1119517	
							5

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	C
Analyte	pCi/l		+/-	pCi/l	date / time		°Qc
RADIUM-226	0.153		0.172	0.227	06/07/2018 17:36	WG1119517	



RADIUM-226

SAMPLE RESULTS - 05

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Sc

Radiochemistry by Method 904

0.224

Collected date/time: 06/04/18 09:25

)						/ Cr
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/L		+ / -	pCi/L	date / time		2
RADIUM-228	-0.603		0.785	0.997	06/19/2018 10:00	WG1120441	Tc
Radiochemistry b	y Method Calcu	Ilation					³ Ss
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+ / -	pCi/l	date / time		⁴ Cr
Combined Radium	0.224		0.973	1.18	06/19/2018 10:00	WG1119517	
Radiochemistry b	y Method SM75	500Ra B M	1				⁵Sr
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	6
Analyte	pCi/l		+/-	pCi/l	date / time		ို့ထူး

0.178

06/07/2018 17:36

WG1119517

0.188

	ACCOUNT:
Kansas	City Board of Public Litilities

Combined Radium

Collected date/time: 06/04/18 00:00

SAMPLE RESULTS - 06 L998977



Radiochemistry by Method 904

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch		
Analyte	pCi/L		+/-	pCi/L	date / time		2	
RADIUM-228	-2.28		1.05	1.29	06/19/2018 10:00	WG1120441	ŤC	
Radiochemistry	by Method Calcu	ulation					³ Ss	
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch		
Analyte	pCi/l		+/-	pCi/l	date / time		4	

Radiochemistry by Method SM7500Ra B M

0.211

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+ / -	pCi/l	date / time		
RADIUM-226	0.211		0.204	0.253	06/07/2018 17:36	WG1119517	

1.54

06/19/2018 10:00

WG1119517

1.25



Cn

Radiochemistry by Method 904

QUALITY CONTROL SUMMARY

Cn

Sr

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Method Blank (MB)

	D)				^{1}Cn		
(MB) R3320557-5 06/22/18 11:20							
	MB Result	MB Qualifier	MB MDA		2		
Analyte	pCi/L		pCi/L		Tc		
Radium-228	-0.730		1.68				
					³ Ss		

L992369-01 Original Sample (OS) • Duplicate (DUP)

(OS) L992369-01 06/13/18	0riginal 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/	CS) 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

DATE/TIME: 06/27/18 17:07 Radiochemistry by Method SM7500Ra B M

QUALITY CONTROL SUMMARY

Cn

Sr

Qc

GI

Â

Sc

Method Blank (MB)

	VID)				^{1}Cn		
(MB) R3316559-1 06/07/18 17:36							
	MB Result	MB Qualifier	MB MDA		2		
Analyte	pCi/l		pCi/l		Tc		
Radium-226	-0.00692		0.0539				
					³ Ss		

L998977-04 Original Sample (OS) • Duplicate (DUP)

Laboratory Control Sample (LCS)

(LCS) R3316559-2 06/07/	.CS) R3316559-2 06/07/18 17:36							
	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier			
Analyte	pCi/l	pCi/l	%	%				
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									
	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier		
Analyte	pCi/l	pCi/l	pCi/l	%		%			
Radium-226	20.1	0.149	17.9	88.4	1	75.0-125			

GLOSSARY OF TERMS

*

Τс

Ss

Cn

Sr

*Q*c

GI

AI

Sc

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

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.

SDG: L998977 DATE/TIME: 06/27/18 17:07

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
Alaska	17-026	Nevada
Arizona	AZ0612	New Hampshire
Arkansas	88-0469	New Jersey–NELAP
California	2932	New Mexico ¹
Colorado	TN00003	New York
Connecticut	PH-0197	North Carolina
Florida	E87487	North Carolina ¹
Georgia	NELAP	North Carolina ³
Georgia ¹	923	North Dakota
Idaho	TN00003	Ohio-VAP
Illinois	200008	Oklahoma
Indiana	C-TN-01	Oregon
lowa	364	Pennsylvania
Kansas	E-10277	Rhode Island
Kentucky ¹⁶	90010	South Carolina
Kentucky ²	16	South Dakota
Louisiana	Al30792	Tennessee ¹⁴
Louisiana ¹	LA180010	Texas
Maine	TN0002	Texas⁵
Maryland	324	Utah
Massachusetts	M-TN003	Vermont
Michigan	9958	Virginia
Minnesota	047-999-395	Washington
Mississippi	TN00003	West Virginia
Missouri	340	Wisconsin
Montana	CERT0086	Wyoming

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 ¹⁴	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	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

Kansas City Board of Public Utilities

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.



62801 BPU Nearman

L998977

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06/27/18 17:07





Sc

			Billing Info	prmation:			-		Analysis /	Container	/ Preservat	lve	122		Chain of Custody	Page of
Kansas City Board of 300 N 65th Street Kansas City, KS 66102	Public Ut	ilities	Ingrid Se 300 N 6 Kansas (Ingrid Setzler 300 N 65th Street Kansas City, KS 66102		Pres Chk	C2 E								££E	SC
Report to: Ingrid Setzler		7	Email To: isetzler@t	bpu.com;kbrown@	bpu.com;bhoye	@burn	ONHP								12065 Lebanon Rd Mount Juliet, TN 3712 Phone: 615,758,5858	
Project Description: groundwater	- Ar 5-		3.9.3	City/State Collected:	lantas cols	14	PE-Add								Phone: 800-767-5859 Fax: 615-758-5859	
Phone: 913-573-9806 Fax:	Client Project 62801 BPU	# Nearman		Lab Project # KCKAN02-M	W NEARMAN		IL-HDI					1		1	1180	971
Collected by (print): Kach Shoth	Site/Facility ID	#		P.O. #			A228		0			1		4	Acctnum: KCKA	N02
Collected by (signature):	Rush? (L Same Du Next Da Two Day Three Du	Lab MUST Be ay Five y 5 Da y 10 D lay	Notified) Day y (Rad Only) ay (Rad Only)	Quote # Date Resu	ults Needed	No.	Rad, RA226, R							-	Template: T133397 Prelogin: P657386 TSR: 650 - Linda Cashman PB:	
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	fota l								Shipped Via: Fec	Sample # (lab only)
MW-2A	G.	GW		6-4	1155	3	x							1		01
MW-3	and the second	NPW	1	6-4	1110	3	х		1							02
MW-4	100	GW		6-4	1005	3	х	· .				1.00		1	a de la	03
MW-8A	69	GW	11 13	6-4	0815	3	X			3612	1.14			1		67
MW-10		GW		6-4	0925	3	X								1.1.1	05
DUP 1	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	GW		6-4		3	х						2			06
		GW	1.02			3	X	134								
MATRIX SPIKE	1	GW		6-4	1005	3	x			2		1.9				03
MATRIX SPIKE DUP	-	GW	-	6-4	1005	3	x							-		03
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bloassay WW - WasteWater DW - Drinking Water	Remarks: Samples vetur	med via:	1						pH Flow		Temp Other		COC Seal COC Sign Bottles Correct Sufficie	ampl l Pre ned/J arr: bott ent	e Receipt Che esent/Intact: Accurate: ive intact: tles used: volume sent:	tokline v
OT - Other Relinquished by : (Signature)	UPS AFE	Date:	urier	Tr Time: Re 1250 -	acking # 42 aceived by: (Signa	36 ature)		2433 MA	A Trip Blan	6 k Receive	d: Yes/N HCL/	o MeoH	VOA Zero Preservo	o Rea ation	If Applicabl adspace: n Correct/Cher	cked: 2
Relinquished by : (Signature)	1.4	Date:	2	Time: Re	ecleived by: (Signa	ature)	LA	yea	Temp: 3.4"	°C	Bottles Rec 2-4	eived: H	If preserv	ation	required by Logi	n: Date/Time
Relinquished by : (Signature)		Date:		Time: Re	eceived for lab by	1: (Signa	iture))	Date:	8	Time:	5	Hold:			Condition: NCF



ANALYTICAL REPORT



Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number:

Description:

L999032 06/05/2018 BPU Nearman Ck CCR groundwater

Report To:

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

Entire Report Reviewed By:

Linde Cashman

Linda Cashman Technical Service Representative

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

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² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
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⁸ Al
⁹ Sc

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SDG: L999032

DATE/TIME: 06/15/18 16:55 PAGE: 2 of 22

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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MW-2A L999032-01 GW			Collected by KS	Collected date/time 06/04/18 11:55	Received date/time 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
			Collected by	Collected date/time	Received date/time
MW-3 L999032-02 GW			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 KS	Collected date/time 06/04/18 10:05	Received date/time 06/05/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/time
MW-8A L999032-04 GW			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
			Collected by	Collected date/time	Received date/time
MW-10 L999032-05 GW			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
Motals (ICPMS) by Mothod 6020	WG1120165	1	06/06/18 13:48	06/06/18 16:24	IPD

PROJECT: BPU Nearman Ck CCR SDG: L999032

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

			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	Analysis	Analyst
			date/time	date/time	
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

*

Ср

Тс

SDG: L999032 DATE/TIME: 06/15/18 16:55 PAGE: 4 of 22

CASE NARRATIVE

*

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All 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.

inde 1

Linda Cashman Technical Service Representative

ACCOUNT: Kansas City Board of Public Utilities PROJECT: BPU Nearman Ck CCR SDG: L999032

6: 032 DATE/TIME: 06/15/18 16:55 PAGE: 5 of 22

SAMPLE RESULTS - 01 L999032

Qc

Sc

Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch	 Ср
Analyte	mg/l		mg/l		date / time		2
Dissolved Solids	537		10.0	1	06/08/2018 12:58	WG1121021	Tc

Wet Chemistry by Method 9040C

Wet Chemistry by Method 9040C							
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	su			date / time		4 Cn	
рН	7.05	<u>T8</u>	1	06/06/2018 09:05	WG1120442		

Sample Narrative:

L999032-01 WG1120442: 7.05 at 12.1C

Wet Chemistry by Method 9056A

							-
	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		G
Chloride	4.34		1.00	1	06/06/2018 23:56	WG1120813	8
Fluoride	0.274	B	0.100	1	06/06/2018 23:56	WG1120813	Ă
Sulfate	53.8		5.00	1	06/06/2018 23:56	WG1120813	

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	06/06/2018 15:57	WG1120165

SAMPLE RESULTS - 02 L999032

Qc

	, , , , , , , , , , , , , , , , , , ,						1°Cn
	Result	Qualifier	RDL	Dilution	Analysis	Batch	Cp
Analyte	mg/l		mg/l		date / time		2
Dissolved Solids	788		10.0	1	06/08/2018 12:58	WG1121021	Tc
Wet Chemistry by M	Nethod 9040C		D				 ³Ss
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	SU			date / time			⁴ Cn
	6.04	TO	4	0010010010 00 0			

Wet Chemistry by Method 9040C

Collected date/time: 06/04/18 11:10

	Result	Qualifier	Dilution	Analysis	Batch	
Analyte	su			date / time		4
рН	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

	Result	Qualifier	RDL	Dilution	Analysis	Batch	7 Cl
Analyte	mg/l		mg/l		date / time		
Chloride	5.74		1.00	1	06/07/2018 00:11	WG1120813	8
Fluoride	0.173	B	0.100	1	06/07/2018 00:11	WG1120813	ĬAĬ
Sulfate	137		25.0	5	06/07/2018 08:58	WG1120813	
							9 50
							150

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	06/06/2018 16:15	WG1120165

SAMPLE RESULTS - 03 L999032

.

Qc

Sc

Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch		Ср		
Analyte	mg/l		mg/l		date / time			2		
Dissolved Solids	741		10.0	1	06/08/2018 12:58	WG1121021		Tc		
Wet Chemistry by	Method 9040C							³ Ss		
	Result	Qualifier	Dilution	Analysis	Batch					
Analyte	SU			date / time				⁴ Cn		
الم	C 0 2	то	1	06/06/2010 00.0	NE WC1120442					

Wet Chemistry by Method 9040C

Collected date/time: 06/04/18 10:05

	Result	Qualifier	Dilution	Analysis	Batch	
Analyte	su			date / time		4
рН	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		G
Chloride	3.59		1.00	1	06/07/2018 00:27	WG1120813	8
Fluoride	0.156	B P1	0.100	1	06/07/2018 00:27	WG1120813	Ă
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	01 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

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	06/06/2018 15:30	WG1120165

SAMPLE RESULTS - 04 L999032

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Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch		Ср
Analyte	mg/l		mg/l		date / time		-	2
Dissolved Solids	853		10.0	1	06/08/2018 15:04	<u>WG1121022</u>		Tc

Wet Chemistry by Method 9040C

Collected date/time: 06/04/18 08:15

Wet Chemistry by Method 9040C							
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	su			date / time		4 Cn	
рН	6.97	<u>T8</u>	1	06/06/2018 09:05	WG1120442	CII	

Sample Narrative:

L999032-04 WG1120442: 6.97 at 8.5C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		G
Chloride	25.7		1.00	1	06/07/2018 01:59	WG1120813	8
Fluoride	0.453	B	0.100	1	06/07/2018 01:59	WG1120813	٦A
Sulfate	353		25.0	5	06/07/2018 09:13	WG1120813	

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	0.0204		0.00200	1	06/06/2018 16:20	WG1120165

SAMPLE RESULTS - 05 L999032

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	Result	Qualifier	RDL	Dilution	Analysis	Batch	 Ср
Analyte	mg/l		mg/l		date / time		2
Dissolved Solids	748		10.0	1	06/08/2018 15:04	WG1121022	Tc

Wet Chemistry by Method 9040C

Wet Chemistry by Method 9040C						
	Result	Qualifier	Dilution	Analysis	Batch	
Analyte	su			date / time		4 Cn
рН	6.94	<u>T8</u>	1	06/06/2018 09:05	WG1120442	CII

Sample Narrative:

L999032-05 WG1120442: 6.94 at 8.8C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	7 Cl
Analyte	mg/l		mg/l		date / time		0
Chloride	19.6		1.00	1	06/07/2018 02:15	WG1120813	8
Fluoride	0.235	B	0.100	1	06/07/2018 02:15	WG1120813	ĬAĬ
Sulfate	214		25.0	5	06/07/2018 09:28	WG1120813	
							⁹ SC
Matala (ICD) las Matla							100

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	0.0126		0.00200	1	06/06/2018 16:24	WG1120165

SAMPLE RESULTS - 06 L999032



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Gravimetric Analysis by Method 2540 C-2011

	· · ·					1 Cm
	Result	Qualifier RDL	Dilution	Analysis	Batch	Ср
Analyte	mg/l	mg/l		date / time		 2
Dissolved Solids	881	10.0	1	06/08/2018 15:04	<u>WG1121022</u>	⁻Tc

Wet Chemistry by Method 9040C

Wet Chemistry by Method 9040C							
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	su			date / time		4 Cn	
рН	6.98	<u>T8</u>	1	06/06/2018 09:05	WG1120442		

Sample Narrative:

L999032-06 WG1120442: 6.98 at 9.5C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	7 CI
Analyte	mg/l		mg/l		date / time		G
Chloride	25.5		1.00	1	06/07/2018 02:30	WG1120813	8
Fluoride	0.441	B	0.100	1	06/07/2018 02:30	WG1120813	ĬĂ
Sulfate	360		25.0	5	06/07/2018 09:44	WG1120813	

Metals (ICP) by Method 6010B

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	0.0195		0.00200	1	06/06/2018 16:29	WG1120165

Gravimetric Analysis by Method 2540 C-2011

QUALITY CONTROL SUMMARY L999032-01,02,03

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Method Blank (MB)

(MB) R3317045-1 06	6/08/18 12:58			
	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	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)	OS) • Dup R3317045-4	011Cate (L 06/08/18 1	2:58			 ⁴ Cn
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	⁵ Sr
Analyte	mg/l	mg/l		%		%	
Dissolved Solids	1030	1080	1	4.76		5	⁶ Qc

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

(LCS) R3317045-2 06/08/1	8 12:58 • (LCSI	D) R3317045-3	06/08/18 12:58	8						
	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	%	%	%			%	%
Dissolved Solids	8800	8620	8560	98.0	97.3	85.0-115			0.698	5

DATE/TIME: 06/15/18 16:55

Gravimetric Analysis by Method 2540 C-2011

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3316958-1 06/08/18 15:04							
	MB Result	MB Qualifier	MB MDL	MB RDL			
Analyte	mg/l		mg/l	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		
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Dissolved Solids	57300	22400	1	87.5	<u>J3</u>	5

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

(LCS) R3316958-2 06/08/1	18 15:04 • (LCSI	D) R3316958-3	06/08/18 15:0	4						
	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	%	%	%			%	%
Dissolved Solids	8800	8700	8760	98.9	99.5	85.0-115			0.687	5

DATE/TIME: 06/15/18 16:55

Wet Chemistry by Method 9040C

QUALITY CONTROL SUMMARY

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L998305-01 Original Sample (OS) • Duplicate (DUP)

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	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	2 TC
Analyte	SU	su		%		%	
рН	8.48	8.47	1	0.118		1	³ Ss
Sample Narrative: OS: 8.48 at 18.2C							⁴ Cn

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 ()9:05		
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	SU		%		%
рН	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	%	%	%			%	%	
рН	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

> ACCOUNT: Kansas City Board of Public Utilities

PROJECT: BPU Nearman Ck CCR SDG: L999032 DATE/TIME: 06/15/18 16:55 PAGE: 14 of 22

Wet Chemistry by Method 9056A

QUALITY CONTROL SUMMARY L999032-01,02,03,04,05,06

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Method Blank (MB)

(MB) R3316098-1	06/06/18 20:40

	0/00/10 20:10				
	MB Result	MB Qualifier	MB MDL	MB RDL	2
Analyte	mg/l		mg/l	mg/l	Tc
Chloride	U		0.0519	1.00	
Fluoride	0.0661	J	0.00990	0.100	³ SS
Sulfate	U		0.0774	5.00	00
					⁴ Cn

L999032-03 Original Sample (OS) • Duplicate (DUP)

(OS) L999032-03 06/07/18 00:27 • (DUP) R3316098-4 06/07/18 01:13										
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits				
Analyte	mg/l	mg/l		%		%				
Chloride	3.59	3.61	1	0.650		15				

L999115-03 Original Sample (OS) • Duplicate (DUP)

(OS) L999115-03 06/07/18	S) L999115-03 06/07/18 03:32 • (DUP) R3316098-7 06/07/18 04:18												
	Original Result DUP Result Dilution DUP RPD <u>DUP Qualifier</u> DUP RPD Limits						⁹ Cc						
Analyte	mg/l	mg/l		%		%							
Chloride	24.4	24.6	1	0.942		15							
Fluoride	0.153	0.225	1	38.0	<u>P1</u>	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												
	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	39.3	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												
	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	%	%		%			%	%
Chloride	50.0	3.59	57.3	53.7	107	100	1	80.0-120			6.60	15

ACCOUNT:	PROJECT:	SDG:	DATE/TIME:	PAGE:
Kansas City Board of Public Utilities	BPU Nearman Ck CCR	L999032	06/15/18 16:55	15 of 22

QUALITY CONTROL SUMMARY

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L999115-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L999115-03 06/07/18	DS) 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						

ACCOUNT: Kansas City Board of Public Utilities PROJECT: BPU Nearman Ck CCR SDG: L999032 DATE/TIME: 06/15/18 16:55 PAGE: 16 of 22

Wet Chemistry by Method 9056A

QUALITY CONTROL SUMMARY L999032-03

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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	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)

L999755-04 Origin	L999755-04 Original Sample (OS) • Duplicate (DUP)											
(OS) L999755-04 06/07/1	8 23:27 • (DUP) R3316378-7 (06/07/18	23:44								
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	⁸ Al					
Analyte	mg/l	mg/l		%		%						
Sulfate	ND	0.000	1	0.000		15	⁹ Sc					

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

(LCS) R3316378-2 06/07/18	_CS) 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	DS) 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	vs) 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	

		SDG.		PAGE
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Kansas City Board of Public Utilities	BPU Nearman CK CCR	L999032	06/15/18 16:55	17 OT 22

Metals (ICP) by Method 6010B

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3316025-1	06/06/18 20:26

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	MB Result	MB Qualifier	MB MDL	MB RDL	2
Analyte	mg/l		mg/l	mg/l	Tc
Barium	U		0.00170	0.00500	
Boron	U		0.0126	0.200	³ Ss
Calcium	U		0.0463	1.00	
Lithium	U		0.00530	0.0150	4
Molybdenum	U		0.00160	0.00500	Cn

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

(LCS) R3316025-2 06/06/1	18 20:28 • (LCS	SD) R3316025-3	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	5) 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	\vee	$\underline{\vee}$	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

DATE/TIME: 06/15/18 16:55

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3315951-1 06/06	6/18 15:16			
	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) R3315951-2 06/06/18	8 15:21 • (LCSD)) R3315951-3 (06/06/18 15:25							
	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	%	%	%			%	%
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 06/06/1	- OS) L999032-03 06/06/18 15:30 • (MS) R3315951-5 06/06/18 15:39 • (MSD) R3315951-6 06/06/18 15:44											
	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	ND	0.0495	0.0521	97.9	103	1	75.0-125			5.14	20

DATE/TIME: 06/15/18 16:55

GLOSSARY OF TERMS

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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
В	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.
Т8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

SDG: L999032
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

A1 1	10000	N 1 1
Alabama	40660	Nebraska
Alaska	17-026	Nevada
Arizona	AZ0612	New Hampshire
Arkansas	88-0469	New Jersey–NEL
California	2932	New Mexico ¹
Colorado	TN00003	New York
Connecticut	PH-0197	North Carolina
Florida	E87487	North Carolina ¹
Georgia	NELAP	North Carolina ³
Georgia ¹	923	North Dakota
Idaho	TN00003	Ohio-VAP
Illinois	200008	Oklahoma
Indiana	C-TN-01	Oregon
lowa	364	Pennsylvania
Kansas	E-10277	Rhode Island
Kentucky ¹⁶	90010	South Carolina
Kentucky ²	16	South Dakota
Louisiana	AI30792	Tennessee ^{1 4}
Louisiana ¹	LA180010	Texas
Maine	TN0002	Texas ⁵
Maryland	324	Utah
Massachusetts	M-TN003	Vermont
Michigan	9958	Virginia
Minnesota	047-999-395	Washington
Mississippi	TN00003	West Virginia
Missouri	340	Wisconsin
Montana	CERT0086	Wyoming

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	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

Kansas City Board of Public Utilities

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.



BPU Nearman Ck CCR

L999032

06/15/18 16:55



Ss

Cn

Sr

Qc

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	1. 195		Billing Information:				Analysis / Container / Preservative					-	Chain or custody	00		
Kansas City Board of P 300 N 65th Street Kansas City, KS 66102	sas City Board of Public Utilities Attn: Ellen Bouse 300 N 65th St Kansas City, KS 66102			Pres Chk		75								SC.		
teport to:		- 3	Email To: isetzler@b	pu.com;kbrown@l	opu.com;bhoye	@burn						160			12065 Lebanon Rd Mount Juliet, TN 371 Phone: 615-758-585	
Project Description: groundwater	ngrid Setzler City/Sta Project Collecte		City/State Collected:	on coly	13	S								Phone: 800-767-585 Fax: 615-758-5859	1000 D77	
Phone: 913-573-9806 Fax: 913-573-9838	Client Project # BPU Nearm	an Ck CCF		Lab Project # KCKAN02-MV	V NEARMAN	с	E-NoPre	403	es				100		C08	5
Collected by (print): Keith Shoth	Site/Facility ID	#		P.O. #		er.	UHDP	PE-HP	NoPre						Acctnum: KCK Template:T13	AN02 5796
Collected by (signature):	Rush? (Li Same Da	ab MUST Be y Five	Notified) Day	(otified) Quote #			1125n	DHIM	HDPE			1			Prelogin: P65	5800 a Cashman
Immediately Packed on Ice N Y	Next Day Two Day Three Da	5 Day 	r (Rad Only) ay (Rad Only)	Date Resu	its Needed	No. of	So4,pt	als 250	250ml			-			PBJ-31- Shipped Via: Fr	18 MG
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Contra	CI,F,	Met	TDS		1				Remarks	Sample # (Jab only)
MW-2A	4.000	GW		6-4	1155	3	X	X	X			_	-		1 - A	-0
MW-3		GW		6-4	1110	3	X	X	X	1		-	-		-	~
MW-4	16. Carlos	GW		6-4	1005	3	X	X	X	-		-			-	-00
MW-8A		GW		6-4	0811	3	X	X	X		-	-	-		-	
MW-10		GW		6-4	0925	3	X	X	X	199		-	-		-	
DUP-1		GW		6-7	9-	- 3	X	X	X	-	-	-	-		-	
Line		GW			-	3	X	X	X	-	2		-			03
MATRIX SPIKE	1	GW	-	6-4	1003	3	X	X	X	-			-			. 07
MATRIX SPIKE DUPLICATE	-	GW	365	6-4	1005	3	X	X	X	-		-	10		1	
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay	Remarks:	narks:								pH Flo	w	_ Temp Other		COC Seal COC Sign Bottles Correct	ample Receipt (Present/Intac med/Accurate: arrive intact: bottles used:	hecklifst t: _WP _Y _YY _YY
DW - Drinking Water OT - Other	Samples retu UPSF	rned via: edExCo	ourier		racking #	43	6	1 1	59	33	8	102	ā	Sufficient volume sent:YN If Applicable VOA Zero Headspace:YN Preservation Correct/Checked:YN		
Relinquished by: (Signature)	14	Date:	1-18	Time:	leceived by: (Sig	hature)	·He	200	A	Trip Bl	ank Rece	Ved: Yes / HC TBI	L MeoH			
Relinquished by : (Signature)	1 - P	Date:	- 32	Time:	teceived by: (Sig	nature)	6			Temp: 3,4	M	C Bottles	-4	in preserv	anon required by c	-Pur coret une
Relinquished by : (Signature)	1	Date:	S. Lugal	Time:	Received for int	by fiel	Lature)		1	Date:	3118	Time:	45	Hold:		NCF / OR



ANALYTICAL REPORT

Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number: Description: L1031071 10/03/2018 BPU Nearman Ck CCR groundwater

Report To:

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

Entire Report Reviewed By:

Tacy Kenned

Stacy Kennedy Project Manager

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

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² Tc	
³Ss	
⁴ Cn	
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ΆI

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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			Collected by	Collected date/time	Received date/tim
MW-2A L1031071-01 GW			Jonathan H.	10/01/18 16:05	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/tim
MW-3 L1031071-02 GW			Jonathan H.	10/02/18 10:35	10/03/18 09:00
Aethod	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Gravimetric Analysis by Method 2540 C-2011	WG1177067	1	10/09/18 19:14	10/09/18 20:03	MMF
Vet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Vet Chemistry by Method 9056A	WG1175177	1	10/06/18 18:54	10/06/18 18:54	MAJ
Net Chemistry by Method 9056A	WG1178040	5	10/09/18 16:05	10/09/18 16:05	MAJ
Aetals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 13:55	ST
			Collected by	Collected date/time	Received date/tim
MW-4 L1031071-03 GW			Jonathan H.	10/02/18 11:20	10/03/18 09:00
Nethod	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
avimetric Analysis by Method 2540 C-2011	WG1177067	1	10/09/18 19:14	10/09/18 20:03	MCG
Vet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Vet 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
			Collected by	Collected date/time	Deceived date/tim
MW-8A L1031071-04 GW			Jonathan H.	10/01/18 14:15	10/03/18 09:00
Vethod	Batch	Dilution	Preparation	Δnalvsis	Δnalvst
	Batch	Dilution	date/time	date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG1176739	1	10/08/18 17:29	10/08/18 18:03	MMF
Not Chomistry by Mothod 9040C	WC1175188	1	10/00/18 07:20	10/04/18 07:30	
Vot Chomistry by Mothod 90564	WC1175177	1	10/06/19 10:50	10/06/19 10/50	AMD MA I
Vet Chemistry by Method 9050A	WG1175177	і Г	10/00/18 19:50	10/00/18 19:50	MAJ
Astala (ICD) by Method CO10D	WG11/51//	5	10/06/18 20:45	10/06/18 20.45	MAJ
	WG11/5384	I	10/04/18 09:40	10/04/18 13.27	IKB
			Collected by	Collected date/time	Received date/tim
MW-10 L1031071-05 GW			Jonathan H.	10/01/18 15:15	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Gravimetric Analysis by Method 2540 C-2011	WG1176739	1	10/08/18 17:29	10/08/18 18:03	MMF
Vet Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Vet Chemistry by Method 9056A	WG1175177	1	10/06/18 21:13	10/06/18 21:13	MAJ
Vet 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
			Collected by	Collected date/time	Received date/tim
MW-13 L1031071-06 GW			Jonathan H.	10/01/18 10:50	10/03/18 09:00
A ethod	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	,
Gravimetric Analysis by Method 2540 C-2011	WG1176739	1	10/08/18 17:29	10/08/18 18:03	MMF
Net Chemistry by Method 9040C	WG1175188	1	10/04/18 07:30	10/04/18 07:30	AMB
Net Chemistry by Method 9056A	WG1175177	1	10/06/18 21:27	10/06/18 21:27	MAJ
ACCOUNT:	PROJECT:		SDG:	DATE/TIME:	
Kansas City Board of Public Utilities	BPU Nearman Ck CCR		L1031071	10/11/18 17:14	

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SAMPLE SUMMARY

	SAMPLE SU	JMMAF	2Y	ON	E LAB. NATIONWIDE
			Collected by	Collected date/time	Received date/time
10100-13 L1031071-06 GVV			-		
Method	Batch	Dilution	Preparation	Analysis	Analyst
	11011700.10		date/time	date/time	
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 16:32	10/09/18 16:32	MAJ
Metals (ICP) by Method 6010B	WG11/5384	I	10/04/18 09:40	10/04/18 14:03	51
			Collected by	Collected date/time	Received date/time
MW-14 L1031071-07 GW			Jonathan H.	10/01/18 12:05	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
	WC417C740	1	date/time	date/time	
Gravinietric Analysis by Method 2540 C-2011	WG11/6/4U	1	10/08/18 17:35	10/08/18 18:22	
Wet Chemistry by Method 9040C	WG11/5188	1	10/04/18 07:30	10/04/18 07:30	AMR
Wet Chemistry by Method 9056A	WG11/51//	ا ۲	10/00/10 21:41	10/00/10 21:41	
Metals (ICP) by Method 6010R	WU11/8040	Э 1	10/03/10 10:40	10/03/10 10.40	LAIW T2
metals (ICP) by method 60106	WG11/5584	I	10/04/18 09.40	10/04/18 14.05	21
			Collected by	Collected date/time	Received date/time
MW-15 L1031071-08 GW			Jonathan H.	10/01/18 13:00	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
			Collected by	Collected date/time	Received date/time
DUP-1 L1031071-09 GW			Jonathan H.	10/01/18 00:00	10/03/18 09:00
Mathad	Ratch	Dilution	Proparation	Analysis	Analyst
Mictilou	Batch	Dilution	date/time	date/time	Analyst
Gravimatric Analysis by Mathod 2540 C-2011	WG1176740	1	10/08/18 17:35	10/08/18 18:22	MME
Wet Chemistry by Method 9040C	WC1175022	1	10/04/18 14.16	10/04/18 14.16	ΔMR
Wet Chemistry by Method 90564	WC1175177	1	10/06/18 22:27	10/06/18 22:37	MAL
Wet Chemistry by Method 9056A	WG1178040	5	10/09/18 17.14	10/09/18 17.14	MΔ I
Metals (ICP) by Method 6010B	WG1175384	1	10/04/18 09:40	10/04/18 14:11	ST
			Collected by	Collected data/time	Pacaivad data/timo
MW-2A L1031071-10 GW			Jonathan H.	10/01/18 16:05	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	,
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:14	LD
			Collected by	Collected date/time	Received date/time
MW-3 L1031071-11 GW			Jonathan H.	10/02/18 10:35	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	-

SDG: L1031071 DATE/TIME: 10/11/18 17:14

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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			Collected by	Collected date/time	Received date/time
MW-4 L1031071-12 GW			Jonathan H.	10/02/18 11:20	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:22	LD
			Collected by	Collected date/time	Received date/time
MW-8A L1031071-13 GW			Jonathan H.	10/01/18 14:15	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 21:33	LD
			Collected by	Collected date/time	Received date/time
MW-10 L1031071-14 GW			Jonathan H.	10/01/18 15:15	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:26	LD
			Collected by	Collected date/time	Received date/time
MW-13 L1031071-15 GW			Jonathan H.	10/01/18 10:50	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:30	LD
			Collected by	Collected date/time	Received date/time
MW-14 L1031071-16 GW			Jonathan H.	10/01/18 12:05	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Metals (ICPMS) by Method 6020	WG1175507	1	10/04/18 12:19	10/04/18 22:34	LD
			Collected by	Collected date/time	Received date/time
MW-15 L1031071-17 GW			Jonathan H.	10/01/18 13:00	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis	Analyst
Motole (ICDMC) by Method 6020	MC447EE07	1			
Inerais (ICPMS) by method 6020	WG11/550/	I	10/04/18 12:19	10/04/18 22:52	LU
			Collected by	Collected date/time	Received date/time
DUP-1 L1031071-18 GW			Jonathan H.	10/01/18 00:00	10/03/18 09:00
Method	Batch	Dilution	Preparation	Analysis dato/time	Analyst
Motals (ICPMS) by Mothod 6020	MC1175507	1		10/04/19 22-56	
	WG11/550/	I	10/04/16 12:19	10/04/10 22:50	LU

PROJECT: BPU Nearman Ck CCR SDG: L1031071 DATE/TIME: 10/11/18 17:14 **PAGE**: 5 of 39

CASE NARRATIVE

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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.

enned

Stacy Kennedy Project Manager

Τс Ss Cn Sr Qc GI AI Sc

SDG: L1031071

PAGE: 6 of 39

SAMPLE RESULTS - 01 L1031071



Tc

Qc

Sc

Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier RDL	Dilution	Analysis	Batch
Analyte	mg/l	mg/l		date / time	
Dissolved Solids	580	10.0	1	10/08/2018 18:03	WG1176739

Wet Chemistry by Method 9040C

Collected date/time: 10/01/18 16:05

Wet Chemistry by Metho	od 9040C					³ Ss
	Result	Qualifier	Dilution	Analysis	Batch	
Analyte	SU			date / time		4 Cn
рН	6.96	<u>T8</u>	1	10/04/2018 07:30	WG1175188	

Sample Narrative:

L1031071-01 WG1175188: 6.96 at 17.3C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Chloride	5.12		1.00	1	10/06/2018 18:40	WG1175177	8
Fluoride	0.208		0.100	1	10/06/2018 18:40	WG1175177	Ă
Sulfate	68.5		5.00	1	10/06/2018 18:40	WG1175177	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

SAMPLE RESULTS - 02 L1031071

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Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch		Ср	
Analyte	mg/l		mg/l		date / time			2	
Dissolved Solids	747		13.3	1	10/09/2018 20:03	<u>WG1177067</u>		Tc	

Wet Chemistry by Method 9040C

Collected date/time: 10/02/18 10:35

Wet Chemistry by Method 9040C								
	Result	Qualifier	Dilution	Analysis	Batch			
Analyte	su			date / time		4 Cn		
рН	6.83	<u>T8</u>	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	8
Fluoride	0.186		0.100	1	10/06/2018 18:54	WG1175177	Ă
Sulfate	136		25.0	5	10/09/2018 16:05	WG1178040	

	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

SAMPLE RESULTS - 03 L1031071



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Gravimetric Analysis by Method 2540 C-2011

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	Result	Qualifier RDL	Dilution	Analysis	Batch	
Analyte	mg/l	mg/l		date / time		Ē
Dissolved Solids	619	13.3	1	10/09/2018 20:03	WG1177067	

Wet Chemistry by Method 9040C

Collected date/time: 10/02/18 11:20

	Result	Quaimer	NDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		2
Dissolved Solids	619		13.3	1	10/09/2018 20:03	<u>WG1177067</u>	Tc
Wet Chemistry by Metho	d 9040C						³ Ss
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	SU			date / time			⁴ Cn
рН	6.91	T8	1	10/04/2018 07:3	0 <u>WG1175188</u>		

Sample Narrative:

L1031071-03 WG1175188: 6.91 at 17.3C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Chloride	1.95		1.00	1	10/06/2018 19:36	WG1175177	8
Fluoride	0.177		0.100	1	10/06/2018 19:36	WG1175177	Ă
Sulfate	87.0		5.00	1	10/06/2018 19:36	WG1175177	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

SAMPLE RESULTS - 04 L1031071

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Gravimetric Analysis by Method 2540 C-2011								
	Result	Qualifier	RDL	Dilution	Ar			

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Dissolved Solids	920		20.0	1	10/08/2018 18:03	WG1176739

Wet Chemistry by Method 9040C

Collected date/time: 10/01/18 14:15

Wet Chemistry by Method 9040C								
	Result	Qualifier	Dilution	Analysis	Batch			
Analyte	SU			date / time		⁴ Cn		
рН	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

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Chloride	26.2		1.00	1	10/06/2018 19:50	WG1175177	8
Fluoride	0.394		0.100	1	10/06/2018 19:50	WG1175177	ĬAĬ
Sulfate	419		25.0	5	10/06/2018 20:45	WG1175177	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

SAMPLE RESULTS - 05 L1031071

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							Cn
	Result	Qualifier	RDL	Dilution	Analysis	Batch	Ср
Analyte	mg/l		mg/l		date / time		 2
Dissolved Solids	822		20.0	1	10/08/2018 18:03	<u>WG1176739</u>	⁻Tc

Wet Chemistry by Method 9040C

Collected date/time: 10/01/18 15:15

Wet Chemistry by Method 9040C							
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	su			date / time		4 Cn	
рН	6.98	<u>T8</u>	1	10/04/2018 07:30	WG1175188		

Sample Narrative:

L1031071-05 WG1175188: 6.98 at 17.3C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Chloride	18.6		1.00	1	10/06/2018 21:13	WG1175177	8
Fluoride	0.219		0.100	1	10/06/2018 21:13	WG1175177	Ă
Sulfate	234		25.0	5	10/09/2018 16:18	WG1178040	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

SAMPLE RESULTS - 06 L1031071



Qc

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Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch	 Ср
Analyte	mg/l		mg/l		date / time		2
Dissolved Solids	542		10.0	1	10/08/2018 18:03	<u>WG1176739</u>	Tc

Wet Chemistry by Method 9040C

Collected date/time: 10/01/18 10:50

Wet Chemistry by Method 9040C							
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	su			date / time		4 Cn	
рН	7.10	<u>T8</u>	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	8
Fluoride	0.380		0.100	1	10/06/2018 21:27	WG1175177	Ă
Sulfate	155		25.0	5	10/09/2018 16:32	WG1178040	

	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

SAMPLE RESULTS - 07 L1031071



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Gravimetric Analysis by Method 2540 C-2011

	Result	Qualifier	RDL	Dilution	Analysis	Batch				
Analyte	mg/l		mg/l		date / time					
Dissolved Solids	839		13.3	1	10/08/2018 18:22	WG1176740				

Wet Chemistry by Method 9040C

Collected date/time: 10/01/18 12:05

Wet Chemistry by Method 9040C							
	Result	Qualifier	Dilution	Analysis	Batch		
Analyte	SU			date / time		4 Cn	
рН	6.70	<u>T8</u>	1	10/04/2018 07:30	WG1175188		

Sample Narrative:

L1031071-07 WG1175188: 6.7 at 17.3C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		G
Chloride	21.5		1.00	1	10/06/2018 21:41	WG1175177	8
Fluoride	0.208		0.100	1	10/06/2018 21:41	WG1175177	Ă
Sulfate	221		25.0	5	10/09/2018 16:46	WG1178040	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

SAMPLE RESULTS - 08 L1031071

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Gravimetric Analysis by Method 2540 C-2011

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	Result	Qualifier	RDL	Dilution	Analysis	Batch	Cp
Analyte	mg/l		mg/l		date / time		2
Dissolved Solids	505		10.0	1	10/08/2018 18:22	WG1176740	Tc

Wet Chemistry by Method 9040C

Collected date/time: 10/01/18 13:00

Wet Chemistry by Method 9040C								
	Result	Qualifier	Dilution	Analysis	Batch			
Analyte	su			date / time		4 Cn		
рН	7.45	<u>T8</u>	1	10/04/2018 14:16	<u>WG1175923</u>	CII		

Sample Narrative:

L1031071-08 WG1175923: 7.45 at 19.9C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Chloride	16.4		1.00	1	10/06/2018 22:23	WG1175177	8
Fluoride	0.462		0.100	1	10/06/2018 22:23	WG1175177	Ă
Sulfate	194		25.0	5	10/09/2018 17:00	WG1178040	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

SAMPLE RESULTS - 09 L1031071



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Gravimetric Analysis by Method 2540 C-2011

	<u>, , , , , , , , , , , , , , , , , , , </u>					Cn
	Result	Qualifier RDL	. Dilution	Analysis	Batch	Ср
Analyte	mg/l	mg/	1	date / time		2
Dissolved Solids	808	13.3	1	10/08/2018 18:22	<u>WG1176740</u>	⁻Tc

Wet Chemistry by Method 9040C

Collected date/time: 10/01/18 00:00

Wet Chemistry by Method 9040C									
	Result	Qualifier	Dilution	Analysis	Batch				
Analyte	su			date / time		⁴ Cn			
рН	6.96	T8	1	10/04/2018 14:16	WG1175923	CII			

Sample Narrative:

L1031071-09 WG1175923: 6.96 at 20.1C

Wet Chemistry by Method 9056A

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Chloride	18.7		1.00	1	10/06/2018 22:37	WG1175177	8
Fluoride	0.217		0.100	1	10/06/2018 22:37	<u>WG1175177</u>	Ă
Sulfate	232		25.0	5	10/09/2018 17:14	WG1178040	

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

SAMPLE RESULTS - 10 L1031071

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	Result	Qualifier	RDL	Dilution	Analysis	Batch	Cp
Analyte	mg/l		mg/l		date / time		2
Arsenic	0.00359		0.00200	1	10/04/2018 22:14	WG1175507	Tc

^³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Cc

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Metals (ICPMS) by Method 6020

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	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	0.00210		0.00200	1	10/04/2018 22:18	WG1175507



DATE/TIME: 10/11/18 17:14 PAGE: 17 of 39

Collected date/time: 10/02/18 11:20

SAMPLE RESULTS - 12 L1031071

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Тс

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 22:22	WG1175507



DATE/TIME: 10/11/18 17:14

SAMPLE RESULTS - 13 L1031071

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	Result	Qualifier	RDL	Dilution	Analysis	Batch	Cp
Analyte	mg/l		mg/l		date / time		2
Arsenic	0.0278		0.00200	1	10/04/2018 21:33	WG1175507	Tc

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
°Sc

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Тс

Metals (ICPMS) by Method 6020

(7)						
	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	0.0245		0.00200	1	10/04/2018 22:26	WG1175507



DATE/TIME: 10/11/18 17:14

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	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	0.0252		0.00200	1	10/04/2018 22:30	WG1175507



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Тс

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	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		6
Arsenic	ND		0.00200	1	10/04/2018 22:34	WG1175507	



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Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Arsenic	0.00482		0.00200	1	10/04/2018 22:52	WG1175507	



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Metals (ICPMS) by Method 6020

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	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	0.0241		0.00200	1	10/04/2018 22:56	<u>WG1175507</u>



SDG: L1031071

Gravimetric Analysis by Method 2540 C-2011

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3349100-1 10	/08/18 18:03			
	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	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						
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Dissolved Solids	451	381	1	16.8	<u>J3</u>	5

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

(LCS) R3349100-2 10/08/1	CS) R3349100-2 10/08/18 18:03 • (LCSD) R3349100-3 10/08/18 18:03											
	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	%	%	%			%	%		
Dissolved Solids	8800	8800	9230	100	105	85.0-115			4.77	5		

DATE/TIME: 10/11/18 17:14 PAGE: 25 of 39

Gravimetric Analysis by Method 2540 C-2011

QUALITY CONTROL SUMMARY L1031071-07,08,09

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Method Blank (MB)

(MB) R3349075-1 10/08/18 18:22									
	MB Result	MB Qualifier	MB MDL	MB RDL					
Analyte	mg/l		mg/l	mg/l					
Dissolved Solids	U		2.82	10.0					

L1028145-04 Original Sample (OS) • Duplicate (DUP)

L1028145-04 O	riginal Sample	(OS) • Du	plicate	DUP)			4
(OS) L1028145-04 10	/08/18 18:22 • (DUP)) R3349075-4	10/08/18 1	8:22			
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	5.
Analyte	mg/l	mg/l		%		%	
Dissolved Solids	3890	3930	1	1.02		5	6

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

(LCS) R3349075-2 10/08/18	LCS) R3349075-2 10/08/18 18:22 • (LCSD) R3349075-3 10/08/18 18:22											
	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	%	%	%			%	%		
Dissolved Solids	8800	8590	8630	97.6	98.1	85.0-115			0.465	5		

DATE/TIME: 10/11/18 17:14

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Gravimetric Analysis by Method 2540 C-2011

QUALITY CONTROL SUMMARY

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Method Blank (MB)

(MB) R3349517-1 10/	(MB) R3349517-1 10/09/18 20:03									
	MB Result	MB Qualifier	MB MDL	MB RDL						
Analyte	mg/l		mg/l	mg/l						
Dissolved Solids	U		2.82	10.0						

L1031308-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1031308-02 10/09/1	DS) L1031308-02 10/09/18 20:03 • (DUP) R3349517-4 10/09/18 20:03										
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits					
Analyte	mg/l	mg/l		%		%					
Dissolved Solids	128	135	1	5.32	<u>J3</u>	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											
		Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits	
A	nalyte	mg/l	mg/l	mg/l	%	%	%			%	%	
D	vissolved Solids	8800	8870	8890	101	101	85.0-115			0.225	5	

DATE/TIME: 10/11/18 17:14 PAGE: 27 of 39

Wet Chemistry by Method 9040C

QUALITY CONTROL SUMMARY L1031071-01,02,03,04,05,06,07

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L1030740-01 Original Sample (OS) • Duplicate (DUP)

	ginal campio	(00) 200	0.00000	/			1'Cn
(OS) L1030740-01 10/0	4/18 07:30 • (DUP) R3347505-3	10/04/18	07:30			Ср
	Original Result	DUP Result	Dilution	DUP RPD DU	JP Qualifier	DUP RPD Limits	^{2}Tc
Analyte	SU	su		%		%	
рН	8.08	8.06	1	0.248		1	³Ss
Sample Narrative: OS: 8.08 at 17.5C							⁴Cn

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 DUP RPD Original Result DUP Result Dilution DUP RPD **DUP** Qualifier Limits % % Analyte su su pН 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	:S) 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	%	%	%			%	%			
рН	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

ACCOUNT:
Kansas City Board of Public Utilities

PROJECT: BPU Nearman Ck CCR

SDG: L1031071 DATE/TIME: 10/11/18 17:14

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Wet Chemistry by Method 9040C

QUALITY CONTROL SUMMARY L1031071-08,09

Sr

Qc

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Sc

L1030539-01 Original Sample (OS) • Duplicate (DUP)

	gina campio		pineare (()			l'Cn l
(OS) L1030539-01 10/0	04/18 14:16 • (DUP)	R3347726-3	10/04/18 14	1:16			Ср
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	2 TC
Analyte	su	su		%		%	
рН	7.57	7.58	1	0.132		1	³ Ss
Sample Narrative: OS: 7.57 at 20.2C							⁴ Cn

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 DUP RPD Original Result DUP Result Dilution DUP RPD **DUP** Qualifier Limits % Analyte su % su pН 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											
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits					
Analyte	su	SU		%		%					
рН	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								
	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits	
Analyte	SU	SU	su	%	%	%			%	%	
рН	10.0	9.96	9.96	99.6	99.6	99.0-101			0.000	1	
Sample Narrative: LCS: 9.96 at 21.1C											
	ACCOUNT:			PRO	JECT:		SDG:			DATE/TIME:	PAGE:
Kansas (City Board of Public Uti	lities		BPU Nearr	man Ck CCR		L103107	71		10/11/18 17:14	29 of 39

QUALITY CONTROL SUMMARY

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

(LCS) R3347726-1 10/04/18	3 14:16 • (LCSD)	R3347726-2 1	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

ACCOUNT: Kansas City Board of Public Utilities PROJECT: BPU Nearman Ck CCR SDG: L1031071 DATE/TIME: 10/11/18 17:14 PAGE: 30 of 39 Wet Chemistry by Method 9056A

QUALITY CONTROL SUMMARY L1031071-01,02,03,04,05,06,07,08,09

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Method Blank (MB)

(MB) R3348698-1	10/06/18 16:10
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(1010) 1(3540050-1	10/00/10 10.10					
	MB Result	MB Qualifier	MB MDL	MB RDL	2	
Analyte	mg/l		mg/l	mg/l	T ⁻ T	C
Chloride	U		0.0519	1.00		
Fluoride	U		0.00990	0.100	³ S	35
Sulfate	U		0.0774	5.00		
					4	
					l C	Cn

L1031021-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1031021-01 10/06/18	3 17:44 • (DUP) R	3348698-4 1	0/06/18 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) F	3348698-6 10	0/06/18 20	0:04					
	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 1	0/06/18 2	0:59		
	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 10/06/1	8 16:24 • (LCSE) R3348698-3	10/06/18 16:38	3						
	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

ACCOUNT:	PROJECT:	SDG:	DATE/TIME:	PAGE:
Kansas City Board of Public Utilities	BPU Nearman Ck CCR	L1031071	10/11/18 17:14	31 of 39

QUALITY CONTROL SUMMARY

L1031021-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1031021-01 10/06/18	17:44 • (MS) R3	348698-5 10/0	06/18 18:12				
	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
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) R	3348698-7 10/	06/18 20:18 • (I	MSD) R334869	8-8 10/06/18 2	20:31						
	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	%	%		%			%	%
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

DATE/TIME: 10/11/18 17:14

Wet Chemistry by Method 9056A

QUALITY CONTROL SUMMARY L1031071-02,05,06,07,08,09

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Method Blank (MB)

(MB) R3349152-1 10/09/1	8 14:50			
	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	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									
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits			
Analyte	mg/l	mg/l		%		%			
Sulfate	5.81	5.90	1	1.66		15			

L1032357-01 Original Sample (OS) • Duplicate (DUP)

∟1032357-01 Original Sample (OS) • Duplicate (DUP)												
(OS) L1032357-01 10/09/18 21:24 • (DUP) R3349152-9 10/09/18 21:38												
	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits	⁸ Al					
Analyte	mg/l	mg/l		%		%						
Sulfate	382	377	10	1.37		15	Sc					

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										
	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	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									
	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier		
Analyte	mg/l	mg/l	mg/l	%		%			
Sulfate	50.0	5.81	51.4	91.2	1	80.0-120			

ACCOUNT:								
Kansas City Board of Public Utilities								

PROJECT: BPU Nearman Ck CCR

SDG: L1031071 DATE/TIME: 10/11/18 17:14

PAGE: 33 of 39 Metals (ICP) by Method 6010B

QUALITY CONTROL SUMMARY <u>L1031071-01,02,03,04,05,06,07,08,09</u>

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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

DATE/TIME: 10/11/18 17:14
WG1175507

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY <u>1031071-10,11,12,13,14,15,16,17,18</u>

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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 10/04/1	8 21:08 • (LCSE) 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

DATE/TIME: 10/11/18 17:14

GLOSSARY OF TERMS

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*Q*c

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AI

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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.
Т8	Sample(s) received past/too close to holding time expiration.

SDG: L1031071 DATE/TIME: 10/11/18 17:14

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	Ne
Alaska	17-026	Ne
Arizona	AZ0612	Ne
Arkansas	88-0469	Ne
California	2932	Ne
Colorado	TN00003	Ne
Connecticut	PH-0197	No
Florida	E87487	No
Georgia	NELAP	No
Georgia ¹	923	No
Idaho	TN00003	Oh
Illinois	200008	Ok
Indiana	C-TN-01	Ore
lowa	364	Per
Kansas	E-10277	Rhe
Kentucky ¹⁶	90010	Sou
Kentucky ²	16	Sou
Louisiana	AI30792	Ter
Louisiana ¹	LA180010	Tex
Maine	TN0002	Tex
Maryland	324	Uta
Massachusetts	M-TN003	Ver
Michigan	9958	Virg
Minnesota	047-999-395	Wa
Mississippi	TN00003	We
Missouri	340	Wis
Montana	CERT0086	Wv

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 ¹⁴	2006
Texas	T 104704245-17-14
Texas ⁵	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wvoming	A2LA
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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

Kansas City Board of Public Utilities

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.



BPU Nearman Ck CCR



10/11/18 17:14

L1031071

	1	Billing Info	irmation:			1000			Analysis /	Containe	r / Preserva	ative		Chain d	of Custody	Page_	_of	
Kansas City Board of 300 N 65th Street Kansas City, KS 66102	Cansas City Board of Public Utilities 300 N 65th Street Cansas City, KS 66102		Attn: Ell 300 N 69 Kansas (Attn: Ellen Bouse 300 N 65th St Kansas City, KS 66102				3								Pace	Analytic	2/* L revovation
Report to: Ingrid Setzler	5 18		Email To: isetzler@t	nail To: ttzler@bpu.com;kbrown@bpu.com;bhoye@b											12065 L Mount Phone:	ebanon Rd Juliet, TN 37 615-758-58	7122	
Project Description: groundwater			10000	City/State Collected:	the second second		s								Phone: Fax: 61	800-767-58 5-758-5859	59 NR	
Phone: 913-573-9806 Fax: 913-573-9838	Client Project # BPU Nearman Ck CCR			Lab Project # KCKAN02-N	IW NEARMAN	ic	E-NoPre	03	5						1	0310 D2	71 35	
Collected by (print): Jenathan thermanson	Site/Facility ID	#		P.O. #			HOPI	PE-HN	NoPre			10			Acctn	um: KC	KAN02	
Collected by (signature): Justim Hammediately Packed on Ice N Y X	Rush? (L. Same Da Next Day Two Day Three Da	ab MUST Be y Five y S Day y 10 D	Notified) Day v (Rad Only) ay (Rad Only)	rtified) Quote # ad Only) Date Results Needed Rad Only)			4,pH 125m 250mHDP								Temp Prelog TSR: (PB: 1	late:T13 gin: P67 550 - Linc 77 9	14202 1a Cashmai 1-24-, 5	1
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cr.trs	CI,F,S	Metal	TDS 2						Shipp	ed Via: F emarks	edEX Sta	ndard
MW-2A	Gins	GW		10.1.18	1605	3	3	X	x								01/	-10
MW-3	Linb	GW	~	10,2.18	1035	3	*	x	X								32	1-11
MW-4	6.6	GW	-	10.2.18	1120	3	х	X	X								23	1-12
MW-8A	Gab	GW	-	10.1.18	1415	3	X	x	X		220						24	1-13
MW-10	brab	GW		10.1.18	1515	3	×	x	X								25	-14
MW-13	Grab	GW	-	10.1.18	1050	3	X	x	X								26	-15
MW-14	beab	GW	-	10.1.18	1205	3	x	X	X								271-	16
MW-15	Liab	GW	-	10.1.18	1300	3	1	x	X								08/	-17
DUP-1	Grab	GW	-	10.1.18	-	3	X	X	X								291	-18
		GWL	6			3	X	X	X					1				
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other	Remarks: Rush Samples return	Arse	nic Re	esults	.5 mF	₹/ hr		pH Temp Flow Other				Sample Receipt Check/st COC Seal Present/Intact: NP COC Signed/Accurate: Bottles arrive intact: Correct bottles used: Sufficient volume sent:			- ANY			
Relinquished by : (Signature)	Date:			Time: 1201	Received by Sign	and the	in .	N	7	Trip Blar	nk Receiv	ed: Yes (HCL TBR	No 7 MeoH	VGA Ze Preser	ro Headspa Vation Cor	ce: rect/Cł	tecked:	YN
R∯linquished by : (Signature)	Date: Tin			Time:	Received by: (Sign	ived by: (Signadure) 000				Temp: 3.SATE	0	Bottles R	3	If preser	vation requi	red by Lo	ogin: Date/	Time
Relinquished by : (Signature) Date:		Date:		Time:	Received for TaB b	y: (S a	ticre			Date:	11	Time:	· ax	Hold:			Cond	ILIOK)

100

			Billing Info	rmation:	1	T	Analysis / Container / Preservative Chain of Custody									y Page of		
Kansas City Board of F 300 N 65th Street Kansas City, KS 66102	ansas City Board of Public Utilities					Fres Chk									Pace	Analytical* Contector Tecting & Inconstant		
Report to: Ingrid Setzler			Email To: isetzler@b	pu.com;kbrown@	-	03							12065 Lebanon Ro Mount Juliet, TN 3 Phone: 615-758-5	17122 558				
Project Description: groundwater	roundwater			City/State Collected:	Harris and			S							Phone: 800-767-5 Fax: 615-758-585			
hone: 913-573-9806 ax: 913-573-9838	Client Project # BPU Nearman Ck CCR			Lab Project # KCKAN02-M	W NEARMAN		с	NoPre							L# 03	1071		
Collected by (print):	Site/Facility ID) #		P.O. #		_	HDPE	PE-HN	NoPre						Acctnum: KC	KAN02		
fullected by (signature):	Rush? (L Same Da	ab MUST Be ay Five	Notified) Day	Quote #	125m	IdHim	HDPE-						Prelogin: P674202					
mmediately Packed on Ice N Y 🏂	Next Day Two Day Three Day	Y5 Day A10 D ay	y (Rad Only) ay (Rad Only)	Date Res	ults Needed	1:0. c;	So4,pH	als 250	250ml						PB: Tb 9	1-2-6-13 FedEX Standard		
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Catr	CI,F,S	Meta	TDS						Remarks	Sample # (lab only)		
MATRIX SPIKE	bears	GW	-	10.1.18	1415	3	X	X	X			8				04/-13		
MATRIX SPIKE DUPLICATE	bras	GW	-	10+1,18	1415	3		X	X				_		-	041-13		
															1			
	-		1	4		+		-										
			1	then It	in a	T												
					an	+	10	2.	13				-		-			
			0								-							
* Matrix: SS – Soil AIR - Air F – Filter GW - Groundwater B - Bioassay WW - WasteWater	Remarks:							<0.5 mR/hr pH Temp							Sample Receipt Checklift COC Seel Present/Intact:Y N COC Signed/Accurate: Bottles arrive intact:Y			
DW - Drinking Water OT - Other	Samples retur	urier	1	racking #		0							Sufficient volume sent: <u>If Applicable</u> VOA Zero Headspace: V					
Refinquished by : (Signature) Date: Autom Humm 10.2.16			(4	1201	Received by: (Signature)						ink Reci	eived: Yes (HCI TBR	No 7 MeoH	Preserva	tion Correct/(mecked:		
Relinquished by : (Signature)		Date:		fime:	lepelved by: tsight	stor i	0	na	1	Temp: 5.8	新生し	°C Bottles	teceived:	If preserva	ation required by I	Login: Date/Time		
Relinquished by : (Signature)		Date:		Time:	teceived for let by	VI (S RI	iature)	~		Date:	lix	Time:	100	Hold:		Conditions NCF / OK		

H.



ANALYTICAL REPORT

November 01, 2018

Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number: Description:

L1031413 10/03/2018 62801 BPU Nearman groundwater

Report To:

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

Entire Report Reviewed By: Mandia Foster

Cassandra Foster Project Manager

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

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	² Tc
	³ Ss
	⁴ Cn
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SDG: L1031413 DATE/TIME: 11/01/18 11:00 PAGE: 2 of 22

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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MW-3 L1031413-01 Non-Potable Water			Collected by Jonathan H.	Collected date/time 10/02/18 10:35	Received date/time 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	МК
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
			Collected by	Collected date/time	Received date/time
MW-4 L1031413-02 Non-Potable Water			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
			Collected by	Collected date/time	Received date/time
MW-13 L1031413-03 Non-Potable Water			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
			Collected by	Collected date/time	Received date/time
MW-14 L1031413-04 Non-Potable Water			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
			Collected by	Collected date/time	Received date/time
MW-15 L1031413-05 Non-Potable Water			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 Jonathan H.	Collected date/time 10/03/18 09:50	Received date/time 10/04/18 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
			autorinit	uutortime	
Radiochemistry by Method 904	WG1184606	1	10/23/18 15.43	10/30/18 11.04	MK
Radiochemistry by Method 904 Radiochemistry by Method Calculation	WG1184606 WG1181125	1 1	10/23/18 15:43 10/18/18 11:14	10/30/18 11:04 10/30/18 11:04	MK MK

PROJECT: 62801 BPU Nearman SDG: L1031413 DATE/TIME: 11/01/18 11:00 PAGE: 3 of 22

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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			Collected by	Collected date/time	Received date/time
MW-8A L1031413-07 Non-Potable Water			Jonathan H.	10/03/18 08:10	10/04/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
MW-10 L1031413-08 Non-Potable Water			Jonathan H.	10/03/18 09:15	10/04/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	МК
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
DUP-1 L1031413-09 Non-Potable Water			Jonathan H.	10/03/18 00:00	10/04/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Radiochemistry by Method 904	WG1184606	1	10/23/18 15:43	10/30/18 11:04	МК
Radiochemistry by Method Calculation	WG1181125	1	10/18/18 11:14	10/30/18 11:04	МК
Radiochemistry by Method SM7500Ra B M	WG1181125	1	10/18/18 11:14	10/19/18 13:55	RGT

SDG: L1031413 DATE/TIME: 11/01/18 11:00

CASE NARRATIVE

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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.

ysandia Foster

Cassandra Foster Project Manager

Τс Ss Cn Sr Qc GI AI Sc

SDG: L1031413 DATE/TIME: 11/01/18 11:00 PAGE: 5 of 22

SAMPLE RESULTS - 01 L1031413

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Radiochemistry by Method 904

Collected date/time: 10/02/18 10:35

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		2
RADIUM-228	0.514		0.371	0.582	10/30/2018 11:04	WG1184606	Tc
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	^³ Ss

Radiochemistry by Method Calculation

Radiochemistry by Method Calculation								
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch		Cn
Analyte	pCi/l		+/-	pCi/l	date / time			5
Combined Radium	0.555		0.549	0.911	10/30/2018 11:04	WG1175897		Sr

	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

Collected date/time: 10/02/18 11:20

SAMPLE RESULTS - 02 L1031413

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Radiochemistry by Method 904

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch		Ср
Analyte	pCi/l		+/-	pCi/l	date / time		-	2
RADIUM-228	0.0875		0.434	0.755	10/30/2018 11:04	WG1184606		Tc
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	L	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606		³ Cc

Radiochemistry by Method Calculation

Radiochemistry by Method Calculation								
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch		Cn
Analyte	pCi/l		+/-	pCi/l	date / time		5	
Combined Radium	0.186		0.624	1.06	10/30/2018 11:04	WG1175897		Sr

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+/-	pCi/l	date / time	
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

Collected date/time: 10/01/18 10:50

SAMPLE RESULTS - 03 L1031413



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Radiochemistry by Method 904

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch		Ср
Analyte	pCi/l		+ / -	pCi/l	date / time			>
RADIUM-228	0.555		0.417	0.593	10/30/2018 11:04	WG1184606		Тс
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	L	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	3	Sc

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+ / -	pCi/l	date / time		5
Combined Radium	0.765		0.620	0.844	10/30/2018 11:04	WG1181125	_ Sr

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+ / -	pCi/l	date / time		
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	

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Radiochemistry by Method 904

Collected date/time: 10/01/18 12:05

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch		-p
Analyte	pCi/l		+ / -	pCi/l	date / time		2	
RADIUM-228	-1.24		0.707	1.1	10/30/2018 11:04	WG1184606		Гс
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606		-
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	3	20

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Cr
Analyte	pCi/l		+/-	pCi/l	date / time		5
Combined Radium	0.138		0.853	1.28	10/30/2018 11:04	WG1181125	ँSr

	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	

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Radiochemistry by Method 904

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		2
RADIUM-228	1.14		0.760	1.13	10/30/2018 11:04	WG1184606	² Tc
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	³ Ss

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Cr
Analyte	pCi/l		+ / -	pCi/l	date / time		5
Combined Radium	1.35		1.00	1.46	10/30/2018 11:04	WG1181125	Sr

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+ / -	pCi/l	date / time	
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

Collected date/time: 10/03/18 09:50

SAMPLE RESULTS - 06 L1031413



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Radiochemistry by Method 904

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		2
RADIUM-228	1.14		0.758	1.02	10/30/2018 11:04	WG1184606	T(
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	³ C

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+ / -	pCi/l	date / time		5
Combined Radium	1.25		0.940	1.31	10/30/2018 11:04	WG1181125	_ Sr

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		
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	

SAMPLE RESULTS - 07 Collected date/time: 10/03/18 08:10 L1031413

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Radiochemistry by Method 904

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Cp
Analyte	pCi/l		+ / -	pCi/l	date / time		2
RADIUM-228	0.583		0.472	0.609	10/30/2018 11:04	WG1184606	Tc
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	³ C c

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Cr
Analyte	pCi/l		+/-	pCi/l	date / time		5
Combined Radium	0.589		0.671	0.948	10/30/2018 11:04	WG1181125	ँSr

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
Analyte	pCi/l		+/-	pCi/l	date / time	
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

Collected date/time: 10/03/18 09:15

SAMPLE RESULTS - 08 L1031413

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Radiochemistry by Method 904

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	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Cp
Analyte	pCi/l		+/-	pCi/l	date / time		2
RADIUM-228	0.256		0.427	0.543	10/30/2018 11:04	WG1184606	Tc
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	³ C c

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Cr
Analyte	pCi/l		+ / -	pCi/l	date / time		5
Combined Radium	0.350		0.545	0.698	10/30/2018 11:04	WG1181125	Sr

	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

Collected date/time: 10/03/18 00:00

SAMPLE RESULTS - 09 L1031413



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Radiochemistry by Method 904

	· ·						1°Cn
	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	Cp
Analyte	pCi/l		+ / -	pCi/l	date / time		2
RADIUM-228	-0.430		0.421	0.532	10/30/2018 11:04	WG1184606	Tc
(T) Barium	100			30.0-110	10/30/2018 11:04	WG1184606	
(T) Yttrium	100			30.0-110	10/30/2018 11:04	WG1184606	³ C c

Radiochemistry by Method Calculation

	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch	
Analyte	pCi/l		+/-	pCi/l	date / time		5
Combined Radium	0.350		0.639	0.706	10/30/2018 11:04	WG1181125	۳Sr

	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

Radiochemistry by Method 904

QUALITY CONTROL SUMMARY L1031413-01,02,03,04,05,06,07,08,09

⁴Cn

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Method Blank (MB)

Method Blauk	K (IVIB)			1 Cr
(MB) R3355561-1 1	10/30/18 11:04			
	MB Result	MB Qualifier	MB MDA	2
Analyte	pCi/l		pCi/l	Tc
Radium-228	-0.561		0.262	
(T) Barium	100			³ Ss
(T) Yttrium	100			

L1031749-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1031749-01 10/30/18	11:04 • (DUP) R	3355561-5 10	/30/18 11:0)4				
	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	0.392	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				
	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	pCi/l	pCi/l	%	%	
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	JS) L1031413-07 10/30/18 11:04 • (MS) R3355561-3 10/30/18 11:04 • (MSD) R3355561-4 10/30/18 11:04												
	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	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							

ACCOLINT:	PRO IECT.	SDG [.]	DATE/TIME:	PAGE
Kansas City Board of Public Utilities	62801 BPU Nearman	L1031413	11/01/18 11:00	15 of 22

Radiochemistry by Method SM7500Ra B M

QUALITY CONTROL SUMMARY

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Method Blank (MB)

				^{1}Cr
(MB) R3349894-1 10	/10/18 12:50			
	MB Result	MB Qualifier	MB MDA	2
Analyte	pCi/l		pCi/l	Tc
Radium-226	0.0236		0.0569	
(T) Barium-133	86.4			350
				100

L1029993-09 Original Sample (OS) • Duplicate (DUP)

	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	0.0135	-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					
	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier	0
Analyte	pCi/l	pCi/l	%	%		Sc
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	8 12:50 • (MS) R	3349894-3 10	/10/18 12:50 • (1	MSD) R334989	4-4 10/10/18 12	:50							
	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	0.0487	21.5	24.1	107	120	1	75.0-125			11.1		20
(T) Barium-133		52.2			35.4	60.6							

DATE/TIME: 11/01/18 11:00 PAGE: 16 of 22 Radiochemistry by Method SM7500Ra B M

QUALITY CONTROL SUMMARY

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Method Blank (MB)

Method Dialik (
(MB) R3353062-5 10)/19/18 14:02			
	MB Result	MB Qualifier	MB MDA	2
Analyte	pCi/l		pCi/l	Tc
Radium-226	0.0628		0.0269	
(T) Barium-133	100			³ Ss
				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
4	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 10/19/1	8 13:55					
	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier	0
Analyte	pCi/l	pCi/l	%	%		Sc
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 1	13:55 • (MS) R33	353062-2 10/1	9/18 13:55 • (M	SD) R3353062	-3 10/19/18 13:5	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							

DATE/TIME: 11/01/18 11:00

GLOSSARY OF TERMS

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Ss

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Sr

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AI

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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

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

SDG: L1031413 DATE/TIME: 11/01/18 11:00

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	Nebr
Alaska	17-026	Neva
Arizona	AZ0612	New
Arkansas	88-0469	New
California	2932	New
Colorado	TN00003	New
Connecticut	PH-0197	North
Florida	E87487	North
Georgia	NELAP	North
Georgia ¹	923	North
Idaho	TN00003	Ohio
Illinois	200008	Oklal
Indiana	C-TN-01	Oreg
lowa	364	Penn
Kansas	E-10277	Rhod
Kentucky ¹⁶	90010	South
Kentucky ²	16	South
Louisiana	AI30792	Tenn
Louisiana ¹	LA180010	Texa
Maine	TN0002	Texa
Maryland	324	Utah
Massachusetts	M-TN003	Verm
Michigan	9958	Virgin
Minnesota	047-999-395	Wash
Mississippi	TN00003	West
Missouri	340	Wisco
Montana	CERT0086	Wvor

NE-OS-15-05
TN-03-2002-34
2975
TN002
n/a
11742
Env375
DW21704
41
R-140
CL0069
9915
TN200002
68-02979
LAO00356
84004
n/a
2006
T 104704245-17-14
LAB0152
TN00003
VT2006
460132
C847
C847 233
C847 233 9980939910

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

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

62801 BPU Nearman

L1031413

11/01/18 11:00

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			Billing Inform	mation:		TT			Analy	sis / Contain	er / Prese	rvative		Chain of Custody	Page of
ansas City Board of P	ublic Utili	ities	Attn: Elle	n Bouse		Pres C X	2							Pace A	Analytical *
000 N 65th Street Kansas City, KS 66102			Kansas C	ity, KS 66102			03							12065 Lebanon Rd	
Report to:	port to: erid Setzler Email To: isetzler@bpu.com;kbro			pu.com;kbrown@	bpu.com;bhoye	@burn	NH PI	1001		1997				Mount Juliet, TN 371 Phone: 615-758-585 Phone: 800-767-585	
Project				City/State Collected:			5-4-3							Fax: 615-758-5859	L 10
Description: groundwater Phone: 913-573-9806	Client Project #	Nearman		Lab Project # KCKAN02-M	N NEARMAN		TT-HDF							IIT	1
Fax:	Site/Facility ID	Ħ	-	P.O. #			228							Acctnum: KCK	AN02
Jonathan Hermanson			Alexille d	Quote #			6,R.2							Template:T13	3397
Collected by (signature):	Rush? (La Same Da Next Day Two Day	Five	Notified) Day y (Rad Only) ay (Rad Only)	Date Res	ults Needed	No.	tad, RA22							TSR: 650 - Lind PB: 78 9	-26-18
Packed on Ice N Y > Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	Tota F							Remarks	Sample # (lab only)
MW-2A	Grab	GW	-	10.1.18	1605	13	X								61
MW-3	brab	NPW	-	10.2.18	1035	3	X		-						07.
MW-4	biab	GW	-	10.2.18	1120	3	4		-	-	-				4D
MW-8A	6.05	GW	-	10.1.18	1415	3	1				-				Part Contractor
MW-10	Genb	GW	-	10.1.18	1515	3	X	-		-					0
MW-13	beab	GW	-	10.1.18	1050	3	X				-				oy
MW-14	Ginb	GW	-	10.1.18	1205	1	X								15
MW-15	beab	GW	-	10.1.18	1.000	3	X	-		-					
DUP-1	Grab	GW	-	10.1.13	-	3	-								
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater	Remarks:	of a	E (1)	MW. 4/	'saked	RIN) (0	polor		pH	Ten	er	COC Sea COC Sig Bottles Correct Suffici	Sancle Receipt 1 Present/Intac ned/Accurate: arrive intact: botties used: ent volume sent If Applic	$\begin{array}{c} \text{Checklist} \\ \text{tr} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
DW - Drinking Water OT - Other Relinquished by : (Signature)	UPS	Date:	iourier	Time:	Tracking # Received by: [Si		1	N	7	Trip Blank Re	eceived:	HCL / MeoH	VOA Zez Preserv	o Headspace: ation Correct/0	Thecked: _Y _
(gelinquished by : (Signature)		Date:	.0	fime:	Received by: (Si	gnat iel	10	V		Temp: -29	°C Bo	33	If preser	vation required by	Login: Date/ Imle
Relinquished by : (Signature)		Date:	-	Time:	Received teriat	orby: Ng	nature	20		Date:	¢ - ™	me: 895	Hold:		NCF / OK

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Kansas City Board of I 300 N 65tl ⁺ Street	Public Util	ities	Attn: Elle 300 N 65 Kansas C	n Bouse th Street ity, KS 66102		Pres Chk	2								Pace, National Ca	Analytical* even for Teeting & Herconetics
Kansas City, KS 66102 Report to: Ingrid Setzler			Email To: isetzler@b	pu.com;kbrown(@bpu.com;bhoye@	Pturn	CONH P								12065 Lebanon Rd Mount Juliet, TN 37 Phone: 615-758-58	
Project Description: groundwater			1	City/State Collected:		1	PE-Au							fac 615-758-5859		
Phone: 913-573-9806 Fax:	Client Project # 62801 BPU	Nearman		Lab Project # KCKAN02-N		ICH-TT								L# (5)(9 Table#	17	
Collected by (print): The other flecmonson	Site/Facility ID	#		P.Q. #			RA228		10						Acctnum: KCk	(AN02
Collected by (signature): Jutim Humm Immediately Packed on Ice N Y X	Rush? (La Same Day Next Day Two Day Three Da	ab MUST Be y Five 5 Da 10 D	Notified} Day y (Rad Only) ay (Rad Only)	Quote # Date Re	No, -sf	3aŭ,RA226,								Prelogin: P67 TSR: 650 - Linc PB: 78 9.	4201 a Cashman <u>86 - 18</u>	
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	K.ntrs	Tota								Remarks	Sample # (lab only)
MATRIX SPIKE	61-5	GW	~	10.1.18	Hurs	3	х									
MATRIX SPIKE DUP	binb	GW	-	10.1.18	1415	3	X			-						
			-	-	-	-						-		_	-	
				11												
				Jutu	a Hunan	-		10,	2.18		_					
						_					100				-	
						_	1	<u> </u>		_			-	C	a Seculat C	hacklist
* Matrix: pH Temp Constraint SS - Soil AIR - Air F - Filter F - Filter GW - Groundwater B - Bioassay Flow Other WW - WasteWater Samples returned via: PH Temp Constraint DW - Drinking Water Samples returned via: Tracking # Other Samples returned via: OT - Other UPS FedEx Courier Tracking # Relinquished by : (Signature) Date: Time: Received by: (Signature) Trip Blank Received: Yes (No										pH Flow		Temp	COC S COC S Bottl Corre	eal Pr igned/ es arr ct bot	esent/Intact Accurate: ive intact: tles used:	
					Tracking #		0	200				a	Suffi VOA Z	cient ero #e	volume sent If Applical adspace:	
				Prese	rvatio	n Correct/Cl	necked: _Y _1									
Rylinquished by : (Signature)		Date:	0	Time:	Secrived by: (Sign	atuge	ore	ACA		Temp: 21.0	-0 °C	Bottle=Secelved:	If preservation required by Login: Date/Time			
Relinquished by : (Signature)		Date:		Time:	Received for Jah b	e tien	ature)	,		Date:	118	Time: 875	Hold:		-	Condition: NCF / OK

						TT			Analy	sis / Conta	iner / Prese	rvative		Chain of Custo	dy P	age of
		E	silling Inform	nation:		Pres	~							0		
nsasCity Board Public 0 N. 65th St ansas City, KS 66102	Utilities	1				Chk	0	Contra Contra						- Pac	e Anai	lytical*
Thore is setzler is a				lacebon.co	e burn	90.00	,		11.10				12065 Lebanon Mount Juliet, 17 Phone: 615-758 Phone: 800-767 Fax: 615-758-58	Rd 1 37122 -5858 -5859 59		
pject Orwadwater		Collected:				com	AD	1				1		L#		
none: 913-573-9806	Client Project # 62-801	Benn	eur man n	Lab Project #		2900							12	206		
Ilected by (print): Janothan Hermonson	Site/Facility ID	#		P.O. #		-	Rai							Acctnum: Template:	TI3	NO2 3397
ollected by (signature):	Rush? (L. Same Da Next Day Two Day Three Da	ab MUST Be I y Five D y 5 Day y 10 Da ay	Notified) lay (Rad Only) y (Rad Only)	Quote # Date Resu	ilts Needed	No. of	otal Red							Prelogin: (TSR: 650 PB: Shipped Vi	2° Lin	1201 Idon Cashma
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	F							Remark		Sample # (lab only)
	Tacab	6h	-	10.3.18	0950	3	×								-	00
MW-2R/MS	Grus	64	-	(0.3.18	0810	3	×	-	-						-	67
MALL- BAIMSO	binb	62	-	10.3.18	6810	3	X	-	-	-						9
mw-8A\$TYD	beas	6W	-	10.3.18	0810	3	X		-	1						50
MW-10	Grab	60	-	10.3.18	0915	3	X						12			09
Qup-1	6(45	600				- 1	Antho	~ Hn	Aur	2	10,-	3.18				
						0										7
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay	Remarks:	RAD	SCREEM	N: <0.5 mR/h						pH _	Te	mp	COC Se COC S Bottle Corre	Sample Receip eal Present/Li igned/Accurat es arrive int ct bottles us	pt Chr stact: s: act: ed: sent:	NP NKKY
WW - WasteWater DW - Drinking Water OT - OtherUPSFedExCourier					Tracking #	Ganatura			1	Tris Black Received: Yes Ma			Sufficient volume sent: _* If Applicable VOA Zero Headspace: Preservation Correct/Checked: _			ecked:
Relinquished by : (Signature)		Date: 10.3.1 Date:	8	Time:	Received by: (Signature	4			Temp: 10	+.2°C	HCL / MeoH TBR Bottles Received:	If pres	ervation require	d by Log	;in: Date/Time
Relinquished by : (Signature)		Date:		Time:	Received for I	ab by: (Sig	miture	for.	,	Date: 10/4	1/18	Time: 845	- Hold:			NCF / O



ANALYTICAL REPORT

November 02, 2018

Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number: Description: L1039637 10/31/2018 NEARMAN CREEK Dissolved Arsenic

Report To:

Ms. Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Tacy Kenned

Stacy Kennedy Project Manager

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

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Cn

Sr

Qc

GI

ΆI

Sc

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ACCOUNT: Kansas City Board of Public Utilities PROJECT: NEARMAN CREEK SDG: L1039637 DATE/TIME: 11/02/18 14:40

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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DPGW-2/GW01 1039637-01 GW			Collected by Lewis Turner	Collected date/time 10/29/18 16:00	Received date/time 10/31/18 08:45
	Datch	Dilution	Proporation	Apolycic	Applyct
metrioa	Balch	Dilution	date/time	AlldiySIS date/time	Andiyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:34	LD
	in child so co		1,0,10,10,10,17		
			Collected by	Collected date/time	Received date/time
DPGW-8/GW01 11039637-02 GW			Lewis Turner	10/29/18 17:35	10/31/18 08:45
	Batch	Dilution	Prenaration	Δnalvsis	Δnalvst
incurou	Batch	Dilution	date/time	date/time	Analyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:38	LD
			Collected by	Collected date/time	Received date/time
DPGW-7/GW01 L1039637-03 GW			Lewis Turner	10/29/18 18:35	10/31/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	,
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:42	LD
			Collected by	Collected date/time	Received date/time
DPGW-1/GW01 L1039637-04 GW			Lewis Turner	10/30/18 09:25	10/31/18 08:45
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:46	LD
			Lowis Turpor		10/31/18 08:45
DPGW-DUP/GWUI LIU39637-05 GW			Eewis funct	10/30/10 00:00	10/31/10 00.13
Method	Batch	Dilution	Preparation	Analysis	Analyst
Matala (CDMC) by Mathead CO20	WC1100FF0	1	date/time	date/time	
Metals (ICPMS) by Method 6020	WG1189558	I	11/01/18 13:47	11/01/18 19:50	LD
			Collected by	Collected date/time	Received date/time
DPGW/3/GW01 11039637-06 GW			Lewis Turner	10/30/18 10:50	10/31/18 08:45
	Datab	Dilution	Droporotion	Anolysis	Analyst
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
	in on objective				
			Collected by	Collected date/time	Received date/time
DPGW-6/GW01 11039637-07 GW			Lewis Turner	10/30/18 12:45	10/31/18 08:45
Method	Ratch	Dilution	Prenaration	Analysis	∆nalvst
menou	Daten	Dilution	date/time	date/time	Allalyst
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 19:58	LD
			Collected by	Collected date/time	Received date/time
DPGW-5/GW01 L1039637-08 GW			Lewis Turner	10/30/18 14:00	10/31/18 08:45
Method	Ratch	Dilution	Prenaration	Analysis	∆nalvst
MCHOU	DdtCII	Dilution	date/time	date/time	AlldiySt
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 20:15	LD
		•			20

PROJECT: NEARMAN CREEK SDG: L1039637 DATE/TIME: 11/02/18 14:40 PAGE: 3 of 18

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

DPGW-4/GW01 L1039637-09 GW			Collected by Lewis Turner	Collected date/time 10/30/18 15:15	Received date/time 10/31/18 08:45	¹ Cp
Method	Batch	Dilution	Preparation	Analysis	Analyst	
			date/time	date/time		^{2}Tc
Metals (ICPMS) by Method 6020	WG1189558	1	11/01/18 13:47	11/01/18 18:56	LD	1C

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

*

SDG: L1039637 DATE/TIME: 11/02/18 14:40

CASE NARRATIVE

*

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

enned

Stacy Kennedy Project Manager

Τс Ss Cn Sr Qc GI AI Sc

SDG: L1039637 DATE/TIME: 11/02/18 14:40 PAGE: 5 of 18



Гс

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	ND		0.00200	1	11/01/2018 19:34	WG1189558

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
[®] AI
⁰Sc



Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	ND		0.00200	1	11/01/2018 19:38	WG1189558



ACCOUNT: Kansas City Board of Public Utilities PROJECT: NEARMAN CREEK SDG: L1039637 DATE/TIME: 11/02/18 14:40 PAGE: 7 of 18



Τс

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	ND		0.00200	1	11/01/2018 19:42	WG1189558

^³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

ACCOUNT: Kansas City Board of Public Utilities PROJECT: NEARMAN CREEK SDG: L1039637 DATE/TIME: 11/02/18 14:40

F

PAGE: 8 of 18



Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	0.0258		0.00200	1	11/01/2018 19:46	WG1189558




	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	0.0239		0.00200	1	11/01/2018 19:50	WG1189558



*

	Result	Qualifier	RDL	Dilution	Analysis	Batch	
Analyte	mg/l		mg/l		date / time		
Arsenic, Dissolved	ND		0.00200	1	11/01/2018 19:54	WG1189558	





Τс

. , , ,						
	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	0.00273		0.00200	1	11/01/2018 19:58	WG1189558

^³ Ss
⁴Cn
⁵Sr
⁶ Qc
⁷ Gl
[°] Al
°Sc



Τс

. , , ,						
	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	0.0314		0.00200	1	11/01/2018 20:15	WG1189558

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
°Sc



Гс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic, Dissolved	ND		0.00200	1	11/01/2018 18:56	WG1189558

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ AI
⁹ Sc

WG1189558

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

Τс

Ss

Cn

Sr

ິQc

GI

Â

Sc

Method Blank (MB)

(MB) R3356156-1 11/01/	/B) 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 MS Result MS Rec. MSD Rec. Dilution Rec. Limits <u>MS Qualifier</u> 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 MS 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

DATE/TIME: 11/02/18 14:40

GLOSSARY OF TERMS

*

Τс

Ss

Cn

Sr

*Q*c

GI

AI

Sc

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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.

SDG: L1039637

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	Nebraska
Alaska	17-026	Nevada
Arizona	AZ0612	New Hampshi
Arkansas	88-0469	New Jersey–N
California	2932	New Mexico ¹
Colorado	TN00003	New York
Connecticut	PH-0197	North Carolina
Florida	E87487	North Carolina
Georgia	NELAP	North Carolina
Georgia ¹	923	North Dakota
Idaho	TN00003	Ohio-VAP
Illinois	200008	Oklahoma
Indiana	C-TN-01	Oregon
lowa	364	Pennsylvania
Kansas	E-10277	Rhode Island
Kentucky 16	90010	South Carolina
Kentucky ²	16	South Dakota
Louisiana	AI30792	Tennessee ¹⁴
Louisiana 1	LA180010	Texas
Maine	TN0002	Texas ⁵
Maryland	324	Utah
Massachusetts	M-TN003	Vermont
Michigan	9958	Virginia
Minnesota	047-999-395	Washington
Mississippi	TN00003	West Virginia
Missouri	340	Wisconsin
Montana	CERT0086	Wyoming

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 ¹⁴	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	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

Kansas City Board of Public Utilities

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.



NEARMAN CREEK

L1039637

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11/02/18 14:40

Τс Ss Cn Sr Qc Gl ΑI Sc

			Billing Infe	ormation:	10000000000	1.1	T		Analusis / C	antaines (D	10	-		C. Contraction
Kansas City Board of	Public U	tilities	Attn: El	en Bouse		Pres		21	Analysis/C	untainer / Prese	rvative	1	Chain of Custo	ody Page of
200 N 65th Street			300 N 6	5th St		Chk	1	1			-	100	81	
Kansas City, KS 66102			Kansas	City, KS 6610	2								1-1°50	State in Anti- Low-o
Report to: Ms. Ingrid Setzler	4. 396	1	Email To:	apu.com:khrowr	a@bou com bbo	un Obum							12065 Labrana	
Project Nearman Creek		1000		City/State	e opulcom,ono	Actionu	03	137					Mount Juliet, TN Phone: 615-758-	37122 X
Description:	a de la dela	and the second	19	Collected:			HN	125					Phone: 800-767- Fax: 615-758-585	5459 D
Phone: 913-573-9806 Fax: 913-573-9838	Client Project	t# Creek		Lab Project # KCKANO2-I	NEARMAN AS		HDPE-						L# 163	9637
Collected by (print): Lewis Turner	Site/Facility I	D#		P.O. #			50ml				1		CO	85
Collected by (signature):	Rush? (Lab MUST Be	Notified)	Quote #			er) 2						Acctnum: KC	KAN02
8F7	Same D	ay Five	Day	1.1.1.1.1.1.1		1	Filte						Template: 11	42240
Immediately Packed on Ice N Y K	Two Da	y 5 Day y 10 Da yay	y (Rad Only) ay (Rad Only)	Date Re 2 DAL	sults Needed	No.	s (Fld						TSR: 650 - Lin	da Cashman
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	S5 A	1.32				1000	Shipped Via:	FedEX Ground
DOGLA = 2/GLIDI	1	GW	2 21	Luch . L .	11		ã		0,00				Remarks	Sample # (lab only)
DOGW-8/CUM	6	GW	10-19	10/29/18	/600	1	X			-	1		11.5	-01
Docu-7 /cust	6	GW	16-20	10/2-9/18	1775	1	X	1000						02
Drow / Gwol	6	GW	31-85	10/29/18	1835	1	X	1.5						03
OPGW-1/GWOI	6	GW	00-06	10/30/18	0925	1	X						1. 19/19	04
DPGW-Dup/Gwol	6	GW	-	10/30/18	-	1	X	1					12	0.5
DP64-3/6WOI	6	GW	39-96	10/30/18	1050	1	х	2.5					·	18/2
DOGW-6 GWOI	6	GW	30-94,	10/30/18	1245	1	х				1.1		1.	m
DpGW-5/GWOI	6	GW	24-98	18/30/18	1400	1	х						-	07
DPGW-4/GWD1	G	GW	34-28	10/20/18	1515	1	x						1	08
DPGW-4 /Ghoims/ma	6	GW	34-28	10/30/19	1515	2	x				1			4
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay	Remarks: J	DAY	TAT		RABBO				рН	Temp		COC Seal	ample Receipt C	Deckleter
WW - WasteWater DW - Drinking Water	Samples return	ned via:			HUB OCH		0.51	nR/hr	Flow	Other		COC Sign Bottles Correct	arrive intact: bottles used:	
Relinquished by : (Signature)	rec	Data:		ıT	acking# L	162	4	29	190 37	46		VOA 200	If Applicah	Le ZY _N
VTS		10/30/1	8 /	1208 -	eceived by: (Signa	iture	a	d	Trip Blank Re	ceived: Yes/ HCL	Меон	Preserva	tion Correct/Che	ecked: $\mathbb{Z}_{X}^{X} = \mathbb{N}_{N}^{N}$
Relinquished by : (Signature)		Date:	Tir	ne: Re	eceived by: (Signa	iture)	0.0		Temp:	°C Bottles Re	ceived:	If preserva	tion required by Log	in: Date/Time
Relinquished by : (Signature)		Date:	Tin	ne: Re	ceived for lab by	: (Signatu	te)		Date:	Time:	-0.	Hold:		Condition:



ANALYTICAL REPORT

November 26, 2018

Kansas City Board of Public Utilities

Sample Delivery Group: Samples Received: Project Number: Description: L1046228 11/21/2018 Nearman Creek groundwater

Report To:

Ms. Ingrid Setzler 300 N 65th Street Kansas City, KS 66102

Entire Report Reviewed By:

Tacy Kenned

Stacy Kennedy Project Manager

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

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12	
13	⁸ Al
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SDG: L1046228

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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Ср

Tc

Ss

Cn

Sr

Qc

GI

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Sc

			Collected by	Collected data/time	Deceived data/time
MW-2A L1046228-01 GW			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
			Collected by	Collected date/time	Received date/time
MW-3 L1046228-02 GW			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
			Collected by	Collected date/time	Received date/time
MW-4 L1046228-03 GW			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
			Collected by	Collected date/time	Received date/time
MW-8A L1046228-04 GW			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
			Collected by	Collected date/time	Received date/time
MW-10 L1046228-05 GW			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
			Collected by	Collected date/time	Received date/time
MW-13 L1046228-06 GW			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
			Collected by	Collected date/time	Received date/time
MW-14 L1046228-07 GW			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

PROJECT: Nearman Creek SDG: L1046228 DATE/TIME: 11/26/18 16:48 **PAGE**: 3 of 22

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

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			Collected by	Collected date/time	Received date/time
MW-15 L1046228-08 GW			KS	11/19/18 16:55	11/21/18 07:30
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
MW-16 L1046228-09 GW			KS	11/19/18 15:15	11/21/18 07:30
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
DUP L1046228-10 GW			KS	11/20/18 00:00	11/21/18 07:30
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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
RINSATE L1046228-11 GW			KS	11/19/18 15:40	11/21/18 07:30
Method	Batch	Dilution	Preparation	Analysis	Analyst
			date/time	date/time	
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

SDG: L1046228 DATE/TIME: 11/26/18 16:48

CASE NARRATIVE

*

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

enned

Stacy Kennedy Project Manager

Τс Ss Cn Sr Qc GI AI Sc

SDG: L1046228 DA⁻ 11/26 PAGE: 5 of 22

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Ср

Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

³Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
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Ср

Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	11/23/2018 08:27	WG1200149
Arsenic, Dissolved	ND		0.00200	1	11/23/2018 09:08	WG1200145



Collected date/time: 11/20/18 10:30

SAMPLE RESULTS - 03 L1046228

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Ср

Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	11/23/2018 08:32	WG1200149
Arsenic, Dissolved	ND		0.00200	1	11/23/2018 09:26	WG1200145



Collected date/time: 11/20/18 13:50

SAMPLE RESULTS - 04 L1046228

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Ср

Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

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⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

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Ср

Тс

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

ິSs
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
°SC

SDG: L1046228 DATE/TIME: 11/26/18 16:48

PAGE: 10 of 22

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Ср

Тс

Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

^³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
°Sc

SDG: L1046228 DATE/TIME: 11/26/18 16:48

Collected date/time: 11/19/18 16:10

SAMPLE RESULTS - 07 L1046228

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Ср

Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	11/23/2018 09:04	WG1200149
Arsenic, Dissolved	ND		0.00200	1	11/23/2018 09:45	WG1200145





Ср

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Metals (ICPMS) by Method 6020

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

^³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
°Sc

SDG: L1046228 DATE/TIME: 11/26/18 16:48 PAGE: 13 of 22

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Ср

Тс

	Result	Qualifier RDL	Dilution	Analysis	Batch
Analyte	mg/l	mg/l		date / time	
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

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ AI
⁹ Sc

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Ср

Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
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

Ss
⁴ Cn
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⁸ Al
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Ср

Тс

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/l		mg/l		date / time	
Arsenic	ND		0.00200	1	11/23/2018 09:18	WG1200149
Arsenic, Dissolved	ND		0.00200	1	11/23/2018 09:58	WG1200145

³ Ss
⁴ Cn
⁵Sr
⁶ Qc
⁷ Gl
⁸ Al
°Sc

WG1200145

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

Τс

Ss

Cn

Sr

ິQc

GI

ΆI

Sc

Method Blank (MB)

(MB) R3362344-1 11/23/18 08:31							
	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) R3362344-2 11/23/18 08:36 • (LCSD) R3362344-3 11/23/18 08:40										
	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	0.0502	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											
Spike Amount Original Result MS Result MSD Result MS Rec. MSD Rec. Dilution Rec. Limits <u>MS Qualifier</u> MSD Qualifier RPD RPD Limits									RPD Limits		
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%		%	%
Arsenic, Dissolved	0.0500	0.00535	0.0537	0.0554	96.7	100	1	75.0-125		3.04	20

SDG: L1046228 DATE/TIME: 11/26/18 16:48

PAGE: 17 of 22

WG1200149

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

Τс

Ss

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Sr

ິQc

GI

ΆI

Sc

Method Blank (MB)

(MB) R3362316-1 11/23/18 07:50								
	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) R3362316-2 11/23/18 07:54 • (LCSD) R3362316-3 11/23/18 07:59										
	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	0.0489	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											
Spike Amount Original Result MS Result MSD Result MS Rec. MSD Rec. Dilution Rec. Limits <u>MS Qualifier</u> MSD Qualifier RPD RPD Limits									RPD Limits		
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%		%	%
Arsenic	0.0500	0.00509	0.0551	0.0530	100	95.8	1	75.0-125		3.94	20

SDG: L1046228 DATE/TIME: 11/26/18 16:48 PAGE: 18 of 22

GLOSSARY OF TERMS

*

Τс

Ss

Cn

Sr

*Q*c

GI

AI

Sc

Guide to Reading and Understanding Your Laboratory Report

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

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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.

SDG: L1046228

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	Nebra
Alaska	17-026	Nevad
Arizona	AZ0612	New H
Arkansas	88-0469	New .
California	2932	New
Colorado	TN00003	New
Connecticut	PH-0197	North
Florida	E87487	North
Georgia	NELAP	North
Georgia ¹	923	North
ldaho	TN00003	Ohio-
Illinois	200008	Oklah
Indiana	C-TN-01	Orego
lowa	364	Penns
Kansas	E-10277	Rhode
Kentucky ¹⁶	90010	South
Kentucky ²	16	South
Louisiana	Al30792	Tenne
Louisiana ¹	LA180010	Texas
Maine	TN0002	Texas
Maryland	324	Utah
Massachusetts	M-TN003	Verme
Michigan	9958	Virgin
Minnesota	047-999-395	Washi
Mississippi	TN00003	West
Missouri	340	Wisco
Montana	CERT0086	Wyom

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	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

Kansas City Board of Public Utilities

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.



Nearman Creek

L1046228

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×	RUSH .	TUR	N Billing Infr	ormation:	0.000	1	4	-	Analysis / C	ontainer / P	reservative		Chain of Custody	Page of	
Kansas City Board of Public Utilities			Attn: Ellen Bouse 300 N 65th St Kansas City, KS 66102										Pace Number Ca	Analytical* ner for Teating & Innovation	
Cansas City, KS 66102			Email To:										12055 Lebanon Rd		
Ms. Ingrid Setzler			isetzler@	bpu.com;kbrowr	@Lum	173	N					Mount Juliet, TN 37 Phone: 615-758-58			
Project Description: groundwater			-	City/State Collected:			SINC	V				2.55	Fax: 615-758-5859	· · · · · · · · · · · · · · · · · · ·	
hone: 913-573-9806 ax: 913-573-9838	Client Project # Nearman Creek			Lab Project # KCKANO2-NEARMAN AS			-ancient	RON					L# L 64000 C170		
collected by (print):	Site/Facility ID #			P.O. #		-	1252	H-340				Acctnum: KCKANO2			
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		Notified)	d) Quote #			. îde	miHD				Template: T143030 Prelogin: P681121			
minediately Packed on Ice N Y			y (Rad Only) ay (Rad Only)	Date R	esults Needed	No.	4S-1 ich	As 250			14		TSR: 650 - Lind PB: 76 /	a Cashman - <u>14 - 1</u> 8	
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Catrs	, ceit	Total					Shipped Via: F Remarks	Sample # (lab only)	
MW-2A		GW	1	11-20	1205	2	1	x						- 61	
/IW-3		GW		11-20	1115	2	X	X						02	
MW-4		GW		11-20	1030	2	*	X	1.70					03	
AW-8A		GW		11-20	1350	2	1	x	3		1			04	
VIW-10		GW		11-20	1250	2	:	x					di di	64	
VIW-13		GW		11-19	1400	2	1	X					1.11	66	
VIW-14		GW		11-19	1610	2	1	X						07	
MW-15		GW		11-19	1655	1	X	x						08	
VIW-16		GW		11-19	1515	2	4	x					10.8	09	
DUP		GW		11-20		2	1	x					1.6	10	
Matrix: S - Soil AIR - Air F - Filter W - Groundwater B - Bioassay NW - WasteWater	Remarks: 2	RAD SCREEN: <0.5 m th /hr				PH Temp Flow Other			Sample Receipt Checkliot COC Seal Present/Intact:NP _YN COC Signed/Accurate:TN Bottles arrive intact:TN Correct bottles used:YN						
DW - Drinking Water OT - Other	Samples return UPSFe	Tracking #							Suffic VOA Ze	ient volume sent If Applica ro Headspace:	ole _Y _N				
Relinquished by (Signature)	- Date: 11-20 1420			1420	Received by: (Sign	ature			Trip Blan	Trip Blank Received: Yes (No HCL / MeoH TBR			Preservation Correct/Checked: _Y _N		
Relinquished by : (Signature)		Date:		Time:	Received by: (Sign	ature'		e.	Temp:	°C 1 0,1 %	Bottles Received:	If prese	rvation required by Lo	ogin: Date/Time	
Relinquished by : (Signature) Date:		Date:		Time:	Received for lab by: (Supratu				Date:	1/18	Time:	Hold:		NCF / OK	

-10

Kansas City Board of Public Utilities			Billing Information:						Anal	ysis / Cont	ainer / Pro	eservative	18	Chain of Custody Page of		
			Attn: Elle 300 N 65 Kansas C	Attn: Ellen Bouse 300 N 65th St Kansas City, KS 66102										Pace H	Analytical* Nor for Testing & Innovation	
			Email To: isetzler@bpu.com;kbrown@bpu.com;bhoye@											12065 Lebanon Rd Mount Juliet, TN 371 Phone: 615-758-585		
Project Description: groundwater			City/State Collected:				CNH-							Phone: 800-767-585 Fax: 615-758-5859		
Phone: 913-573-9806 Fax: 913-573-9838	Client Project # Nearman Creek CCR			Lab Project # KCKANO2-NEARMAN AS			NHUPE	EON		2				L# 616 Table #	46228	
Collected by (print): K. Schult	Site/Facility ID #			P.O. #			2500	DPE-H						Acctnum: KCK	AN02	
Collected by (signature):	Rush? (Lab MUST Be Notified) Same Day Five Day Next Day Next Day Doay 10 Day (Rad Only)		Notified) lay (Rad Only) v (Rad Only) v (Rad Only) Date Result		fło.	Reid filte 250mHf							Prelogin: P68 TSR: 650 - Lind	1121 a Cashman		
Packed on Ice N Y Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cotrs	ek ssio	Total A						Shipped Via: Fo	Sample # (lab only)	
RINSATE	1	GW		11-19	1540	2	X	X						e	- 11	
Ref. at		GW		1000		2	×	X				1			130/01	
MATRIX SPIKE		GW		11-19	1655	2	X	X							08	
MATRIX SPIKE DUP		GW		11-19	1655	2	X	X		2					68	
and pairs						F				-						
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water	Remarks: #24 HD WSU TAT- Samples returned via: 					SCREE	EN: <	0.5 mR	Inr	pH Flow	Ter	np	COC Se COC Si Bottle Correc Suffic	Sample Receipt C al Present/Intact gned/Accurate: s arrive intact: t bottles used: ient valume sent: t t bottles	heskligs : NP N	
OT - Other Relinquished By (Signature)						ature	A	uzi	Q.	ip Blank R	eceived:	Yes (No HCL / Meor TBR	VOA Ze Preser	VOA Zero Headspace: _Y _} Preservation Correct/Checked: _Y _}		
Relinquished by : (Signature)		Date:		Time:	Received by: (Sign	nature		0	Te	emp: 1.2 - J.(°C 84	A 2C	If prese	rvation required by Lo	gin: Date/Time	
Relinquished by : (Signature) Date:			Time:	Received for lab by: (Signature) Date: Time						me: 7:30	Hold:		NCF / CS			

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:

¹Metals 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. ²The 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. <u>Chain-of-Custody (COC)</u> The relinquished and received signatures, times, and dates on the COCs were present.
- 2. <u>Requested Analyses Completed</u> All analyses were completed as requested for the appropriate parameters for the March groundwater sampling event.
- 3. <u>Holding Times</u> All samples were analyzed within the recommended method holding times.
- 4. <u>Sample Preservation</u> All samples were received by the laboratory within the recommended 4 degrees Celsius ($^{\circ}$ C) ± 2 $^{\circ}$ C sample preservation temperature range.

Memorandum (continued)



March 28, 2018 Page 2

- 5. <u>Laboratory Method Blanks</u> 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. <u>Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)</u> 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. <u>Matrix Spike/Matrix Spike Duplicates (MS/MSD)</u> 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. <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,

Memorandum (continued)



March 28, 2018 Page 3

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 March 2018 sampling event. Table 2 presents the sideby-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. <u>Detection and Quantitation Limits</u> No dilutions for any analytes/samples were noted.
- 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.

Attachments

Table 1: Data QualifiersTable 2: Field Duplicate Results

Table 1Data QualifiersKansas City Board of Public Utilities (BPU) - Kansas City, KansasNearman 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)	nCi/l	0.628 J	0.308 J	No
(Uncertainty)	PO//	+/- 0.726	+/- 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:

¹Metals performed by SW-846 6010B include barium, boron, calcium, lithium, and molybdenum. Analysis of arsenic was performed by SW-846 6020.

²Project 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. <u>Chain-of-Custody (COC)</u> The relinquished and received signatures, times, and dates on the COCs were present.
- 2. <u>Requested Analyses Completed</u> All analyses were completed as requested for the appropriate parameters for the June groundwater sampling event.
- 3. <u>Holding Times</u> 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.



July 3, 2018 Page 2

- 4. <u>Sample Preservation</u> All samples were received by the laboratory within the recommended 4 degrees Celsius ($^{\circ}$ C) \pm 2 $^{\circ}$ C sample preservation temperature range.
- 5. <u>Laboratory Method Blanks</u> 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. <u>Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)</u> 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. <u>Matrix Spike/Matrix Spike Duplicates (MS/MSD)</u> 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.



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- 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 sideby-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.

Attachments

Table 1: Data Qualifiers



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Table 2: Field Duplicate Results

Table 1Data QualifiersKansas City Board of Public Utilities (BPU) - Kansas City, KansasNearman 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	рН	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
рН	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)	nCi/l	1.32	0.211	No
(Uncertainty)	μοινι	+/- 0.977	+/- 1.25	INO

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
То:	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
рН	SW-846 9040C
Radium 226 and 228 ² (Combined)	SM 7500 Ra B M (radium-226)
	EPA 904.0 (radium-228)

Notes:

¹Metals performed by SW-846 6010B include total and/or dissolved arsenic. Other metals may include total barium, boron, calcium, lithium, and/or molybdenum.

²Project 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. <u>Chain-of-Custody (COC)</u> The relinquished and received signatures, times, and dates on the COCs were present.
- 2. <u>Requested Analyses Completed</u> All analyses were completed as requested for the appropriate parameters for the October and November groundwater sampling events.
- 3. <u>Holding Times</u> 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



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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. <u>Sample Preservation</u> All samples were received by the laboratory at or within the recommended 2 to 6 degrees Celsius (°C) sample preservation temperature range. No samples were received frozen, and all were considered viable.
- 5. <u>Laboratory Method Blanks</u> 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. <u>Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)</u> 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. <u>Matrix Spike/Matrix Spike Duplicates (MS/MSD)</u> 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



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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



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- 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. <u>Detection and Quantitation Limits</u> 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. <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.

Attachments

Table 1: Data Qualifiers Table 2: Field Duplicate Results

Table 1Data QualifiersKansas City Board of Public Utilities (BPU) - Kansas City, KansasNearman 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	IJ	Method blank detections for radium-226 (see text)
MW-2A MW-3 MW-4 MW-8A MW-10 MW-13 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	рН	IJ	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

5	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
рН	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:	DPGW-1	DPGW-DUP	
	Date Sampled: SDG(s):	October 30, 2018 L1039637	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/I picoCuries per Liter
- QC Quality Control
- SDG Sample Delivery Group
 - su Standard Unit
 - U Nondetect

APPENDIX D – HPT / EC LOGS



































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