AECOM Imagine it. Delivered. Environment

Submitted to:
Platte River Power Authority
Fort Collins, CO

Submitted by:
AECOM
Fort Collins, CO
60709371
January 2024

FINAL

Platte River Power Authority Ash Monofill Annual Groundwater Monitoring and Corrective Action Report for 2023

AECOM Imagine it. Delivered. Environment

Submitted to:
Platte River Power Authority
Fort Collins, CO

Submitted by:
AECOM
Fort Collins, CO
60709371
January 2024

Platte River Power Authority Ash Monofill Draft Annual Groundwater Monitoring and Corrective Action Report for 2023

Prepared By
Kara Hoppes P.G. (WY)
Geologist

Reviewed By
Dennis Connair C.P.G.
Principal Hydrogeologist

Approved By
Jeremy Hurshman, P.G. (WY)
Project Manager

Acronyms and Abbreviations

95% LCL	95 percent lower confidence limit
ACM	Assessment of Corrective Measure
AECOM	AECOM Technical Services, Inc.
bgs	below ground surface
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EROP	Engineering Report and Operational Plan
ft/day	foot/feet per day
ft/ft	feet per foot
GWPS	groundwater protection standard
mg/L	milligrams per liter
Platte River	Platte River Power Authority
Rawhide Station or Site	Rawhide Energy Station
SSI	statistically significant increase
SSL	statistically significant level
TDS	total dissolved solids
USEPA	United States Environmental Protection Agency
UPL	upper prediction limit

Table of Contents

Executive Summary ..... **iii**

1.0 Introduction **1-1**

1.1 Report Organization 1-1

2.0 Facility Description **2-1**

2.1 Facility Location and Operational History 2-1

2.2 Ash Monofill Description 2-1

2.3 Rawhide Station Hydrogeology 2-1

2.4 Ash Monofill Hydrogeology 2-1

3.0 Groundwater Monitoring Activities in 2023 ..... **3-1**

3.1 Water Level Measurements 3-1

3.2 Groundwater Sample Collection 3-1

3.3 Analytical Program 3-2

3.4 Quality Control/Quality Assurance 3-2

3.5 Data Validation 3-3

4.0 Monitoring Results and Evaluation **4-1**

4.1 Groundwater Potentiometric Surface 4-1

4.2 Groundwater Flow Rate 4-1

4.3 Groundwater Analytical Results 4-1

4.4 Groundwater Monitoring System Evaluation 4-1

4.5 Problems Encountered and Actions Taken 4-2

5.0 Statistical Analysis Results **5-1**

5.1 Appendix III SSI Determination 5-1

5.2 Appendix IV SSI Determination 5-1

5.3 Establishment of Groundwater Protection Standards 5-2

5.4 Appendix IV SSL Determination 5-2

6.0 Projected Activities in 2024 ..... **6-1**

7.0 Summary and Findings **7-1**

8.0 References **8-1**

List of Tables

Table 1 Ash Monofill Monitoring Well Construction Details
Table 2 Ash Monofill Groundwater Level Measurements 2023
Table 3 Ash Monofill Analytical Results and Statistical Summary 2023
Table 4 Ash Monofill Appendix III Background Upper Prediction Limits
Table 5 Ash Monofill Appendix IV Background Upper Prediction Limits

List of Figures

Figure 1 Ash Monitoring Well Network
Figure 2 Ash Monitoring Well Networks April 2023 Water Levels
Figure 3 Ash Monitoring Well Networks October 2023 Water Levels

List of Appendices

Appendix A Groundwater Sampling Forms
Appendix B Laboratory Analytical Reports and Data Validation Reports
Appendix C Groundwater Velocity Calculation Sheet
Appendix D Statistical Analysis Results and Input/Output Files

Executive Summary

This report summarizes groundwater monitoring action activities completed between January 1 and December 31, 2023 at the Coal Combustion Residuals (CCR) Ash Monofill at the Platte River Power Authority (Platte River) Rawhide Energy Station (Rawhide Station or Site), as required by 40 Code of Federal Regulations (CFR) Section 257.90(e) of the United States Environmental Protection Agency (USEPA) CCR Rule. The location of the CCR unit and program monitoring network for the CCR unit, including supporting monitoring wells, are illustrated on **Figure 1**. No program monitoring wells were modified or abandoned during the reporting period.

At the start of the 2023 reporting period, Platte River was operating the Ash Monofill under the Assessment monitoring program outlined in 40 Code of Federal Regulations (CFR) Section 257.95. The Assessment monitoring program for the Ash Monofill was initiated on April 30, 2018 upon submittal of an Appendix III Constituents Alternate Source Demonstration which was unable to identify alternate sources for the statistically significant increases (SSIs) of Appendix III constituents downgradient of the Ash Monofill (AECOM 2018b). In the 2023 reporting period, monitoring data reported the detections of the following Appendix III constituents in downgradient monitoring wells at concentrations that represent verified SSIs over background:

- Boron in each of the downgradient monitoring wells within the Ash Monofill network
- Calcium in monitoring wells ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08
- Chloride in monitoring wells ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08
- Sulfate in monitoring wells ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08
- Total dissolved solids (TDS) in monitoring wells ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08

Per CCR rule requirements, groundwater protection standards (GWPS) were established for each detected Appendix IV constituent and the data were tested for whether the monitoring well concentrations represented statistically significant levels (SSLs) above their respective GWPSs. Downgradient wells with a constituent or constituents reported above GWPSs at an SSL are as follows:

- Selenium in monitoring wells ASH-03, ASH-04, and ASH-07.

Other salient points for the 2023 annual reporting period include:

- Semiannual Assessment-mode groundwater monitoring events were conducted in April and October. Monitoring involved sampling of background monitoring wells and downgradient monitoring wells.
- No program transitions (Detection to Assessment or vice versa) were triggered.
- Completed construction of a new engineered landfill cell (referred to as Cell 2B) for ash management in April (AECOM 2024). Cell 2B has an engineered leachate collection system and improved storm water diversion features that may influence groundwater flow and constituent concentrations within the footprint and downgradient of the landfill.

Anticipated activities for the 2024 annual reporting period include:

- Completion of two semi-annual Assessment-mode groundwater monitoring events.
- Statistical evaluation of groundwater data for Appendix III and Appendix IV constituents.
- Evaluation of final remedy selection and implementation. Evaluation will include determining if adequate monitoring data, hydrogeological data, contaminant migration pathways information, and contaminant exposure pathways information are available to make the final remedy selection. The evaluation will also consider any influence the newly engineered landfill Cell 2B may have on groundwater flow and constituent concentrations.

1.0 Introduction

This is the 2023 Annual Groundwater Monitoring and Corrective Action Report for the Coal Combustion Residuals (CCR) Ash Monofill at the Platte River Power Authority (Platte River) Rawhide Energy Station (Rawhide Station or Site) in Larimer County, Colorado. This report was developed by AECOM Technical Services, Inc. (AECOM) at the request of Platte River. The purpose of this report is to provide a summary of the groundwater monitoring activities performed at the Ash Monofill in 2023 to comply with the requirements of Title 40 of the Code of Federal Regulations (CFR) Part 257 Subpart D, known as the CCR Rule, which became effective on October 19, 2015. The Rule provides standards for the disposal of CCR in landfills and surface impoundments (CCR units) and establishes groundwater monitoring requirements in 40 CFR 257.90 through 257.94. In accordance with 40 CFR 257.90(e), an annual report must document the status of the groundwater monitoring and correction action program (as applicable) for the CCR unit, summarize the key actions completed the previous year, describe any problems encountered, discuss actions taken to resolve the problems, and project key activities for the upcoming year. The annual report will be considered complete when it is placed in the facility operating record by January 31, 2024.

1.1 Report Organization

This Annual Report is divided into eight sections as outlined below and includes text, tables, figures, and appendices. The sections include:

- Section 1.0 includes this introduction and report organization.
- Section 2.0 provides a facility description that includes the facility location and operational history, a description of the CCR unit and a summary of the areal and site hydrogeology.
- Section 3.0 summarizes the groundwater monitoring and corrective action activities performed in 2023, and references appendices to this report that contain detailed documentation of those activities.
- Section 4.0 summarizes the groundwater sampling, analyses and results.
- Section 5.0 provides the statistical analyses and results.
- Section 6.0 provides a projection of the key activities anticipated in 2024.
- Section 7.0 provides a summary of findings.
- Section 8.0 provides a list of references cited in the report.

The report also includes four appendices that provide supporting documentation of the groundwater monitoring and related activities conducted in 2023:

- Appendix A – Groundwater Sampling Forms.
- Appendix B – Laboratory Analytical Reports and Data Validation Reports.
- Appendix C – Groundwater Velocity Calculation Sheet
- Appendix D – Statistical Analysis Results and Input/Output Files.

2.0 Facility Description

2.1 Facility Location and Operational History

The Rawhide Station encompasses approximately 4,560 acres north of Wellington in Larimer County, Colorado. In addition to the plant buildings, the major feature of the facility is an approximately 500-acre dry-land construction reservoir of reclaimed wastewater from the City of Fort Collins, also known as Hamilton Reservoir, which contains approximately 15,000 acre-feet of water and is used for cooling processes. The power block area contains the boiler and turbine buildings, the air quality control equipment, and the administrative offices. A rail spur along the northern edge of the Site connects the Rawhide Facility with the mainline of the Burlington Northern Santa Fe Railway Company and is used to deliver coal and construction materials for plant operations. Six generating units are located at the Rawhide Station. Units A, B, C, D, and F are fueled by natural gas, and Unit 1 is fueled by coal mined from the Powder River Basin in Wyoming.

2.2 Ash Monofill Description

The Ash Monofill is located northwest of the main plant and north of Hamilton Reservoir. CCR solid waste from Unit 1 operations is disposed of in the Ash Monofill which is comprised of two cells, Cell 1 and Cell 2, as shown on **Figure 1**. Cell 1 was operated from approximately 1980 to 2007 and is no longer in use. It is capped with cover soils but has not undergone final closure. Cell 2 is active, lies to the west of Cell 1, and is progressively advancing northwards as further ash material is placed within the cell. In 2023, a lined Cell 2B was completed, which contains a leachate collection system. CCR waste generated post completion of liner is placed in the lined portion of the cell. The footprint of the lined Cell 2B is presented in **Figure 1**.

2.3 Rawhide Station Hydrogeology

The hydrogeology of the Rawhide Station is discussed in the Engineering Report and Operational Plan (EROP) for the Solid Waste Disposal Facility (Platte River 1980), and in the Final Report Investigation of the Groundwater Monitoring Program for the Bottom Ash Disposal Site conducted by Lidstone and Anderson Inc. (1989). According to the 1980 EROP, hydrogeology of the Rawhide Station was originally investigated by drilling and installing 23 piezometers in conjunction with the original geotechnical investigation of the Site prior to construction of the facility. Data from the piezometers indicated that a groundwater table exists within the weathered and fractured Pierre Shale bedrock beneath the Site, and in alluvial deposits along Coal Creek. The report indicated that the depth to groundwater varied across the Site from 11 to 67 feet below ground surface (bgs), with groundwater generally flowing to the south-southeast. The shallow water table, as explained in the 1980 EROP, was reported to be directly recharged by infiltration from precipitation and surface runoff.

Following construction and operation of the Rawhide Station, Lidstone and Anderson (1989) concluded that sufficient groundwater data were collected to determine a mound had formed in the shallow, weathered, and fractured Pierre Shale in the vicinity of Hamilton Reservoir. After a review of available groundwater level information for Rawhide Station, AECOM concluded that the CCR units present at the Site are located hydraulically upgradient of any groundwater mound created by Hamilton Reservoir.

2.4 Ash Monofill Hydrogeology

The Ash Monofill is constructed within a narrow south-sloping valley with bedrock highs along both sides. The uppermost water-bearing stratum at the Ash Monofill was identified during groundwater monitoring well installation as the weathered and fractured Pierre Shale. Groundwater at the Ash Monofill is under water table conditions and, in 2023, was present at depths from approximately 20 to 34 feet bgs in piezometers PZ-3 through PZ-5, located within the footprint of Cell 2. Groundwater flow is generally from northwest to southeast, from the Ash Monofill towards Hamilton Reservoir, generally following the topographic slope of the valley.

3.0 Groundwater Monitoring Activities in 2023

This section summarizes groundwater monitoring activities conducted in 2023 to comply with the CCR Rule. Groundwater monitoring activities included:

- Measuring groundwater levels at each monitoring well prior to purging and sampling to provide potentiometric data;
- Groundwater sampling and analysis of Appendix III and Appendix IV constituents to identify potential releases from the Ash Monofill and to collect supplemental data to update the background statistics. Two semi-annual Assessment monitoring sampling events were conducted in April and October 2023; and
- Statistical analysis of the 2023 Appendix III and Appendix IV data to determine if there were any SSIs over background and whether any of the SSIs were above GWPS at an SSL.

3.1 Water Level Measurements

During each monitoring event, groundwater levels were measured at Ash Monofill network monitoring wells using an electronic water level meter. **Table 1** presents monitoring well survey locations and well construction details including surveyed top of casing results. Groundwater level measurements were recorded to the nearest hundredth (0.01) of a foot. The water level meter cable and sensor were decontaminated at the start of field activities and after use at each well to limit the potential for cross-contamination between wells. Water level measurements were recorded on groundwater sampling forms, provided in **Appendix A**, and are tabulated in **Table 2** for the April and October 2023 monitoring events.

3.2 Groundwater Sample Collection

Two rounds of semi-annual Appendix III and Appendix IV groundwater samples were collected at the Ash Monofill wells (ASH-01, ASH-02, ASH-03, ASH-04, ASH-05, ASH-06, ASH-07, and ASH-08) on April 24 to April 27, 2023, and October 10 to October 12, 2023.

Groundwater samples were collected in general accordance with the CCR Ash Monofill Groundwater Detection Monitoring Plan (AECOM 2017). Each well was initially purged using a submersible bladder pump and dedicated polyethylene bonded tubing. Disposable bladder liners were replaced before sampling each monitoring well and the pump casing was decontaminated prior to purging and sampling each monitoring well to avoid cross contamination between wells. The bladder pump and tubing were lowered into the well to a depth within the screen interval that was at least 1 to 2 feet off the bottom of the well to avoid disturbing accumulated sediment in the lower part of the well screen. Monitoring wells were purged using low flow sampling techniques until field parameter measurements of pH, temperature, dissolved oxygen, oxidation reduction potential, turbidity, and conductivity stabilized within ±10 percent and water level drawdown was observed to be less than 0.33 feet between measurement readings. If the well did not stabilize, it was purged dry and sample collection was attempted after well recharge, but within 24 hours of purging. . Purge water volumes were recorded on groundwater sampling forms (**Appendix A**).

After purging, the samples were collected from the discharge tube of the bladder pump directly into laboratory-supplied sample containers. Sample water was slowly pumped into each laboratory sample container until the containers were appropriately filled, taking care not to spill the laboratory preservative contained in sample bottles. The sample containers were then labeled and placed on ice in a sample cooler. At the conclusion of the field day, the samples were shipped by overnight carrier to Pace Analytical in Lenexa, Kansas and Greensburg, Pennsylvania, for analysis.

3.3 Analytical Program

Groundwater samples collected from the Ash Monofill wells were analyzed using U.S. Environmental Protection Agency (USEPA) SW-846 methods for Appendix III and Appendix IV constituents. All analytical results are reported as totals (unfiltered). **Table 3** summarizes the groundwater analytical results for 2023 for each sampling event. The laboratory analytical reports are provided in **Appendix B**.

Appendix III constituents include:

Chemical Name	Analytical Method
Boron	6010C
Chloride	9056A
Calcium	6010C
Fluoride	9056A
pH	Field measurement
Sulfate	9056A
TDS	TDS (American Public Health Association et al. [1998] Standard Method 2540C)

TDS = total dissolved solids.

Appendix IV constituents include:

Chemical Name	Analytical Method
Antimony	6020A
Arsenic	6020A
Barium	6020A
Beryllium	6020A
Cadmium	6020A
Chromium	6020A
Cobalt	6020A
Fluoride	9056A
Lead	6020A
Lithium	6010C
Mercury	7470A
Molybdenum	6020A
Selenium	6020A
Thallium	6020A
Radium 226 and 228, combined	9315/9320

3.4 Quality Control/Quality Assurance

Quality assurance and quality control samples collected during sampling activities included one field duplicate for each round of Assessment monitoring, one equipment rinse blank, and one matrix spike/matrix spike duplicate sample. The field duplicate samples were collected immediately following

collection of the primary samples using the same sampling procedures. The equipment rinse blank samples were collected after decontaminating the bladder pump casing or water level meter using procedures outlined in the Groundwater Monitoring Plan (AECOM 2017).

3.5 Data Validation

The laboratory data were validated by AECOM chemists using USEPA guidance. Data validation reports are provided in **Appendix B**.

4.0 Monitoring Results and Evaluation

This section discusses potentiometric surface elevations, groundwater flow directions, and analytical sampling results for the samples collected during the two Assessment monitoring events conducted in April and October 2023 at the Ash Monofill.

4.1 Groundwater Potentiometric Surface

The groundwater elevations were used to prepare potentiometric surface maps for April and October sampling events (**Figure 2** and **Figure 3**). These maps were used to determine if groundwater in the uppermost aquifer beneath the Ash Monofill flows from northwest to southeast at an average hydraulic gradient of 0.0143 feet per foot (ft/ft) between monitoring wells ASH-01 and ASH-02 in 2023. This is similar to the gradient of 0.0142 ft/ft between ASH-01 and ASH-02 calculated in 2022 and is consistent with the average gradients previously reported in past annual reports (AECOM 2018a, 2019, 2020, 2021, 2022, and 2023).

4.2 Groundwater Flow Rate

An average flow rate was calculated for groundwater in the uppermost aquifer beneath the Ash Monofill using the minimum (0.085 foot per day (ft/day]); maximum (1.44 ft/day); and geometric mean (0.935 [ft/day) hydraulic conductivities determined from slug tests, the average hydraulic gradient (0.0143 ft/ft) determined between monitoring wells ASH-01 and ASH-02, and an assumed effective porosity of 15 percent for fractured Pierre Shale. The results indicate that groundwater in the uppermost aquifer beneath the Ash Monofill flows at a rate ranging from approximately 8.123E-3 to 1.376E-1 ft/day, with a geometric mean of 8.935E-2 ft/day. The groundwater velocity calculation sheet is attached in **Appendix C**.

4.3 Groundwater Analytical Results

Groundwater samples were collected and analyzed for Appendix III and IV parameters specified in Section 3.3 in April and October 2023. The samples were analyzed by Pace Analytical in Lenexa, Kansas and Greensburg, Pennsylvania. The laboratory analytical reports are provided in **Appendix B** and included in the facility operating record. The laboratory results were reviewed for completeness against the project-required analytical methods and the chain-of-custody forms and subsequently validated by AECOM. The data were found to be valid and useable with qualification as outlined in the data validation reports provided in **Appendix B**. **Table 3** summarizes the groundwater analytical results for each sampling round. Monitoring wells ASH-01, ASH-02, ASH-03, ASH-04, ASH-05, ASH-06, ASH-07, and ASH-08 were sampled during the 2023 events to comply with Assessment monitoring requirements.

4.4 Groundwater Monitoring System Evaluation

All monitoring wells comprising the Ash Monofill groundwater monitoring network were inspected during each sampling round and were found to be in good condition and capable of supplying a representative sample. However, historically wells within the ash groundwater monitoring network have had increased turbidity due to the fine-grained composition of the Pierre Shale and may require further well development into the future if turbidity levels return to elevated levels. Ash monofill network wells in 2023 did not show elevated turbidity measurements.

Analysis of potentiometric surface maps constructed using the depth to groundwater measurements obtained during each sampling round confirm that monitoring wells ASH-01 and ASH-06 are located upgradient of the Ash Monofill and represent background groundwater quality, and that monitoring wells ASH-02, ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08 are located downgradient of the Ash Monofill and represent downgradient groundwater quality.

4.5 Problems Encountered and Actions Taken

There were no problems encountered or actions taken during 2023.

5.0 Statistical Analysis Results

The Ash Monofill groundwater quality data were evaluated using the certified statistical approach presented in the CCR Ash Monofill Groundwater Detection Monitoring Plan (AECOM 2017). Groundwater quality data were evaluated using an interwell approach that statistically compared constituent concentrations at downgradient monitoring wells to those present at background monitoring wells. For the Ash Monofill, monitoring wells ASH-01 and ASH-06 are designated as the background wells because they are located upgradient of the northern landfill boundary, whereas monitoring wells ASH-02, ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08 are designated as compliance wells because they are located downgradient of the southern monofill boundary.

The statistical analyses were performed in accordance with 40 CFR Parts 257.93(f), 257.93(g), and 257.93(h) and the Statistical Method Certification (AECOM 2017). Using ProUCL Version 5.1, prediction limits (i.e., parametric or nonparametric) with one of retesting were developed for each constituent based on the frequency of non-detect values and whether the background data for that constituent exhibited a normal, lognormal, or nonparametric distribution. For the statistical analysis, non-detect values were represented as one-half the detection limit. No outliers were identified in the data. Analytical data from the background monitoring wells collected between March 2016 and October 2021 were used to develop an upper prediction limit (UPL) for the background data at 95 percent confidence. Data from the downgradient monitoring wells for the reporting period were compared to the UPL to identify SSIs over background. The results of the statistical analyses, including the Appendix III and IV UPLs, are provided in **Table 4** and **Table 5**, respectively. The ProUCL statistical analysis input files and output files are provided in **Appendix D**.

5.1 Appendix III SSI Determination

The Appendix III results were compared against their respective background UPLs to determine if they exhibited SSIs above background. This comparison indicates that some of the boron, calcium, chloride, sulfate, and TDS concentrations at monitoring wells ASH-02, ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08 have verified SSIs above the background UPLs as shown in the table below. Fluoride and pH did not show any SSIs above background at any of the downgradient compliance wells. The Appendix III SSIs found during 2023 are consistent with those identified during 2022 and prior years. Specific events where exceedances were observed, and analytical concentrations of detections can be found in **Table 3**.

Well	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
ASH-02	SSI	-----	-----	-----	-----	-----	-----
ASH-03	SSI	SSI	SSI	-----	-----	SSI	SSI
ASH-04	SSI	SSI	SSI	-----	-----	SSI	SSI
ASH-05	SSI	SSI	SSI	-----	-----	SSI	SSI
ASH-07	SSI	SSI	SSI	-----	-----	SSI	SSI
ASH-08	SSI	SSI	SSI	-----	-----	SSI	SSI

Notes:
----- = concentration below UPL.
SSI = statistically significant increase (Indicating concentrations above the background UPL).

5.2 Appendix IV SSI Determination

The Appendix IV Assessment monitoring results were compared against their respective background UPLs to determine if they exhibited SSIs above background. This comparison indicates that selenium at monitoring wells ASH-03, ASH-04, and ASH-07 exhibit verified SSIs over the background UPL as shown

in the table below. No other Appendix IV constituents exhibited verified SSIs over background. SSLs were calculated for select constituents and are described in Section 5.4 below.

Well	Sb	As	Ba	Be	Cd	Cr	Co	F	Pb	Li	Hg	Mo	Ra	Se	Th
ASH-02	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
ASH-03	----	----	----	----	----	----	----	----	----	----	----	----	----	SSI	----
ASH-04	----	----	----	----	----	----	----	----	----	----	----	----	----	SSI	----
ASH-05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
ASH-07	----	----	----	----	----	----	----	----	----	----	----	----	----	SSI	----
ASH-08	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Notes:
---- = concentration below UPL.
SSI = statistically significant increase (Indicating concentrations above the background UPL).

5.3 Establishment of Groundwater Protection Standards

GWPS were selected for the detected Ash Monofill Appendix IV constituents using the criteria specified in 40 CFR 257.95(h). The GWPSs listed on **Tables 3**, **4**, **5** were selected from the USEPA drinking water maximum contaminant limits, groundwater standards provided in 40 CFR 257.95(h)(2), or the background UPLs where they exceeded either of the other standards.

5.4 Appendix IV SSL Determination

Constituents exhibiting an SSI over the background UPL for two consecutive events were further evaluated to determine whether they are present at SSLs relative to GWPS established under the CCR Rule (40 CFR 257.95(d)(2)). SSLs were identified by calculating the 95 percent lower confidence limit (95% LCL) at each well where the Assessment monitoring constituents exhibited a verified SSI over background and comparing the 95% LCL to the GWPS. A constituent is present at an SSL over the GWPS if the 95% LCL is greater than the GWPS. Selenium concentrations at monitoring wells ASH-03, ASH-04, and ASH-07 were found at an SSL above the GWPS because their 95% LCLs were greater than the selenium GWPS (0.05 milligram per liter [mg/L]) as shown in the table below. Appendix IV constituents that exceed the GWPS at an SSL require an alternate source demonstration or corrective action. Selenium is the only Appendix IV constituent requiring corrective action at this time.

Well	Sb	As	Ba	Be	Cd	Cr	Co	F	Pb	Li	Hg	Mo	Ra	Se	Th
ASH-02	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
ASH-03	----	----	----	----	----	----	----	----	----	----	----	----	----	SSL	----
ASH-04	----	----	----	----	----	----	----	----	----	----	----	----	----	SSL	----
ASH-05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
ASH-07	----	----	----	----	----	----	----	----	----	----	----	----	----	SSL	----
ASH-08	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Notes:
---- = concentration below UPL.
SSL = statistically significant level (indicating 95% LCL exceeded GWPS).

Well No.	Parameter	95% LCL (mg/L)	GWPS (mg/L)
ASH-03	Selenium	0.08845	0.05
ASH-04	Selenium	0.07333	0.05
ASH-07	Selenium	0.11380	0.05

Notes:

constituent's 95% LCL exceeds the GWPS.

GWPS = groundwater protection standard.

95% LCL = 95 percent lower confidence limit.

mg/L = milligrams per liter.

6.0 Projected Activities in 2024

The following activities are anticipated to be performed at the Ash Monofill during calendar year 2024:

- Platte River will continue groundwater monitoring at the Ash Monofill on a semiannual basis for the Appendix III constituents and Appendix IV constituents that were detected as specified in 40 CFR 257.95(d)(1) or 40 CFR 257.95(f). The full list of Appendix IV constituents also will be sampled annually.
- Platte River completed construction of a new engineered landfill cell (referred to as Cell 2B) for ash management in April 2023 (AECOM 2024). Cell 2B has an engineered leachate system and improved storm water diversion features that may influence groundwater flow within the footprint and downgradient of the landfill. Groundwater monitoring data from 2023 onwards will be evaluated for potential influence Cell 2B may have on groundwater flow and constituent concentrations.
- An assessment of corrective measure (ACM) was prepared in August 2019 to identify potential remedial alternatives for selenium in groundwater at the Ash Monofill. The ACM included a range of cleanup options that included monitored natural attenuation, groundwater pump and treat, and a permeable reactive barrier. The ACM options were presented at a public meeting in November 2019. In 2024, the corrective action options presented in the ACM will be evaluated for a final remedy selection and implementation. Remedy selection will be based on adequate monitoring data, the site hydrogeology, contaminant migration pathways and contaminant exposure pathways. The evaluation will also consider any influence the newly engineered landfill Cell 2B may have on groundwater flow and constituent concentrations.

7.0 Summary and Findings

AECOM, on behalf of Platte River, oversaw groundwater sampling and analysis of Detection (Appendix III) and Assessment (Appendix IV) monitoring at the Ash Monofill. Monitoring data and analytical results collected as part of the semi-annual Detection and Assessment monitoring programs were evaluated to determine potentiometric surface elevations, groundwater flow directions and rates, and whether any constituents were present at an SSI above background UPLs or exceeded GWPS at an SSL. The existing Ash Monofill monitoring well network was not modified this year as no new monitoring wells were installed as part of the Assessment monitoring program.

The Appendix III detection monitoring results indicate that some of the boron, calcium, chloride, sulfate, and TDS concentrations at monitoring wells ASH-02, ASH-03, ASH-04, ASH-05, ASH-07, and ASH-08 represent verified SSIs above the background UPLs. Selenium concentrations in groundwater at monitoring wells ASH-03, ASH-04, ASH-07 were found to represent verified SSIs above background UPLs. Additional statistical analysis found that selenium exceeds the GWPS at an SSL at wells ASH-03, ASH-04, and ASH-07. These results require continued Assessment monitoring and corrective action for selenium at the Ash Monofill.

An ACM was prepared in August 2019 to identify potential remedial alternatives for selenium in groundwater at the Ash Monofill. The ACM included a range of cleanup options that included monitored natural attenuation, groundwater pump and treat, and a permeable reactive barrier. The ACM options were presented at a public meeting in November 2019. In 2024, the corrective action options presented in the ACM will be evaluated for a final remedy selection and implementation. The evaluation will also consider any influence the newly engineered landfill Cell 2B may have on groundwater flow and constituent concentrations.

8.0 References

AECOM Technical Services, Inc. (AECOM). 2017. Coal Combustion Residuals (CCR) Ash Monofill Groundwater Detection Monitoring Plan Revision 0. Prepared for Platte River Power Authority Rawhide Energy Station Larimer County, Colorado. October 10, 2017.

AECOM. 2018a. ASH Monofill Annual Groundwater Monitoring and Corrective Action Report 2016 – 2017. Prepared for Platte River Power Authority. January 31.

AECOM. 2018b. Ash Monofill Appendix III Constituents Alternate Source Demonstration. Prepared for Platte River Power Authority. April 30.

AECOM. 2019. ASH Monofill Annual Groundwater Monitoring and Corrective Action Report For 2018. Prepared for Platte River Power Authority. January 31.

AECOM. 2020. ASH Monofill Annual Groundwater Monitoring and Corrective Action Report For 2019. Prepared for Platte River Power Authority. January 31.

AECOM. 2021. ASH Monofill Annual Groundwater Monitoring and Corrective Action Report For 2020. Prepared for Platte River Power Authority. January 31.

AECOM. 2022. ASH Monofill Annual Groundwater Monitoring and Corrective Action Report For 2021. Prepared for Platte River Power Authority. January 31.

AECOM. 2023a. ASH Monofill Annual Groundwater Monitoring and Corrective Action Report for 2022. Prepared for Platte River Power Authority. January 31.

AECOM. 2024. ASH Monofill Cell 2B Construction Quality Assurance Certification Report. Prepared for Platte River Power Authority. January 10.

American Public Health Association, American Water Works Association, and Water Environment Federation. 1998. Standard Methods for the Examination of Water and Wastewater, 20th Edition.

Lidstone and Anderson, Inc. 1989. Investigation of the Ground-Water Monitoring Program for the Bottom Ash Disposal Site. March 1989.

Platte River Power Authority (Platte River). 1980. Engineering Report and Operational Plan for the Solid Waste Disposal Facility, Rawhide Energy Project, December 1980.

Tables

Table 1
Ash Monofill Monitoring Well Construction Details
PRPA Ash Monofill Annual Report for 2023
PRPA Rawhide Facility, Colorado

Well Name	Location Relative to Waste Unit	Easting (ft)	Northing (ft)	Ground Surface Elevation (ft amsl)	Top of Casing Elevation (ft amsl)	Total Depth (ft bgs)	Well Screen Interval (ft bgs)	Well Screen Lithology
ASH-01	Upgradient Well	3124781.307	1562659.296	5759.29	5760.15	31	26-29	Shale
ASH-02	Downgradient Well	3127250.213	1558450.627	5679.25	5679.87	55	51-54	Shale
ASH-03	Downgradient Well	3126904.393	1558820.854	5714.21	5717.18	49	39-49	Shale
ASH-04	Downgradient Well	3126544.377	1558803.996	5689.58	5692.57	29	19-29	Shale
ASH-05	Downgradient Well	3126255.648	1558603.939	5696.68	5698.71	29	19-29	Shale
ASH-06	Upgradient Well	3126039.957	1562657.603	5783.23	5786.41	65	50-65	Shale
ASH-07	Downgradient Well	3127068.621	1558643.688	5687.58	5690.56	25	15-25	Shale
ASH-08	Downgradient Well	3126672.477	1558046.977	5681.22	5684.41	29	19-29	Shale

Notes:

ft amsl = feet above mean sea level; ft bgs = feet below ground surface

ASH-01 was installed in December 1980 as MW-1 by Black & Veatch.

ASH-02 was installed in December 1980 as MW-2 by Black & Veatch.

Wells surveyed in North American Datum 1983 (NAD83)

Table 2
Ash Monofill Groundwater Level Measurements 2023
PRPA Ash Monofill Annual Report for 2023
PRPA Rawhide Facility, Colorado

Well ID	Sampling Event	Measurement Date	Measuring Point Elevation (ft amsl)	Depth To Water (ft btoc)	Groundwater Elevation (ft amsl)
ASH-01	April 2023	4/24/2023	5760.15	13.95	5746.20
ASH-01	October 2023	10/11/2023	5760.15	13.34	5746.81
ASH-02	April 2023	4/24/2023	5679.87	1.82	5678.05
ASH-02	October 2023	10/09/2023	5679.87	3.95	5675.92
ASH-03	April 2023	4/24/2023	5717.18	36.06	5681.12
ASH-03	October 2023	10/09/2023	5717.18	37.93	5679.25
ASH-04	April 2023	4/24/2023	5692.57	11.58	5680.99
ASH-04	October 2023	10/09/2023	5692.57	12.87	5679.70
ASH-05	April 2023	4/24/2023	5698.71	19.77	5678.94
ASH-05	October 2023	10/09/2023	5698.71	20.53	5678.18
ASH-06	April 2023	4/24/2023	5786.41	62.51	5723.90
ASH-06	October 2023	10/09/2023	5786.41	62.60	5723.81
ASH-07	April 2023	4/24/2023	5690.56	12.61	5677.95
ASH-07	October 2023	10/09/2023	5690.56	14.76	5675.80
ASH-08	April 2023	4/24/2023	5684.41	8.48	5675.93
ASH-08	October 2023	10/09/2023	5684.41	9.71	5674.70

Notes:
ft = feet
ft amsl = feet above mean sea level
ft btoc = feet below top of casing
NM = not measured

Table 3

ASH Monofill Analytical Results and Statistical Summary 2023
PRPA ASH Monofill Annual Report for 2023
PRPA Rawhide Facility, Colorado

				Sample Location	ASH-01	ASH-01	ASH-02	ASH-02	ASH-02	ASH-03	ASH-03	ASH-03
				Sample Type	N	N	FD	N	N	N	FD	N
				Sample Date	4/25/2023	10/11/2023	4/25/2023	4/25/2023	10/12/2023	4/27/2023	10/10/2023	10/10/2023
Chemical Name	**Analytical Method**	**Background Upper Prediciton Limit (UPL)**	**Groundwater Protection Standard (GWPS)**	**Unit**								
Appendix III Parameters												
Boron	SW6010	0.608	--	mg/L	**0.454**	**0.494**	**1.93**	**1.93**	**2.01**	**0.773**	**0.783**	**0.805**
Calcium	SW6010	380.55	--	mg/L	**350**	**395**	**169**	**167**	**177**	**450**	**467**	**468**
Chloride	EPA9056	27.74	--	mg/L	**19.0**	**18.7**	**32.1**	**24.8**	**22.8**	**99.6**	**108**	**100**
Fluoride	EPA9056	1.49	--	mg/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Sulfate	EPA9056	2408	--	mg/L	**2660**	**1880**	**2990**	**2290**	**2330**	**3840**	**3690**	**3000**
Total Dissolved Solids	SM2540C	3900	--	mg/L	**3590**	**3400**	**3590**	**3900**	**3330**	**5820**	**5510 J+**	**5320 J+**
Appendix IV Parameters												
Antimony	SW6020	0.004	0.006	mg/L	< 0.0030	< 0.0010	< 0.0030	< 0.0030	< 0.0030	< 0.0050	< 0.0010	< 0.0020
Arsenic	SW6020	0.004	0.01	mg/L	< 0.0030	< 0.0010	< 0.0030	< 0.0030	< 0.0030	< 0.0050	< 0.0010	< 0.0020
Barium	SW6020	0.070	2.0	mg/L	**0.0091**	**0.0093**	**0.0199**	**0.0203**	**0.0236**	**0.0124**	**0.0086**	**0.0091**
Beryllium	SW6020	0.002	0.004	mg/L	< 0.0015	< 0.00050	< 0.0015	< 0.0015	< 0.0015	< 0.0025	< 0.00050	< 0.0010
Cadmium	SW6020	0.002	0.005	mg/L	< 0.0015	< 0.00050	< 0.0015	< 0.0015	< 0.0015	< 0.0025	< 0.00050	< 0.0010
Chromium	SW6020	0.033	0.10	mg/L	< 0.0030	< 0.0010	< 0.0030	< 0.0030	< 0.0030	< 0.0050	< 0.0010	< 0.0020
Cobalt	SW6020	0.042	0.042 (0.006)	mg/L	< 0.0030	< 0.0010	< 0.0030	< 0.0030	< 0.0030	< 0.0050	< 0.0010	< 0.0020
Fluoride	EPA9056	1.49	4.0	mg/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Lead	SW6020	0.004	0.015	mg/L	< 0.0030	< 0.0010	< 0.0030	< 0.0030	< 0.0030	< 0.0050	< 0.0020	< 0.0020
Lithium	SW6010	0.549	0.549 (0.040)	mg/L	**0.394**	**0.45**	**0.3**	**0.301**	**0.325**	**0.407**	**0.43**	**0.434**
Mercury	EPA7470	0.0002	0.002	mg/L	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020
Molybdenum	SW6020	0.052	0.10	mg/L	< 0.0030	< 0.0010	**0.0068**	**0.0069**	**0.0077**	< 0.0050	< 0.0010	< 0.0020
Radium, total	TRC	6.18	6.18 (5.0)	pCi/L	**1.09**	**1.20**	**0.764**	**0.592**	**0.188**	**1.89**	**1.18**	**1.24**
Radium-226	E903.1	3.09	5.0	pCi/L	0	**0.121**	**0.296 J**	**0.133 J**	-0.143	**0.552**	**0.196**	**0.220**
Radium-228	E904.0	3.09	5.0	pCi/L	**1.09 J+**	**1.08 J+**	**0.468**	**0.459**	**0.188**	**1.34**	**0.980**	**1.02**
Selenium	SW6020	0.039	0.05	mg/L	< 0.0030	< 0.0010	< 0.0030	< 0.0030	< 0.0030	**0.113**	**0.121**	**0.111**
Thallium	SW6020	0.004	0.004 (0.002)	mg/L	< 0.0030	< 0.0010	< 0.0030	< 0.0030	< 0.0030	< 0.0050	< 0.0020	< 0.0020
Field Parameters												
Specific Conductivity	Field Measure	--	--	us/cm	**3586**	**4013**	**3987**	**3987**	**3557**	**6345**	**5208**	**5208**
Dissolved Oxygen	Field Measure	--	--	mg/L	**4.48**	**0.47**	**3.92**	**3.92**	**0.12**	**0.68**	**0.42**	**0.42**
ORP	Field Measure	--	--	mV	**112.1**	**149.7**	**46.6**	**46.6**	**167.1**	**105.9**	**109.7**	**109.7**
pH	Field Measure	8.84	--	SU	**7.37**	**7.15**	**7.75**	**7.75**	**7.65**	**6.83**	**7.26**	**7.26**
Turbidity	Field Measure	--	--	NTU	**0.72**	**2.24**	**2.17**	**2.17**	**6.89**	**3.00**	**6.34**	**6.34**
Temperature	Field Measure	--	--	Degrees C	**10.1**	**11.7**	**9.9**	**9.9**	**12.5**	**12.8**	**12.2**	**12.2**

Notes:

N = primary sample
R = unusable, non-detect data analyzed outside of required holding time
FD = field duplicate
mg/L = milligrams per liter
ug/L = micrograms per liter
pCi/L = picoCuries per liter
Bold **black** value is detected result
Bold **red** value exceeds groundwater protection standard (GWPS)
SSI = statistically significant increase over background upper prediction limit (UPL)
SSL = statistically significant level above the GWPS
J = estimated concentration (+ = biased high, - = biased low)

The GWPS represents the maximum contaminant limits (MCLs) outlined by 40 CFR 257.95 (h), unless the background UPL exceeds the MCL, in which case the GWPS will be represented by the UPL. For GWPSs represented by the UPL, the MCL is presented next to it in parentheses.

Table 3

ASH Monofill Analytical Results and Statistical Summary 2023
PRPA ASH Monofill Annual Report for 2023
PRPA Rawhide Facility, Colorado

				Sample Location	ASH-04	ASH-04	ASH-05	ASH-05	ASH-06	ASH-06	ASH-07	ASH-07	ASH-08	ASH-08
				Sample Type	N	N	N	N	N	N	N	N	N	N
				Sample Date	4/27/2023	10/11/2023	4/26/2023	10/11/2023	4/24/2023	10/11/2023	4/27/2023	10/12/2023	4/26/2023	10/10/2023
Chemical Name	**Analytical Method**	**Background Upper Prediciton Limit (UPL)**	**Groundwater Protection Standard (GWPS)**	**Unit**										
Appendix III Parameters														
Boron	SW6010	0.608	--	mg/L	**0.597**	**0.665**	**0.86**	**0.916**	**0.304**	**0.305**	**0.721**	**0.845**	**0.838**	**0.919**
Calcium	SW6010	380.55	--	mg/L	**462**	**483**	**487**	**520**	**25.5**	**25.5**	**411**	**435**	**419**	**460**
Chloride	EPA9056	27.74	--	mg/L	**219**	**197**	**363**	**226**	**8.0**	**8.0**	**319**	**214**	**32.0**	**28.9**
Fluoride	EPA9056	1.49	--	mg/L	< 0.20	**0.25**	< 0.20	**0.36**	**0.47**	**0.72**	< 0.20	< 0.20	< 0.20 UJ	< 0.20
Sulfate	EPA9056	2408	--	mg/L	**3480**	**3580**	**3180**	**2390**	**77.6**	**75.7**	**4380**	**3440**	**3300**	**2080**
Total Dissolved Solids	SM2540C	3900	--	mg/L	**6310**	**6060**	**4170**	**4760**	**427**	**417**	**7910**	**7110**	**3400**	**4400 J+**
Appendix IV Parameters														
Antimony	SW6020	0.004	0.006	mg/L	< 0.0050	< 0.0010	< 0.0050	< 0.0010	< 0.0010	< 0.0010	< 0.0100	< 0.0030	< 0.0050	< 0.0020
Arsenic	SW6020	0.004	0.01	mg/L	< 0.0050	**0.0011**	< 0.0050	< 0.0010	< 0.0010	**0.0010**	< 0.0100	< 0.0030	< 0.0050	< 0.0020
Barium	SW6020	0.070	2.0	mg/L	**0.0335**	**0.0093**	**0.0200**	**0.0138**	**0.0360**	**0.0380**	**0.0160**	**0.0111**	**0.0112**	**0.0116**
Beryllium	SW6020	0.002	0.004	mg/L	< 0.0025	< 0.00050	< 0.0025	< 0.00050	< 0.00050	< 0.00050	< 0.0050	< 0.0015	< 0.0025	< 0.0010
Cadmium	SW6020	0.002	0.005	mg/L	< 0.0025	< 0.00050	< 0.0025	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.0015	< 0.0025	< 0.0010
Chromium	SW6020	0.033	0.10	mg/L	< 0.0050	< 0.0010	< 0.0050	< 0.0010	< 0.0010	**0.0028**	< 0.0010	< 0.0030	< 0.0050	< 0.0020
Cobalt	SW6020	0.042	0.042 (0.006)	mg/L	< 0.0050	< 0.0010	< 0.0050	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0030	< 0.0050	**0.0020**
Fluoride	EPA9056	1.49	4.0	mg/L	< 0.20	**0.25**	< 0.20	**0.36**	**0.47**	**0.72**	< 0.20	< 0.20	< 0.20 UJ	< 0.20
Lead	SW6020	0.004	0.015	mg/L	< 0.0050	< 0.0030	< 0.0050	< 0.0010	< 0.0010	< 0.0010	< 0.0100	< 0.0030	< 0.0050	< 0.0020
Lithium	SW6010	0.549	0.549 (0.040)	mg/L	**0.373**	**0.42**	**0.313**	**0.344**	**0.0561**	**0.0535**	**0.502**	**0.543**	**0.288**	**0.326**
Mercury	EPA7470	0.0002	0.002	mg/L	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020
Molybdenum	SW6020	0.052	0.10	mg/L	< 0.0050	**0.0011**	< 0.0050	< 0.0010	**0.0133**	**0.0133**	< 0.0100	< 0.0030	< 0.0050	< 0.0020
Radium, total	TRC	6.18	6.18 (5.0)	pCi/L	**0.755**	**1.68**	**0.907**	**1.20**	**0.482**	**0.397**	**1.88**	**0.917**	**1.01**	**0.675**
Radium-226	E903.1	3.09	5.0	pCi/L	**0.267**	**1.68**	**0.368 J**	**0.649 J**	**0.180**	0	**0.642**	**0.378**	**0.398 J**	**0.155**
Radium-228	E904.0	3.09	5.0	pCi/L	**0.488**	-0.00464	**0.539**	**0.547**	**0.302**	**0.397**	**1.24**	**0.539**	**0.616**	**0.520**
Selenium	SW6020	0.039	0.05	mg/L	**0.121**	**0.125**	**0.0169**	**0.0153**	**0.0257**	**0.0252**	**0.124**	**0.101**	< 0.0050	< 0.0020
Thallium	SW6020	0.004	0.004 (0.002)	mg/L	< 0.0050	< 0.0030	< 0.0050	< 0.0010	< 0.0010	< 0.0010	< 0.0100	< 0.0030	< 0.0050	< 0.0020
Field Parameters														
Specific Conductivity	Field Measure	--	--	us/cm	**6738**	**6228**	**5835**	**5291**	**709**	**730**	**8091**	**6078**	**5313**	**4198**
Dissolved Oxygen	Field Measure	--	--	mg/L	**7.62**	**0.48**	**0.72**	**0.37**	**6.11**	**4.76**	**6.24**	**0.29**	**0.48**	**0.26**
ORP	Field Measure	--	--	mV	**115.0**	**141.2**	**106.7**	**140.3**	**60.5**	**124.8**	**113.4**	**185.0**	**101.1**	**44.1**
pH	Field Measure	8.84	--	SU	**7.80**	**7.39**	**6.88**	**7.12**	**8.04**	**8.08**	**7.10**	**7.30**	**6.77**	**7.14**
Turbidity	Field Measure	--	--	NTU	**22.1**	**4.76**	**10.9**	**17.4**	**3.55**	**4.77**	**13.1**	**4.09**	**6.89**	**3.55**
Temperature	Field Measure	--	--	Degrees C	**11.4**	**12.2**	**13.2**	**13.1**	**14.0**	**14.1**	**12.3**	**12.3**	**9.8**	**13.3**

Notes:

N = primary sample

R = unusable, non-detect data analyzed outside of required holding time

FD = field duplicate

mg/L = milligrams per liter

ug/L = micrograms per liter

pCi/L = picoCuries per liter

Bold **black** value is detected result

Bold **red** value exceeds groundwater protection standard (GWPS)

SSI = statistically significant increase over background upper prediction limit (UPL)

SSL = statistically significant level above the GWPS

J = estimated concentration (+ = biased high, - = biased low)

The GWPS represents the maximum contaminant limits (MCLs) outlined by 40 CFR 257.95 (h), unless the background UPL exceeds the MCL, in which case the GWPS will be represented by the UPL. For GWPSs represented by the UPL, the MCL is presented next to it in parentheses.

Table 4
Ash Monofill Appendix III Background Upper Prediction Limits
PRPA Ash Monofill Annual Report for 2023
PRPA Rawhide Facility, Colorado

Parameter (Units)	Number of Samples	Percent Non-detects	Normal or Lognormal Distribution?	Statistical Test	Background UPL
Boron (mg/L)	28	0	No/No	Nonparametric	0.608
Calcium (mg/L)	28	0	No/No	Nonparametric	380.55
Chloride (mg/L)	26	0	No/No	Nonparametric	27.74
Fluoride (mg/L)	28	25	Yes/Yes	Parametric	1.49
pH (standard units)	26	0	No/Yes	Parametric	8.84
Sulfate (mg/L)	26	3.8	No/No	Nonparametric	2,408
Total Dissolved Solids (mg/L)	28	0	No/No	Nonparametric	3,900

Notes:

mg/L = milligrams per liter

UPL = upper prediction limit

Upper Prediction Limit calculated using data from September 2016 through October 2021

Table 5
Ash Monofill Appendix IV Background Upper Prediction Limits
PRPA Ash Monofill Annual Report for 2023
PRPA Rawhide Facility, Colorado

Parameter (Units)	Number of Samples	Percent Non-detects	Normal or Lognormal Distribution?	Statistical Test	Background UPL	GWPS
Antimony (mg/L)	28	100	No/No	MDL	0.004	0.006
Arsenic (mg/L)	28	85	No/No	MDL	0.004	0.01
Barium (mg/L)	28	0	No/No	Nonparametric	0.070	2.0
Beryllium (mg/L)	28	100	No/No	MDL	0.002	0.004
Cadmium (mg/L)	28	100	No/No	MDL	0.002	0.005
Chromium (mg/L)	28	68	Yes/Yes	Nonparametric	0.033	0.1
Cobalt (mg/L)	28	100	No/No	MDL	0.042	0.042 (0.006)
Fluoride (mg/L)	28	25	Yes/Yes	Parametric	1.49	4.0
Lead (mg/L)	28	93	No/No	MDL	0.004	0.015
Lithium (mg/L)	28	0	No/No	Nonparametric	0.549	0.549 (0.040)
Mercury (mg/L)	28	100	No/No	MDL	0.0002	0.002
Molybdenum (mg/L)	28	57	Yes/Yes	Nonparametric	0.052	0.1
Selenium (mg/L)	28	36	No/No	Nonparametric	0.039	0.05
Thallium (mg/L)	28	100	No/No	MDL	0.004	0.004 (0.002)
Radium-226+228 Combined (pCi//L)	24	8	No/Yes	Parametric	3.09	6.18 (5.0)

Notes:
GWPS = groundwater protection standard
mg/L = milligrams per liter
pCi/L = picoCuries per liter
MDL = background limit set at maximum detection or reporting limit
Upper Prediction limits calculated using data from September 2016 through October 2021

All of the antimony, beryllium, cadmium, chromium, cobalt, mercury, molybdenum, and thallium results in the background monitoring wells were reported as not detected or detected less than 5 percent. For these constituents, the maximum detection or reporting limit was selected as the UPL per the double quantification rule in the U.S. Environmental Protection Agency's Unified Statistical Guidance (2009).

The GWPS represents the maximum contaminant limits (MCLs) outlined by 40 CFR 257.95 (h), unless the background UPL exceeds the MCL, in which case the GWPS will be represented by the UPL. For GWPSs represented by the UPL, the MCL is presented below it in parentheses.

Figures

Last saved: 1/24/2024
Path: \\na.aecomnet.com\lfs\AMER\Denver-USDEN06\DCS\Projects\ENV\PRPA\z_GIS\CCR\2023\Figure1_SiteOverview.mxd

Project Management Initials: Design RLH Drawn ADB Checked JH Approved VK ANSI B 11" x 17"

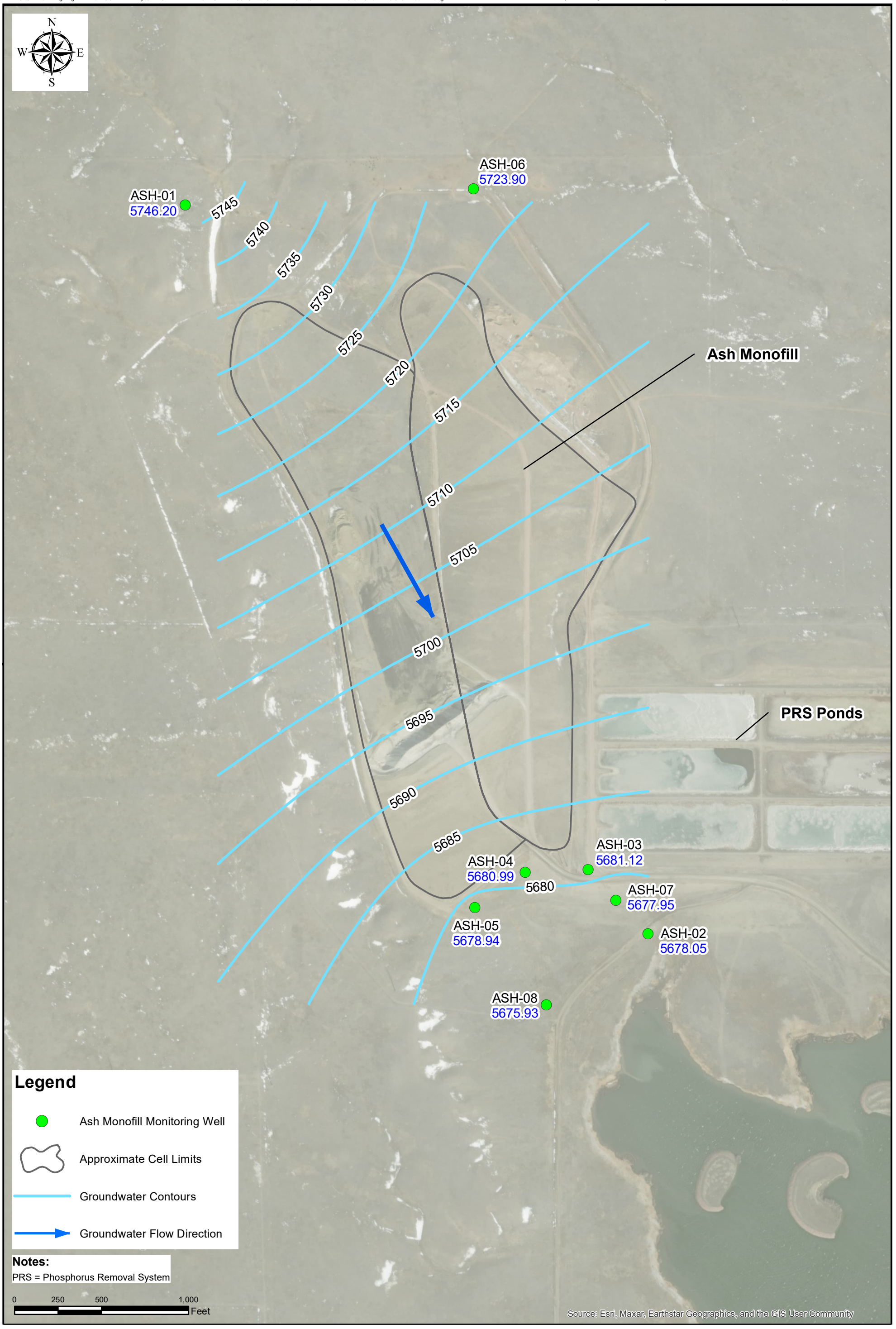
CCR 2023 Annual Groundwater Report
Platte River Power Authority Wellington, CO
Project No.: 60709371 Date: 2024-01-24

Rawhide Energy Station
ASH Monitoring Well Networks

AECOM

Figure 1

Last saved: 12/15/2023
Path: C:\Users\lilianageorgeta.croi\AECOM Directory\GDS GIS Services - GIS CAD PROJECTS\DCS AMERICAS\CENTRAL REGION US\PRPA\20231215\Work\Figure 2 ASH.mxd
Project Management Initials: Design RLH Drawn AGS Checked JH Approved VK ANSI B 11" x 17"



CCR 2023 Annual Groundwater Report
Platte River Power Authority Wellington, CO
Project No.: 60709371 Date: 2023-12-15

Rawhide Energy Station
ASH Monitoring Well Networks
April 2023 Water Levels

AECOM

Figure 2

Last saved: 12/15/2023
Path: C:\Users\lilianageorgeta.croi\AECOM Directory\GDS GIS Services - GIS CAD PROJECTS\DCS AMERICAS\CENTRAL REGION US\PRPA\20231215\Work\Figure 3 ASH.mxd
Project Management Initials: Design RLH Drawn AGS Checked JH Approved VK ANSI B 11" x 17"

N
W E
S

ASH-01
5746.81

ASH-06
5723.81

5745
5740
5735
5730
5725
5720
5715
5710
5705
5700
5695
5690
5685
5680
5675

Ash Monofill

PRS Ponds

ASH-04
5679.70

ASH-03
5679.25

ASH-07
5675.80

ASH-05
5678.18

ASH-02
5675.92

ASH-08
5674.70

Legend

- Ash Monofill Monitoring Well
- Approximate Cell Limits
- Groundwater Contours
- Groundwater Flow Direction

Notes:
PRS = Phosphorus Removal System

0 250 500 1,000
Feet

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

CCR 2023 Annual Groundwater Report
Platte River Power Authority Wellington, CO
Project No.: 60709371 Date: 2023-12-18

Rawhide Energy Station
ASH Monitoring Well Networks
October 2023 Water Levels

AECOM

Figure 3

Appendix A

Groundwater Sampling Forms

April 2023

AECOM

Well/Piezo ID: ASH-01

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: cloudy, cool ~40°F Collector(s) D. Woodward & K. Hopper

Date: 4/25/23
Time: Start 0910
Finish 1040

WATER LEVEL DATA: (measured from Top of Casing) Well ☒ Piezometer ☐

a. Total Well Length _____ c. Casing Material PVC e. Length of Water Column _____ (a-b)

b. Water Table Depth 13.80 d. Casing Diameter 4" f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~200 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump_____

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) __ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
	YSI ~~556~~	ProSeries	43979
	Turbidity	HACH 2100Q	18010C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time	Volume Removed (gal)	T° (C) ✓	pH ✓	Spec. Cond ✓ (µs/cm)	ORP ✓	DO ✓ mg/L	Turbidity ✓ (NTU)	Color	DTW ✓ (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
0910	0.1	10.4	7.40	3573	96.7	6.06	1.70	clear	14.08
0915	0.3	10.3	7.38	3586	104.4	5.13	0.88	clear	14.25
0920	0.6	10.2	7.37	3586	107.6	4.80	0.70	clear	14.33
0925	1.0	10.2	7.37	3585	111.1	4.53	0.71	clear	14.36
0928	1.2	10.1	7.37	3586	112.1	4.48	0.72	clear	14.36

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-01-CCR	See CoC	3	See CoC →		0930
ASH-01-CCR	1L plastic	2	HNO_3	Radium-226 & -228	0930
ASH-01-CDPHE	See CoC	6	See CoC →		0930

Comments _____

Signature _____ Date 4/25/23

AECOM

Well/Piezo ID: ASH-02

Ground Water Sample Collection Record

Client:	Platte River Power Authority	Date:	4/25/23
Project No:	CDPHE = 60630004, CCR = 60630103	Time: Start	1235
Site Location:	Rawhide Generating Station	Finish	1520
Weather Conds:	cloudy, cold, windy	Collector(s)	D. Woodward & K. Hoppes

WATER LEVEL DATA: (measured from Top of Casing) Well ☑ Piezometer ☐

a. Total Well Length _____ c. Casing Material PVC e. Length of Water Column _____ (a-b)

b. Water Table Depth _____ d. Casing Diameter 4" f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~100 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump_____

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) ___ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
YSI-556		ProSeries	43979
Turbidity	Hach	2100Q	18010 C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time	Volume Removed (gal)	T° (C) ✓	pH ✓	Spec. Cond ✓ (µs/cm)	ORP ✓	DO ✓ mg/L	Turbidity ✓ (NTU)	Color	DTW ✓ (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
1236	0.1	10.3	7.79	3942	120.6	7.88	6.94	clear	1.82
1241	0.2	9.9	7.75	3979	115.9	4.60	5.78	clear	1.96
1246	0.4	9.9	7.75	3981	112.2	4.15	5.68	clear	2.18
1251	0.5	10.2	7.75	3983	107.2	4.11	820	clear	2.39
1254	0.6	10.3	7.75	3975	94.9	4.12	7.04	clear	2.55
1257	0.7	10.2	7.73	3980	87.7	4.07	5.44	clear	2.71
1300	0.75	10.2	7.74	3987	77.4	3.95	4.71	clear	2.88
1303	0.8	10.2	7.75	3986	67.8	4.06	5.50	clear	3.03
1306	0.9	10.2	7.75	3988	64.0	4.00	5.29	clear	3.22
1309	1.0	10.2	7.75	3989	61.7	3.99	5.08	clear	3.38
1312	1.1	10.2	7.74	3988	61.1	3.92	3.96	clear	3.55
1315	1.25	10.2	7.74	3990	56.7	3.90	2.73	clear	3.76
1318	1.4	10.1	7.75	3986	50.6	3.83	2.55	clear	3.91
1321	1.5	9.9	7.73	3988	48.2	3.87	2.29	clear	4.01
1324	1.6	9.9	7.75	3987	46.6	3.92	2.17	clear	4.12

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

_____

_____

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-02-CCR	See CoC	3	See CoC	→	1327
ASH-02-CCR	1L plastic	2	nitric acid	Radium-226 & 228	↓
ASH-02-CDPHE	See CoC	6	See CoC	→	1327

P-01-CCR
JP-01-CCR
P-01-CDPHE

Comments _____

Signature _____ Date 4/25/23

AECOM

Well/Piezo ID: ASH-03

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: v. windy, partly cloudy (COOL)
Date: 4/27/23
Time: Start 1315
Finish 1450
Collector(s) D. Woodward & K. Hoppes

WATER LEVEL DATA: (measured from Top of Casing)

Well ☑ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth _____
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~150 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) __ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
YSI ~~556~~		ProSeries	18J103059
Turbidity		Hach 2100Q	18010C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page # _____

Time	Volume Removed (gal)	T° (C)	pH	Spec. Cond (µs/cm)	ORP	DO mg/L	Turbidity (NTU)	Color	DTW (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
1316	0.1	13.6	6.63	6347	125.5	1.54	4.36	clear	36.61
1319	0.2	13.1	6.81	6353	116.4	1.05	4.17	clear	36.84
1322	0.25	13.0	6.83	6350	113.6	0.97	3.78	clear	36.95
1325	0.45	12.8	6.82	6344	110.6	0.89	3.05	clear	37.13
1328	0.6	12.8	6.82	6349	108.9	0.80	3.12	clear	37.14
1331	0.8	12.8	6.83	6338	107.5	0.75	3.35	clear	37.20
1334	0.9	12.7	6.82	6339	106.6	0.72	2.80	clear	37.25
1337	1.0	12.8	6.83	6345	105.9	0.68	3.00	clear	37.31

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-03-CCR	See CoC	3	See CoC		1340
ASH-03-CCR	1 L plastic	2	HNO3	Radium-226 & 228	
ASH-03-CDPHE	See CoC	6	See CoC		1340

Comments _____

Signature _____ Date 4/27/23

AECOM

Well/Piezo ID: ASH-04

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: sunny, windy, cool
Collector(s): K. Hoppes & D. Woodward
Date: 4/27/23
Time: Start 0850
Finish 1050

WATER LEVEL DATA: (measured from Top of Casing)

Well ☒ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth _____
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~200 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) __ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
YSI ~~556~~		Pro Series	18J103059
Turbidity		Hach 2100Q	18010C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time	Volume Removed (gal)	T° (C)	pH	Spec. Cond (µs/cm)	ORP	DO mg/L	Turbidity (NTU)	Color	DTW (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
0852	0.0	11.6	7.27	6729	132.5	2.22	28.5	clear	10.84
0857	0.2	11.4	7.49	6759	124.8	7.10	51.9	clear	11.02
0902	0.4	11.3	7.60	6761	120.2	7.60	40.0	clear	10.98
0907	0.5	11.3	7.68	6771	119.1	8.30	42.1	clear	11.10
0912	0.75	11.3	7.78	6753	117.6	7.58	30.5	clear	11.03
0917	0.85	11.4	7.73	6733	116.8	7.57	30.1	clear	10.99
0922	1.0	11.3	7.78	6742	115.8	7.63	22.8	clear	11.04
0925	1.1	11.3	7.79	6744	115.4	7.57	23.2	clear	10.99
0928	1.2	11.4	7.80	6738	115.0	7.62	22.1	clear	11.03

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-04-CCR	See CoC	3	See CoC	Radium-226 & -228	0932
ASH-04-CCR	1 L plastic	2	HNO3		
ASH-04-CDPHE	See CoC	6	See CoC		0932

Comments: Do not trust DO numbers; decomm YSI DO probe again after sampling (before next use)

Signature _____ Date 4/27/23

AECOM

Well/Piezo ID: ASH-05

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Sunny, cool, slight breeze
Collector(s): D. Woodward & K. Hoppes
Date: 4/26/23
Time: Start 1210
Finish 1355

WATER LEVEL DATA: (measured from Top of Casing)

Well ☑ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth _____
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~100 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) __ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
YSI ~~556~~		ProSeries	18J103059
Turbidity		Hach 2100Q	18010C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page # _____

Time	Volume Removed (gal)	T° (C)	pH	Spec. Cond (µs/cm)	ORP	DO mg/L	Turbidity (NTU)	Color	DTW (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
1212	0.1	13.9	6.81	5970	127.9	2.62	86.3	clear	19.95
1217	0.2	13.4	6.82	5942	120.8	1.19	55.9	clear	19.96
1222	0.4	13.3	6.86	5909	115.4	1.05	38.3	clear	19.95
1227	0.5	13.2	6.87	5873	112.5	0.91	23.0	clear	19.93
1232	0.6	13.1	6.87	5857	110.3	0.84	18.4	clear	19.94
1237	0.8	13.2	6.88	5848	108.8	0.81	14.7	clear	19.93
1242	0.95	13.2	6.88	5840	107.7	0.80	11.5	clear	19.95
1245	1.05	13.2	6.89	5841	107.4	0.80	10.6	clear	19.95
1248	1.2	13.2	6.88	5835	106.9	0.72	10.9	clear	19.96

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-05-CCR	See CoC	3	See CoC	→	1250
ASH-05-CCR	1L plastic	2	HNO3	Radium-226 & -228	↓
ASH-05-CCR	See CoC	6	See CoC	→	↓

Comments _____

Signature _____ Date 4/26/23

AECOM

Well/Piezo ID: ASH-06

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Sunny, windy, ~60°F Collector(s) DW & KH

Date: 4/24/23
Time: Start 1313
Finish 1520

WATER LEVEL DATA: (measured from Top of Casing) Well ☑ Piezometer ☐

a. Total Well Length _____ c. Casing Material PVC e. Length of Water Column _____ (a-b)

b. Water Table Depth _____ d. Casing Diameter 2" f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~200 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) __ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
YSI ~~650~~		ProSeries	43979
Turbidity		Hach 2100Q	18010C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time	Volume Removed (gal)	T° (C) ✓	pH ✓	Spec. Cond (µs/cm) ✓	ORP ✓	DO mg/L ✓	Turbidity (NTU) ✓	Color	DTW (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
1313	0.1	17.0	7.91	796	34.7	2.97	10.5	clear	62.68
1318	0.3	13.5	7.91	756	46.0	3.34	12.5	clear	63.02
1323	0.6	13.2	7.75	741	50.6	4.30	11.9	clear	63.35
1328	0.9	13.2	7.97	724	53.8	5.08	10.0	clear	63.68
1333	1.2	13.2	8.01	715	55.0	5.96	6.76	clear	63.98
1338	1.4	13.6	8.04	712	56.7	5.91	5.08	clear	64.27
1343	1.5	13.8	8.03	711	59.0	6.06	5.03	clear	64.57
1346	1.6	14.0	8.05	709	60.0	6.13	3.47	clear	64.61
1349	1.65	14.0	8.04	709	60.5	6.11	3.55	clear	64.72

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-06-CCR	1L plastic	2	HNO_3	Radium-226, 228	1350
ASH-06-CCR	See CoC	3	See CoC	→	1350
ASH-06-CDPHE	See CoC	6	See CoC	→	1350

Comments _____

Signature _____ Date 4/24/23

AECOM

Well/Piezo ID: ASH-07

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: partly Sunny, v. windy, cool
Date: 4/27/23
Time: Start 1110
Finish 1235
Collector(s) D. Woodward & Kera Hoppes

WATER LEVEL DATA: (measured from Top of Casing)

Well ☑ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth _____
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~200 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) __ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
	YSI ~~556~~	ProSeries	18J103059
Turbidity	Hach	2100Q	18010C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time	Volume Removed (gal)	T° (C) ✓	pH ✓	Spec. Cond (µs/cm) ✓	ORP ✓	DO ✓ mg/L	Turbidity ✓ (NTU)	Color	DTW ✓ (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
1110	0.05	12.8	6.94	8109	144.8	1.89	86.2	clear	12.71
1115	0.5	11.9	7.03	8098	128.6	3.81	53.4	clear	12.78
1120	0.7	12.0	7.05	8089	121.5	5.05	28.0	clear	12.73
1125	1.0	12.2	7.10	8082	117.1	5.71	20.6	clear	12.73
1130	1.2	12.3	7.12	8089	115.0	6.39	12.2	clear	12.76
1135	1.7	12.3	7.11	8088	113.8	6.47	12.8	clear	12.73
1140	1.9	12.3	7.10	8091	113.4	6.24	13.1	clear	12.75

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.
DO still having problems it seems; recalibrated/deconned before next well (ASH-03)

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-07-CCR	See CoC	3	See CoC		1145
ASH-07-CCR	1L plastic	2	HNO_3		
ASH-07-CDPHE	See CoC	6	See CoC		1145

Comments _____

Signature _____ Date 4/27/23

AECOM

Well/Piezo ID: ASH-08

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: sunny, cool, slight breeze
Collector(s): D. Woodward & K. Hoppe
Date: 4/26/23
Time: Start 0910
Finish 1140

WATER LEVEL DATA: (measured from Top of Casing)

Well ☑ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth _____
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

Flow Rate (< 500 ml/min): ~150 mL/min

WELL PURGING DATA

a. Purge Method __bladder pump

b. Acceptance Criteria defined (from workplan)
- Minimum Required Purge Volume (@ _____ well volumes) __ Low flow

c. Field Testing Equipment Used:

	Make	Model	Serial Number
YSI ~~556~~		ProSeries	18J103059
Turbidity		Hach 2100Q	18010C064580

d. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time	Volume Removed (gal)	T° (C)	pH	Spec. Cond (µs/cm)	ORP	DO mg/L	Turbidity (NTU)	Color	DTW (ft)
Stabilization	--	+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV	+/- 10%	5 NTU, 10%		0.3 ft
0912	0.05	10.1	7.01	5288	120.5	7.02	9.87	clear	8.89
0917	0.4	10.5	6.79	5328	111.2	0.67	10.2	clear	10.27
0922	0.6	10.6	6.78	5316	104.6	0.59	9.49	clear	10.35
0927	0.65	10.1	6.78	5337	102.9	0.61	9.07	clear	10.28
0932	0.7	10.2	6.77	5316	101.2	0.56	8.32	clear	10.23
0937	0.75	9.7	6.77	5328	101.0	0.52	6.75	clear	10.24
0940	0.8	9.7	6.77	5319	101.0	0.51	7.12	clear	10.25
0943	0.85	9.8	6.77	5313	101.1	0.48	6.89	clear	10.26

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers per set	Preservation	Analysis	Time
ASH-08-CCR	See CoC	3	See CoC		0945
ASH-08-CCR	1L plastic	2	HNO_3	Radium-226 & -228	↓
ASH-08-CDPHE	See CoC	6	See CoC		

4 MS/MSD

Comments _____

Signature _____ Date 4/26/23

Event: PRPA Rawhide Sampling
MP: Top of Casing

Date: 4/24/2023
Recorder: D. Woodward, K. Hoppes

Location	Group	DTW	TD	Notes
PZ-3	Piezometer	32.53	—	
PZ-4	Piezometer	33.09	—	
PZ-5	Piezometer	35.69	—	
ASH-01	ASH	13.95	—	Buffalo Area - Need Escort
ASH-02	ASH	1.82	—	
ASH-03	ASH	36.16	—	
ASH-04	ASH	11.58		
ASH-05	ASH	19.77	—	
ASH-06	ASH	62.51	—	
ASH-07	ASH	12.61	—	
ASH-08	ASH	8.48	—	
BAT-01	BAT	13.98	—	
BAT-02	BAT	17.20	—	
BAT-03	BAT	13.20	—	Needs 2 bolts to secure well lid; filled w/ sed.
BAT-04R	BAT	15.87	—	
BAT-05	BAT	19.85	—	Needs bolts to secure vault lid; mouse nest present
BAT-06	BAT	14.69	—	
BAT-08	BAT	-	-	Abandoned
BAT-09	BAT	20.82	—	
BAT-10	BAT	12.60	—	
BAT-11	BAT	27.95	—	
BAT-12	BAT	30.67	—	
PRS-01	PRS	13.93	—	
PRS-02	PRS	12.46	—	
PRS-03	PRS	46.71	—	
PRS-04	PRS	29.26	—	
PRS-05	PRS	28.25	—	
PRS-06	PRS	18.74	—	
MW-3	Sitewide	25.18	—	
MW-4	Sitewide	19.51	—	
MW-5	Sitewide	22.00	—	Buffalo Area - Need Escort
MW-6	Sitewide	1.26	—	Cross Barbed Wire Fence and Access by Foot
MW-7	Sitewide	2.10	—	Cross Barbed Wire Fence and Access by Foot
MW-8	Sitewide	10.81	—	

4/25/23 (ASH-01)

4/25/23 (MW-5)

Acronyms:
DTW - Depth to Water
MP - Measuring Point
TD - Total Depth

October 2023

AECOM

Well/Piezo ID: ASH-01

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: overcast, warm, breezy Collector(s) Kara Hoppes & Olivia Helinski

Date: 10/11/23
Time: Start 1024
Finish 1120

WATER LEVEL DATA: (measured from Top of Casing)

Well ■ Piezometer ☐

a. Total Well Length ____
b. Water Table Depth 13.34'
c. Casing Material PVC
d. Casing Diameter 4"
e. Length of Water Column ____ (a-b)
f. Calculated Well Volume (see back) ____

WELL PURGING DATA

a. Purge Method bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	50146
HACH	2100Q Turbidimeter	24785

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # ____ Page # ____

Time Stabilization	Volume Removed (L) --	T° (C) +/-0.2 or 3%	pH +/- 0.1	Spec. Cond (µs/cm) +/- 3 %	ORP (mV) +/- 10	DO (mg/L) 0.5mg, +/- 10%	Turbidity (NTU) +/-5 or 10%	Color --	DTW 0.33 ft
1030	0.0	12.0	7.19	4014	157.9	4.20	5.93	clear	13.64
1037	2.0	11.5	7.18	4007	156.2	2.41	3.55	clear	13.90
1034	3.0	11.4	7.18	4004	155.1	1.39	2.96	clear	14.03
1037	4.8	11.5	7.17	4011	153.6	0.88	3.09	clear	14.08
1040	5.0	11.5	7.16	4005	151.9	0.69	4.03	clear	14.11
1043	6.2	11.7	7.15	4013	149.7	0.47	2.24	clear	14.14

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☑
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-01-CCRME	See CoC	7	See CoC	↓	1045
ASH-01-CCR	↓	5	↓		↓

Comments ____

Signature [signature] Date 10/11/23

AECOM

Well/Piezo ID: ASH-02

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: Cool, Cloudy, 40/50's
Collector(s): Kara Hoppes & Olivia Helinski
Date: 10/12/23
Time: Start 0805
Finish 0945

WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length —
b. Water Table Depth 3.45'
c. Casing Material PVC
d. Casing Diameter 4"
Well ■ Piezometer ☐
e. Length of Water Column — (a-b)
f. Calculated Well Volume (see back) —

WELL PURGING DATA

a. Purge Method bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	50146
HACH	2100Q Turbidimeter	147853

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # ____ Page # ____

Time	Volume Removed (L)	T° (C)	pH	Spec. Cond (µs/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Color	DTW
Stabilization	--	+/-0.2 or 3%	+/- 0.1	+/- 3 %	+/- 10	0.5mg, +/- 10%	+/-5 or 10%	--	0.33 ft
0814	0.0	12.6	7.91	3687	208.0	4.80	20.4	clear	3.84
0817	1.9	12.0	7.68	3606	207.3	2.24	9.63	clear	4.25
0820	3.7	11.9	7.68	3558	201.8	1.04	10.6	clear	4.57
0823	4.1	11.9	7.67	3579	194.7	0.36	11.7	"	5.04
0826	5.0	11.9	7.68	3593	191.6	0.28	9.13	"	5.29
0829	5.9	12.0	7.67	3581	186.8	0.19	9.57	"	5.63
0832	6.3	12.0	7.67	3585	182.5	0.16	6.64	"	5.95
0835	7.0	12.0	7.67	3580	178.6	0.14	6.54	"	6.07
0839	7.5	12.1	7.66	3581	175.1	0.13	7.95	"	6.33
0841	8.0	12.2	7.68	3578	172.1	0.12	7.47	"	6.54
0844	8.43	12.5	7.69	3579	169.3	0.12	7.79	"	6.75
			7.65	3557	167.1	0.12	6.89	"	6.86

↓ flow

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☑
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-02-COMP	See COC	7	ICE COC		0845
ASH-02-CCR	See COC	5	See COC		0845

Comments

Signature [signature] Date 10/12/23

AECOM

Well/Piezo ID: ASH-03

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: cloudy, warm, breezy Collector(s) Olivia Helinski & Kara Hoppes
Date: 10/10/23
Time: Start 1350
Finish 1510

WATER LEVEL DATA: (measured from Top of Casing)

Well ☑ Piezometer ☐

a. Total Well Length ~
b. Water Table Depth 37.93'
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column ~ (a-b)
f. Calculated Well Volume (see back) ~

WELL PURGING DATA

a. Purge Method bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	50146
HACH	2100Q Turbidimeter	24785

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page # _____

Time	Volume Removed (L)	T° (C)	pH	Spec. Cond (µs/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Color	DTW
Stabilization	--	+/-0.2 or 3%	+/- 0.1	+/- 3 %	+/- 10	0.5mg, +/- 10%	+/-5 or 10%	--	0.33 ft
1354	0.0	15.5	7.20	5444	116.8	7.79	13.5	clear	38.18
1357	1.0	12.5	7.23	5261	115.1	0.83	8.91	" "	39.06
1400	2.0	12.3	7.26	5229	113.5	0.60	8.66	" "	39.46
1403	3.0	12.2	7.26	5223	112.0	0.50	6.94	" "	39.64
1406	4.5	12.2	7.26	5208	109.7	0.42	6.34	" "	39.79

↓ flow

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☑
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-03-CDPHE	See CoC	7	See CoC		1410
ASH-03-CCR	See CoC	5	See CoC		1410
DUP-ASH-CDPHE		7			1410
DUP-ASH-CCR		5			1410

JP-01-CDPHE
UP-01-CCR

Comments DUP collected here

Signature _____ Date 10/10/23

AECOM

Well/Piezo ID: ASH-04

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: light rain, windy, dark
Collector(s): Kara Hoppes & Olivia Helinski
Date: 10/11
Time: Start 1400
Finish 1445

WATER LEVEL DATA: (measured from Top of Casing)

Well ■ Piezometer ☐

a. Total Well Length ~
b. Water Table Depth 12.87'
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column ~ (a-b)
f. Calculated Well Volume (see back) ~

WELL PURGING DATA

a. Purge Method bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	501476
HACH	2100Q Turbidimeter	24795

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # ____ Page # ____

Time	Volume Removed (L)	T° (C)	pH	Spec. Cond (µs/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Color	DTW
Stabilization	--	+/-0.2 or 3%	+/- 0.1	+/- 3 %	+/- 10	0.5mg, +/- 10%	+/-5 or 10%	--	0.33 ft
1407	0.0	13.3	7.35	6256	147.7	5.32	75.4	clearish	12.96
1412	1.9	12.3	7.40	6298	145.7	3.49	24.5	clear	13.49
1415	2.9	12.1	7.48	6263	144.2	2.38	9.55	clear	13.74
1418	4.6	12.2	7.37	6206	143.0	1.55	13.40	" "	13.92
1421	5.1	12.2	7.36	6201	143.6	0.98	8.11	" "	14.03
1424	6.6	12.1	7.38	6206	142.3	0.69	7.47	" "	14.09
1427	7.9	12.2	7.39	6228	141.2	0.48	4.76	" "	14.20

↓ flow

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☑
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-04-COMP	See CoC	7	See CoC		1430
ASH-04-CCR	See CoC	5	See CoC		1430

Comments

Signature [signature] Date 10/11/23

AECOM

Well/Piezo ID: ASH-05

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: Overcast, windy, dark Collector(s) Kara Hoppes & Olivia Helinski
Date: 10/11/25
Time: Start 1300
Finish 1350

WATER LEVEL DATA: (measured from Top of Casing)

Well ■ Piezometer ☐

a. Total Well Length ____
b. Water Table Depth 20.53'
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column ____ (a-b)
f. Calculated Well Volume (see back) ____

WELL PURGING DATA

a. Purge Method bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	50146
HACH	2100Q Turbidimeter	24785

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # ____ Page # ____

Time	Volume Removed (L)	T° (C)	pH	Spec. Cond (µs/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Color	DTW
Stabilization	--	+/-0.2 or 3%	+/- 0.1	+/- 3 %	+/- 10	0.5mg, +/- 10%	+/-5 or 10%	--	0.33 ft
1307	0.0	14.4	7.08	5337	154.1	4.45	56.6	clear	20.67
1310	1.4	13.4	7.11	5357	149.6	3.32	64.5	"	20.81
1313	8.4	13.4	7.11	5355	147.9	2.09	55.1	"	20.93
1316	4.0	13.3	7.12	5340	146.4	1.11	48.9	"	20.83
1319	5.5	13.2	7.12	5322	144.8	0.56	35.0	"	20.91
1322	6.9	13.2	7.12	5312	1435	0.36	33.7	"	20.86
1325	8.0	13.1	7.12	5304	142.4	0.28	21.6	"	20.92
1328	9.1	13.1	7.12	5298	141.4	0.29	16.9	"	20.94
1331	10.4	13.1	7.12	5291	140.3	0.37	17.4	"	20.86

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☑
Has required turbidity been reached	☐	☐	☐
Have parameters stabilized	☐	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-05-COMME	See CoC	7	See CoC		1335
ASH-05-CCR	1	5	1		

Comments ____

Signature [signature] Date 10/11/25

AECOM

Well/Piezo ID: ASH-06

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: warm, sunny, breezy
Collector(s): Kara Hoppes & Olivia Helinski
Date: 10/11/23
Time: Start 1128
Finish 1250

WATER LEVEL DATA: (measured from Top of Casing)

Well ■ Piezometer ☐

a. Total Well Length: NM
b. Water Table Depth: 62.60'
c. Casing Material: PVC
d. Casing Diameter: 2"
e. Length of Water Column: ——— (a-b)
f. Calculated Well Volume (see back): ———

WELL PURGING DATA

a. Purge Method: low flow bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	50146
HACH	2100Q Turbidimeter	24785

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time	Volume Removed (L)	T° (C)	pH	Spec. Cond (µs/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Color	DTW
Stabilization	--	+/-0.2 or 3%	+/- 0.1	+/- 3 %	+/- 10	0.5mg, +/- 10%	+/-5 or 10%	--	0.33 ft
1128	0.0	17.5	7.98	870	132.3	4.06	13.4	clear	62.69
1131	0.6	15.8	7.97	809	129.7	2.85	7.65	clear	62.86
1134	1.1	15.6	8.00	782	128.0	3.62	6.23	clear	62.99
1137	1.8	14.5	8.03	757	128.2	4.08	6.19	clear	63.16
1140	2.1	14.5	8.02	746	127.0	4.36	5.98	clear	63.31
1143	2.6	14.2	8.07	739	125.7	4.61	5.47	clear	63.51
1146	3.2	14.1	8.08	730	124.8	4.76	4.77	clear	63.61

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☑
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-06-CDPHE	See CoC	7	See CoC	↓	1150
ASH-06-CCR	↓	5	↓		1150

Comments: ERB-01-CDPHE & -CCR collected here @ 1200.

Signature: _____ Date: 10/11/23

AECOM

Well/Piezo ID: ASH-07

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: cloudy, cool ~50°, windy
Collector(s): Kara Hoppes & Olivia Helinski
Date: 10/12/23
Time: Start 1006
Finish

WATER LEVEL DATA: (measured from Top of Casing)

Well ■ Piezometer ☐

a. Total Well Length —
b. Water Table Depth 14.76'
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column — (a-b)
f. Calculated Well Volume (see back) —

WELL PURGING DATA

a. Purge Method bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	20146
HACH	2100Q Turbidimeter	24785

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page #_____

Time Stabilization	Volume Removed (L) --	T° (C) +/-0.2 or 3%	pH +/- 0.1	Spec. Cond (µs/cm) +/- 3 %	ORP (mV) +/- 10	DO (mg/L) 0.5mg, +/- 10%	Turbidity (NTU) +/-5 or 10%	Color --	DTW 0.33 ft	
1008	0.5	—	—	—	—	—	28.3	clear	14.93	
1011	2.0	12.1	7.29	6061	196.3	0.27	22.8	clear	15.05	
1014	3.6	12.2	7.29	6060	192.0	0.31	15.0	clear	15.11	
1017	3.9	12.2	7.29	6058	190.4	0.31	9.13	Clear	15.14	← turned throttle down
1020	4.9	12.3	7.30	6068	187.2	0.31	5.35	Clear	15.14	
1023	5.8	12.3	7.30	6078	185.0	0.29	4.09	Clear	15.10	

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☐	☐	☒
Has required turbidity been reached	☒	☐	☐
Have parameters stabilized	☒	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-07-CDTHG	See CoC	7	See CoC		1025
ASH-07-CCR	↓	5	↓	↓	1025

Comments: YSI not turning on for 1st reading; fixed for second

Signature [signature] Date 10/12/23

AECOM

Well/Piezo ID: ASH-08 ~~CCR~~

Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: 60709371 / 60709418
Site Location: Rawhide Generating Station
Weather Conds: Sunny, breezy, 70's
Collector(s): Olivia Helinski & Kara Hopps
Date: 10/10/23
Time: Start 1015
Finish 1142

WATER LEVEL DATA: (measured from Top of Casing)

Well ☑ Piezometer ☐

a. Total Well Length —
b. Water Table Depth 9.71'
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column — (a-b)
f. Calculated Well Volume (see back) —

WELL PURGING DATA

a. Purge Method bladder pump

b. Field Testing Equipment Used:

Make	Model	Serial Number
YSI	ProSeries	50146
HACH	2100Q Turbidimeter	24785

c. Field Testing Equipment Calibration Documentation Found in Field Notebook # _____ Page # _____

Time	Volume Removed (L)	T° (C)	pH	Spec. Cond (µs/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Color	DTW	
Stabilization	--	+/-0.2 or 3%	+/- 0.1	+/- 3 %	+/- 10	0.5mg, +/- 10%	+/-5 or 10%	--	0.33 ft	
1020	0.0	13.2	7.15	4360	113.3	1.21	15.4	clear	9.42	
1023	1.8	12.5	7.14	4313	91.5	0.63	10.3	" "	10.94	
1026	2.7	12.4	7.14	4296	68.8	0.48	16.1	" "	12.33	
1029	3.8	12.3	7.15	4270	61.2	0.40	13.8	" "	13.29	
1032	4.9	12.5	7.15	4240	57.2	0.35	5.66	" "	14.09	
1035	5.9	12.6	7.15	4227	54.8	0.32	4.38	" "	15.18	← ↓ flow rate
1038	7.0	12.7	7.15	4191	51.8	0.30	7.70	" "	15.49	
1041	7.6	12.8	7.14	4194	49.2	0.30	3.11	" "	15.64	↓
1044	8.3	13.3	7.14	4202	46.6	0.29	6.70	" "	15.83	
1047	8.9	13.5	7.18	4200	44.8	0.26	6.17	" "	15.98	
1050	9.5	13.3	7.14	4198	44.1	0.26	3.55	" "	15.98	

e. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☑	☐	☐
Has required turbidity been reached	☐	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

SAMPLE COLLECTION: Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-08-CCR	SEE COC	MM #5	SEE COC		1055
ASH-08-COPHE	SEE COC	7	SEE COC		

Comments

Signature _____ Date 10/10/23

Event: PRPA October Sampling
MP: Top of Casing

Date: 10/9/23
Recorder: Olivia Helinski

	Location	Group	DTW	TD	Notes
0826	*PZ-3	Piezometer	32.94'	—	
	*PZ-4	Piezometer	23.21'	—	
0817	*PZ-5	Piezometer	36.96'	—	
10/11 1019	ASH-01	ASH	13.34' → 9.54'	—	Buffalo Area - Need Escort
0945	ASH-02	ASH	3.95'	—	
0917	ASH-03	ASH	37.93'	—	
0926	ASH-04	ASH	12.87'	—	
0930	ASH-05	ASH	20.53'	—	
0833	ASH-06	ASH	62.60'	—	
0921	ASH-07	ASH	14.76'	—	
	ASH-08	ASH	9.71'	—	
	ASH-09	ASH	4.55'	—	no tubing; heavy producer; watch for mud
1020	BAT-01	BAT	9.54'	—	
1025	BAT-02	BAT	15.43	—	
1032	BAT-03	BAT	11.40	—	Consider new tubing
1037	BAT-04R	BAT	15.40	—	
1042	BAT-05	BAT	19.60	—	
	BAT-06	BAT	16.81	—	
1017	BAT-09	BAT	16.48'	—	
	BAT-10	BAT	12.19'	—	
0900	BAT-11	BAT	26.77'	—	
1012	BAT-12	BAT	30.98'	—	
1045	BAT-13	BAT	37.04'	—	
0909	PRS-01	PRS	20.87'	—	
0842	PRS-02	PRS	17.45'	—	
0847	PRS-03	PRS	47.00'	—	
0854	PRS-04	PRS	27.25'	—	
	PRS-05	PRS	28.32'	—	
1000	PRS-06	PRS	20.11'	—	
0950 ish	PRS-07	PRS	23.95'	—	
	MW-3	Sitewide	24.65	—	
1112	MW-4	Sitewide	19.50	—	
10/11 0851	MW-5	Sitewide	22.02	—	Buffalo Area - Need Escort; no lock
	MW-6	Sitewide	1.65	—	Cross Barbed Wire Fence and Access by Foot
10/10 0815	MW-7	Sitewide	3.40	—	Cross Barbed Wire Fence and Access by Foot
	MW-8	Sitewide	11.04	—	
1138	FTP-1	FTP	28.88	—	

Acronyms:
DTW - Depth to Water
MP - Measuring Point
TD - Total Depth
** Fluid levels only, no sample*

Appendix B

Laboratory Analytical and Data Validation Reports

April 2023

Platte River Power Authority - Rawhide
Coal Combustion Residuals (CCR)
Ash Monofills (ASH)
Data Validation Review

Sample Delivery Group: 60427179, 60427315, 60427323, 60427378, 60427409, 60427514
Sampling Date: April 24-27, 2023
Data Reviewer: Lillia Shub **Date Completed:** July 19, 2023
Peer Reviewer: Brian Rothmeyer **Date Completed:** July 25, 2023

The table below summarizes the data packages and sample identifications discussed in this data validation review.

Field Identification	Sample Type	Laboratory Identification	Matrix	Analyses		
				Total Metals	General Chemistry	Total Radium*
Data Package 60427179						
ASH-06-CCR	N	60427179001	Water	X	X	--
ERB-02-CCR	EB	60427179002	Water	X	X	--
Data Package 60427315						
ASH-01-CCR	N	60427315001	Water	X	X	--
ASH-02-CCR	N	60427315002	Water	X	X	--
DUP-01-CCR	FD	60427315003	Water	X	X	--
Data Package 60427323						
ASH-08-CCR	N	60427323001	Water	X^{m}	X^{m1}	--
ASH-05-CCR	N	60427323002	Water	X	X	--
Data Package 60427378						
ASH-01-CCR	N	60427378001	Water	--	--	X
ASH-02-CCR	N	60427378002	Water	--	--	X
DUP-01-CCR	FD	60427378003	Water	--	--	X
ERB-02-CCR	EB	60427378004	Water	--	--	X
ASH-06-CCR	N	60427378005	Water	--	--	X
Data Package 60427409						
ASH-08-CCR	N	60427409001	Water	--	--	X^{m}
ASH-05-CCR	N	60427409004	Water	--	--	X
ASH-04-CCR	N	60427409005	Water	--	--	X
ASH-07-CCR	N	60427409006	Water	--	--	X
ASH-03-CCR	N	60427409007	Water	--	--	X
Data Package 60427514						
ASH-04-CCR_042723	N	60427514001	Water	X	X	--
ASH-07-CCR_042723	N	60427514002	Water	X	X	--
ASH-03-CCR_042723	N	60427514003	Water	X	X	--

Sample Type: -- – Not analyzed for this parameter
EB – Equipment Blank
FD – Field Duplicate
N – Normal Sample
X^{m} – Matrix Spike/Matrix Spike Duplicate
X^{m1} – Matrix/Matrix Spike Duplicate – Select Methods

Analyses: General Chemistry – Anions: chloride, fluoride, sulfate (Method 9056), and total dissolved solids (TDS) (SM 2540C).
Total Metals – Boron, calcium, lithium (6010), antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, molybdenum, selenium, thallium (6020), mercury (7470A)
Total Radium* – Includes radium-226 (Method 903.1), radium-228 (Method 904.0), and total radium combined (TRC)

This report contains the final results of the data validation conducted for water samples collected April 2023 for the Platte River Power Authority – Rawhide CCR sampling event. The sample results were presented in ten data packages. The data validation review was conducted in accordance with *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA November 2020), and evaluation of laboratory criteria, as applicable.

General Overall Assessment:

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below, summarized in Attachment A).
_____ Some or all data are unusable for any purpose (noted below, summarized in Attachment A).

Case Narrative Comments:

Any case narrative comments concerning data qualification were addressed as noted in the table below.

Review Parameter	Criteria Met?	Comments
Chain of Custody & Sample Receipt	Yes	With the exceptions noted below, the samples were received by Pace Analytical Services, LLC in Lenexa, Kansas and Greensburg, Pennsylvania in good condition and were consistent with the accompanying chain of custody (COC). The cooler temperatures upon receipt were within the recommended ≤6 degrees Celsius (°C) temperature range. **Data Package 60427315** The sample collection time for sample DUP-01-CCR was not documented on the COC. The sample is a blind field duplicate, and the parent sample and collection time are documented on the applicable field forms. As no collection time was documented on the COC, and as the collection time is required for sample login, it is standard laboratory practice to log the sample with a collection time of midnight (00:00). No further action was required, and qualification was not considered necessary. **Data Package 60427378** During review of the data package, it was noted that the cooler temperature upon receipt was not provided. However, due to the stability of the radiological parameters, data qualification on the basis of temperature exceedance is not considered necessary, and no further action is required. The sample collection time for sample DUP-01-CCR was notdocumented on the COC. . The sample is a blind field duplicate, and the parent sample and collection time are documented on the applicable field forms. As no collection time was documented on the COC, and as the collection time is required for sample login, it is standard laboratory practice to log the sample with a collection time of midnight (00:00). No further action was required, and qualification was not considered necessary. **Data Package 60427409** During review of the data package, it was noted that the cooler temperature upon receipt was not provided. However, due to the stability of the radiological parameters, data qualification on the

Review Parameter	Criteria Met?	Comments
		basis of temperature exceedance is not considered necessary, and no further action is required.
Holding Times	Yes	The analyses were conducted within the method required holding time.
Laboratory Blanks • Method Blank (MB)	No	With the exception listed in Table 1, the target analytes were not detected within the method blanks or the associated radium concentrations were reported at concentrations less than the minimum detectable concentration (MDC).
Matrix Quality Control • Matrix Spike/ Matrix Spike Duplicate **Data Packages 60427323** ASH-08-CCR (Total metals, anions) **Data Package 60427409** ASH-08-CCR (Radium 226, Radium 228) • Laboratory Duplicate **Data Package 60427323** ASH-08-CCR (TDS, anions)	No	**Matrix Spike/ Matrix Spike Duplicate (MS/MSD)** With the exceptions listed in Table 2, the MS/MSD recoveries and relative percent differences (RPDs) met quality control criteria. Results in the native sample greater than four times the concentration of the spike added during digestions/extractions are not considered to be a representative measure of accuracy. Further action with respect to spike recovery evaluation or qualification of data was not considered necessary. **Laboratory Duplicate** The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates: • When both the sample and duplicate values are >5x the reporting limit (RL), acceptable sampling and analytical precision is indicated by an relative percent difference (RPD) between the results of ≤20%. • Where the result for one or both analytes of the method duplicate pair is <5xRL, satisfactory precision is indicated if the absolute difference between the method duplicate results is <1xRL.
Laboratory Performance • Laboratory Control Sample	Yes	There was one laboratory control sample (LCS) and/or laboratory control sample duplicate (LCSD) per method per analytical method, prepared and analyzed, except for radium 226, radium 228, and total radium. The available LCS recoveries and LCS/LCSD RPDs were within the laboratory acceptance limits. These results are indicative of an acceptable level of accuracy and precision with respect to the analytical method.
Field Quality Control • Field Blank None • Equipment Blank **Data Packages 60427179/ 60427378** ERB-02-CCR • Field Duplicate **Data Packages 60427315/ 60427378** ASH-02-CCR/ DUP-01-CCR	No	**Field Blank** A field blank was not submitted with the samples associated with this sampling event. **Equipment Blank** The target analytes were not detected within the equipment blank or the associated radium concentrations were reported at concentrations less than the MDC. **Field Duplicate** The field duplicate sample results satisfied the evaluation criteria below:

Review Parameter	Criteria Met?	Comments
		• When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%. • Where the result for one or both analytes of the field duplicate pair is <5xRL, satisfactory precision is indicated if the absolute difference between the field duplicate results is <2xRL. • For radiological parameters, the agreement between parent sample results and field duplicate sample results were evaluated. The duplicate error ratio (DER) met the criterion of a DER ≤2.
Tracer and/or Carrier Recovery	Yes	The sample specific recoveries were within the laboratory limits (30-110%).
Reporting Limits	No	For non-radiological parameters, several analytes were reported as non-detect at elevated reporting limits. These non-detect results will need to be evaluated by the end user of the data with respect to project objectives. With the exceptions listed in Table 3, for radiological parameters, if the associated uncertainty was greater than the reported result, the 2 sigma (σ) uncertainty multiplied by 1.65 was less than or equal to the specified detection limit.
Package Completeness	Yes	The results are usable as qualified for the project objective. The data are considered 100% complete.

ºC – Degrees Celsius
% – Percent
≥ – Greater Than or Equal To
≤ – Less Than or Equal To
> – Greater Than
< – Less Than
± – Plus or Minus
σ – Sigma
COC – Chain of Custody
DER – Duplicate Error Ratio
ID – Identification
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MDC – Minimum Detectable Concentration
MDL – Method Detection Limit
MS – Matrix Spike
MSD – Matrix Spike Duplicate
RL – Reporting Limit
RPDs – Relative Percent Differences
VOCs – Volatile Organic Compounds

Table 1: Laboratory Blank Outliers and Resultant Data Qualification

Laboratory Blank/ Associated Samples	Analyte	Concentration	Qualification
Data Package 60427378			

Table 1: Laboratory Blank Outliers and Resultant Data Qualification

Laboratory Blank/ Associated Samples	Analyte	Concentration	Qualification
MB 2843569 ASH-01-CCR ASH-02-CCR DUP-01-CCR ERB-02-CCR ASH-06-CCR	Radium 226	0.508 ± 0.332 pCi/L	None. The associated sample results were reported at concentrations less than the MDC; therefore, qualification was not considered necessary.
	Radium 228	0.424 ± 0.314 pCi/L	The associated result for sample ASH-01-CCR was reported at a concentration greater than the MDC and <10x the concentration of the blank contamination and was qualified as estiamted (J+ bl) to reflect the high bias indicated by the blank contamination.

± – Plus or Minus
< – Less than
bl – Laboratory Blank Contamination
J+ – Estimated, High Bias
MB – Method Blank
MDC – Minimum Detectable Concentration
pCi/L – Picocuries per Liter
x – Times

Table 2: MS/MSD Recovery and RPD Outliers and Resultant Data Qualification

Associated Samples	Analyte	%R (Limits)	RPD (Limit)	Qualification
Data Package 60427323				
ASH-08-CCR	Fluoride	**70/73** (80-120)	3 (15)	As the potential bias was considered to be low, the associated sample result was qualified as estimated (UJ m).

Bold – indicates a value that is outside of acceptance limits
%R – Percent Recoveries
ld – Laboratory Duplicate Imprecision
RPD – Relative Percent Difference
UJ – Estimated, Non-Detect

Table 3: Uncertainty Outliers and Resultant Data Qualification

Associated Samples	Analyte	Result (pCi/L)	2 Sigma (σ) Uncertainty	MDC (pCi/L)	Qualification
Data Package 60427378					
ASH-02-CCR	Radium 226	0.133	± 0.304	0.489	As the 2σ uncertainty multiplied by 1.65 was greater than the reported minimum detectable concentration (MDC), the associated results were qualified as estimated (J v).
DUP-01-CCR		0.296	± 0.387	0.638	
Data Package 60427409					
ASH-08-CCR	Radium 226	0.398	± 0.435	0.701	As the 2σ uncertainty multiplied by 1.65 was greater than the reported MDC, the associated result was qualified as estimated (J v).
ASH-05-CCR		0.368	± 0.452	0.737	

MDC – Minimum Detectable Concentration
pCi/L – Picocuries per Liter
v – Compound Identification Issue

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

June 22, 2023

Vasanta Kalluri
AECOM
6200 South Quebec Street
Greenwood Village, CO 80111

RE: Project: 60709371 PRPA CCR
Pace Project No.: 60427179

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on April 26, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Kansas City

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Heather M. Wilson

Heather Wilson
heather.wilson@pacelabs.com
1(913)563-1407
Project Manager

Enclosures

cc: Ann Cinabro, AECOM
Jeremy Hurshman, AECOM
Brian Rothmeyer, AECOM

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

Pace Analytical Services Kansas
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 88-00679
Illinois Certification #: 2000302023-5
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212023-1
Oklahoma Certification #: 2022-057
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-22-16
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60427179001	**ASH-06-CCR**	Water	04/24/23 13:50	04/26/23 08:45
60427179002	**ERB-02-CCR**	Water	04/24/23 16:20	04/26/23 08:45

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60427179001	**ASH-06-CCR**	EPA 6010	MA1	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	ALH	1	PASI-K
		SM 2540C	CRN2	1	PASI-K
		EPA 9056	CRN2	3	PASI-K
60427179002	**ERB-02-CCR**	EPA 6010	MA1	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	ALH	1	PASI-K
		SM 2540C	CRN2	1	PASI-K
		EPA 9056	CRN2	3	PASI-K

PASI-K = Pace Analytical Services - Kansas City

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

Sample: ASH-06-CCR **Lab ID: 60427179001** Collected: 04/24/23 13:50 Received: 04/26/23 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	**304**	ug/L	100	1	05/02/23 13:59	05/09/23 11:55	7440-42-8	
Calcium	**25500**	ug/L	200	1	05/02/23 13:59	05/09/23 11:55	7440-70-2	
Lithium	**56.1**	ug/L	10.0	1	05/02/23 13:59	05/09/23 11:55	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7440-36-0	
Arsenic	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7440-38-2	
Barium	**36.0**	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7440-39-3	
Beryllium	ND	ug/L	0.50	1	05/02/23 13:59	05/11/23 17:21	7440-41-7	
Cadmium	ND	ug/L	0.50	1	05/02/23 13:59	05/11/23 17:21	7440-43-9	
Chromium	**2.4**	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7440-47-3	
Cobalt	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7440-48-4	
Lead	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7439-92-1	
Molybdenum	**13.3**	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7439-98-7	
Selenium	**25.7**	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7782-49-2	
Thallium	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:21	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	05/15/23 15:31	05/16/23 11:48	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**427**	mg/L	10.0	1		04/28/23 12:43		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	**8.0**	mg/L	1.0	1		05/02/23 18:45	16887-00-6	
Fluoride	**0.47**	mg/L	0.20	1		05/02/23 18:45	16984-48-8	
Sulfate	**77.6**	mg/L	10.0	10		05/02/23 18:58	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

Sample: ERB-02-CCR **Lab ID: 60427179002** Collected: 04/24/23 16:20 Received: 04/26/23 08:45 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	ND	ug/L	100	1	05/02/23 13:59	05/09/23 11:57	7440-42-8	
Calcium	ND	ug/L	200	1	05/02/23 13:59	05/09/23 11:57	7440-70-2	
Lithium	ND	ug/L	10.0	1	05/02/23 13:59	05/09/23 11:57	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7440-36-0	
Arsenic	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7440-38-2	
Barium	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7440-39-3	
Beryllium	ND	ug/L	0.50	1	05/02/23 13:59	05/11/23 17:31	7440-41-7	
Cadmium	ND	ug/L	0.50	1	05/02/23 13:59	05/11/23 17:31	7440-43-9	
Chromium	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7440-47-3	
Cobalt	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7440-48-4	
Lead	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7439-92-1	
Molybdenum	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7439-98-7	
Selenium	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7782-49-2	
Thallium	ND	ug/L	1.0	1	05/02/23 13:59	05/11/23 17:31	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	05/15/23 15:31	05/16/23 11:50	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	ND	mg/L	5.0	1		04/28/23 12:44		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	ND	mg/L	1.0	1		05/02/23 19:11	16887-00-6	
Fluoride	ND	mg/L	0.20	1		05/02/23 19:11	16984-48-8	
Sulfate	ND	mg/L	1.0	1		05/02/23 19:11	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

QC Batch: 847174
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60427179001, 60427179002

METHOD BLANK: 3356742 Matrix: Water
Associated Lab Samples: 60427179001, 60427179002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	05/16/23 11:34	

LABORATORY CONTROL SAMPLE: 3356743

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.8	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3356744 3356745

Parameter	Units	60427323001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	4.5	4.5	90	89	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

QC Batch: 844753
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60427179001, 60427179002

METHOD BLANK: 3347662 Matrix: Water
Associated Lab Samples: 60427179001, 60427179002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	ND	100	05/09/23 11:46	
Calcium	ug/L	ND	200	05/09/23 11:46	
Lithium	ug/L	ND	10.0	05/09/23 11:46	

LABORATORY CONTROL SAMPLE: 3347663

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	964	96	80-120	
Calcium	ug/L	10000	10400	104	80-120	
Lithium	ug/L	1000	1000	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3347664 3347665

Parameter	Units	60427323001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	838	1000	1000	1760	1780	92	94	75-125	1	20	
Calcium	ug/L	419000	10000	10000	434000	442000	156	234	75-125	2	20	M1
Lithium	ug/L	288	1000	1000	1280	1310	100	103	75-125	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

QC Batch: 844754
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60427179001, 60427179002

METHOD BLANK: 3347666 Matrix: Water
Associated Lab Samples: 60427179001, 60427179002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	ND	1.0	05/11/23 17:03	
Arsenic	ug/L	ND	1.0	05/11/23 17:03	
Barium	ug/L	ND	1.0	05/11/23 17:03	
Beryllium	ug/L	ND	0.50	05/11/23 17:03	
Cadmium	ug/L	ND	0.50	05/11/23 17:03	
Chromium	ug/L	ND	1.0	05/11/23 17:03	
Cobalt	ug/L	ND	1.0	05/11/23 17:03	
Lead	ug/L	ND	1.0	05/11/23 17:03	
Molybdenum	ug/L	ND	1.0	05/11/23 17:03	
Selenium	ug/L	ND	1.0	05/11/23 17:03	
Thallium	ug/L	ND	1.0	05/11/23 17:03	

LABORATORY CONTROL SAMPLE: 3347667

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	37.7	94	80-120	
Arsenic	ug/L	40	40.1	100	80-120	
Barium	ug/L	40	38.8	97	80-120	
Beryllium	ug/L	40	42.3	106	80-120	
Cadmium	ug/L	40	39.7	99	80-120	
Chromium	ug/L	40	37.8	94	80-120	
Cobalt	ug/L	40	39.8	100	80-120	
Lead	ug/L	40	39.4	98	80-120	
Molybdenum	ug/L	40	39.1	98	80-120	
Selenium	ug/L	40	41.3	103	80-120	
Thallium	ug/L	40	38.6	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3347668 3347669

Parameter	Units	60427323001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	ND	40	40	36.8	37.0	92	92	75-125	1	20	
Arsenic	ug/L	ND	40	40	41.1	40.9	101	100	75-125	1	20	
Barium	ug/L	11.2	40	40	50.1	50.3	97	98	75-125	0	20	
Beryllium	ug/L	ND	40	40	39.0	40.1	97	100	75-125	3	20	
Cadmium	ug/L	ND	40	40	37.4	37.5	93	94	75-125	0	20	
Chromium	ug/L	ND	40	40	36.3	40.0	90	99	75-125	10	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3347668 3347669

Parameter	Units	60427323001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cobalt	ug/L	ND	40	40	38.8	39.1	93	94	75-125	1	20	
Lead	ug/L	ND	40	40	38.1	38.2	95	95	75-125	0	20	
Molybdenum	ug/L	ND	40	40	40.7	41.0	101	102	75-125	1	20	
Selenium	ug/L	ND	40	40	40.1	40.6	100	101	75-125	1	20	
Thallium	ug/L	ND	40	40	37.5	37.8	94	95	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

QC Batch: 844134
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60427179001, 60427179002

METHOD BLANK: 3345517 Matrix: Water
Associated Lab Samples: 60427179001, 60427179002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	5.0	04/28/23 12:40	

LABORATORY CONTROL SAMPLE: 3345518

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	976	98	80-120	

SAMPLE DUPLICATE: 3345519

Parameter	Units	60426917001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	318	297	7	10	

SAMPLE DUPLICATE: 3345520

Parameter	Units	60426948001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	355	356	0	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

QC Batch: 844670
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60427179001, 60427179002

METHOD BLANK: 3347451 Matrix: Water
Associated Lab Samples: 60427179001, 60427179002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	05/02/23 13:01	
Fluoride	mg/L	ND	0.20	05/02/23 13:01	
Sulfate	mg/L	ND	1.0	05/02/23 13:01	

LABORATORY CONTROL SAMPLE: 3347452

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	95	80-120	
Fluoride	mg/L	2.5	2.7	107	80-120	
Sulfate	mg/L	5	5.8	117	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3347453 3347454

Parameter	Units	60427417003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	288	50	50	324	326	73	76	80-120	0	15	M1
Fluoride	mg/L	ND	2.5	2.5	1.1	0.99	37	33	80-120	8	15	M1
Sulfate	mg/L	1.7	5	5	6.3	5.4	93	74	80-120	16	15	M1,R1

SAMPLE DUPLICATE: 3347455

Parameter	Units	60427417003 Result	Dup Result	RPD	Max RPD	Qualifiers
Chloride	mg/L	288	285	1	15	
Fluoride	mg/L	ND	.18J		15	
Sulfate	mg/L	1.7	1.8	6	15	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60709371 PRPA CCR
Pace Project No.: 60427179

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60427179001	**ASH-06-CCR**	EPA 3010	844753	EPA 6010	844966
60427179002	**ERB-02-CCR**	EPA 3010	844753	EPA 6010	844966
60427179001	**ASH-06-CCR**	EPA 3010	844754	EPA 6020	844967
60427179002	**ERB-02-CCR**	EPA 3010	844754	EPA 6020	844967
60427179001	**ASH-06-CCR**	EPA 7470	847174	EPA 7470	847253
60427179002	**ERB-02-CCR**	EPA 7470	847174	EPA 7470	847253
60427179001	**ASH-06-CCR**	SM 2540C	844134		
60427179002	**ERB-02-CCR**	SM 2540C	844134		
60427179001	**ASH-06-CCR**	EPA 9056	844670		
60427179002	**ERB-02-CCR**	EPA 9056	844670		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-LENE-0010_S (SCUR_ESI)	WO# : 60427179
	Revision: 3	Effective Date: 01/1

60427179

Client Name: AECOM

Courier: FedEx ☑ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☐ Other ☐

Tracking #: 6091 0798 5347 Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☑ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ ZPLC

Thermometer Used: T299 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 0.3 **Corr. Factor** +0.2 **Corrected** 0.5

Date and initials of person examining contents: 4/26/23 SA

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:**	☐Yes ☐No ☑N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.

Start:	Start:
End:	End:
Temp:	Temp:

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at https://info.pacelabs.com/hubfs/pas-standard-terms.pdf.

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	AECOM	Report To:	Brian Rothmeyer	Attention:	Accounts Payable
Address:	6200 South Quebec Street	Copy To:		Company Name:	AECOM
	Greenwood Village, CO 80111			Address:	Same as Section A
Email:	brian.rothmeyer@aecom.com	Purchase Order #:		Pace Quote:	
Phone:	(303)740-2614 Fax	Project Name:	PRPA Rawhide CCR- App III & IV (KS)	Pace Project Manager:	heather.wilson@pacelabs.com,
Requested Due Date:	Standard	Project #:		Pace Profile #:	11033, 3

Regulatory Agency	
	CCR
State / Location	
	CO

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Anions by 300.0	Metals- 6020, 6010, 7470	TDS by 2540C	1L plastic DI Water (non-VO	FEDEX Prepaid Saturday R	Residual Chlorine (Y/N)	60427179
1	~~ASH-01-CCR~~	WT																	X	X	X					
2	~~ASH-02-CCR~~	WT																	X	X	X					
3	~~ASH-03-CCR~~	WT																	X	X	X					
4	~~ASH-04-CCR~~	WT																	X	X	X					
5	~~ASH-05-CCR~~	WT																	X	X	X					
6	ASH-06-CCR	WT		4/24/23	1350														X	X	X					
7	~~ASH-07-CCR~~	WT																	X	X	X					
8	~~ASH-08-CCR~~	WT																	X	X	X					
9	~~BAT-01-CCR~~	WT																	X	X	X					
10	~~BAT-02-CCR~~	WT																	X	X	X					
11	~~BAT-03-CCR~~	WT																	X	X	X					
12	~~BAT-04R-CCR~~	WT																	X	X	X					

Not in this shipment

Not in this shipment

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	[signature] / AECOM	4/24/23	1700	[signature]	4/26	845	0.5	Y	Y	Y

SAMPLER NAME AND SIGNATURE			
PRINT Name of SAMPLER:	Kara Hoppes		
SIGNATURE of SAMPLER:	[signature]	DATE Signed:	4/24/23

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at https://info.pacelabs.com/hubfs/pas-standard-terms.pdf.

Section A Required Client Information:		Section B Required Project Information:	Section C Invoice Information:	
Company: AECOM		Report To: Brian Rothmeyer	Attention:	
Address: 6200 South Quebec Street		Copy To:	Company Name:	
Greenwood Village, CO 80111			Address:	Regulatory Agency
Email: brian.rothmeyer@aecom.com		Purchase Order #:	Pace Quote:	
Phone: (303)740-2614	Fax:	Project Name: PRPA Rawhide CCR- App III & IV (KS)	Pace Project Manager: heather.wilson@pacelabs.com,	State / Location
Requested Due Date:		Project #:	Pace Profile #: 11033, 3	CO

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Anions by 300.0	Metals- 6020, 6010, 7470	TDS by 2540C	1L plastic DI Water (non-VO	FEDEX Prepaid Saturday Re	Residual Chlorine (Y/N)	60427179
13	~~BAT-05-CCR~~	WT																	X	X	X				
14	~~BAT-06-CCR~~	WT																	X	X	X				
15	~~BAT-08-CCR~~	WT																	X	X	X				
16	~~BAT-09-CCR~~	WT																	X	X	X				
17	~~BAT-10-CCR~~	WT																	X	X	X				
18	~~BAT-11-CCR~~	WT																	X	X	X				
19	~~BAT-12-CCR~~	WT																	X	X	X				
20	~~DUP-01-CCR~~	WT																	X	X	X				
21	~~DUP-02-CCR~~	WT																	X	X	X				
22	~~ERB-01-CCR~~	WT																	X	X	X				
23	ERB-02-CCR	WT		4/4/23	1620														X	X	X				
24		WT																	X	X					

Not included in this shipment

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
					4/26	595	0.5	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed:

TEMP in C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

P9-1 of 2

Client: AECOM

Profile # 11033, 3

Site: PRPA Rawhide CCR-App III & IV (KS)

Notes

COC Line Item	Matrix	VG9H	DG9H	DG9Q	VG9U	DG9U	DG9M	DG9B	BG1U	AG1H	AG1U	AG2U	AG3S	AG4U	AG5U	JGFU	WGKU	WGDU	BP1U	BP2U	BP3U	BP1N	BP3N	BP3F	BP3S	BP3C	BP3Z	WPDU	ZPLC	Other		
1																																
2																																
3																																
4																																
5																																
6	WT																		1		1	1										
7																																
8																																
9																																
10																																
11																																
12																																

Container Codes

Glass			
DG9B	40mL bisulfate clear vial	WGKU	8oz clear soil jar
DG9H	40mL HCl amber voa vial	WGFU	4oz clear soil jar
DG9M	40mL MeOH clear vial	WG2U	2oz clear soil jar
DG9Q	40mL TSP amber vial	JGFU	4oz unpreserved amber wide
DG9S	40mL H2SO4 amber vial	AG0U	100mL unores amber glass
DG9T	40mL Na Thio amber vial	AG1H	1L HCl amber glass
DG9U	40mL amber unpreserved	AG1S	1L H2SO4 amber glass
VG9H	40mL HCl clear vial	AG1T	1L Na Thiosulfate clear/amber glass
VG9T	40mL Na Thio. clear vial	AG1U	1liter unpres amber glass
VG9U	40mL unpreserved clear vial	AG2N	500mL HNO3 amber glass
BG1S	1liter H2SO4 clear glass	AG2S	500mL H2SO4 amber glass
BG1U	1liter unpres glass	AG3S	250mL H2SO4 amber glass
BG3H	250mL HCL Clear glass	AG2U	500mL unpres amber glass
BG3U	250mL Unpres Clear glass	AG3U	250mL unpres amber glass
WGDU	16oz clear soil jar	AG4U	125mL unpres amber glass
		AG5U	100mL unpres amber glass

Plastic	
BP1C	1L NAOH plastic
BP1N	1L HNO3 plastic
BP1S	1L H2SO4 plastic
BP1U	1L unpreserved plastic
BP1Z	1L NaOH, Zn Acetate
BP2C	500mL NAOH plastic
BP2N	500mL HNO3 plastic
BP2S	500mL H2SO4 plastic
BP2U	500mL unpreserved plastic
BP2Z	500mL NaOH, Zn Acetate
BP3C	250mL NaOH plastic
BP3F	250mL HNO3 plastic - field filtered
BP3N	250mL HNO3 plastic
BP3U	250mL unpreserved plastic
BP3S	250mL H2SO4 plastic
BP3Z	250mL NaOH, Zn Acetate
BP4U	125mL unpreserved plastic
BP4N	125mL HNO3 plastic
BP4S	125mL H2SO4 plastic
WPDU	16oz unpresserved plstic

Misc.	
I	Wipe/Swab
SP5T	120mL Coliform Na Thiosulfate
ZPLC	Ziploc Bag
AF	Air Filter
C	Air Cassettes
R	Terracore Kit
U	Summa Can

Matrix	
WT	Water
SL	Solid
NAL	Non-aqueous Liquid
OL	OIL
WP	Wipe
DW	Drinking Water

Work Order Number: 60427179

Client: AECom

Profile # 11033, 3

Site: PRPA Rawhide CCR-App III & IV (KS)

Notes

COC Line Item	Matrix	VG9H	DG9H	DG9Q	VG9U	DG9U	DG9M	DG9B	BG1U	AG1H	AG1U	AG2U	AG3S	AG4U	AG5U	JGFU	WGKU	WGDU	BP1U	BP2U	BP3U	BP1N	BP3N	BP3F	BP3S	BP3C	BP3Z	WPDU	ZPLC	Other		
1																																
2																																
3																																
4																																
5																																
6																																
7																																
8																																
9																																
10																																
11	WT																		1		1	1										
12																																

Container Codes

Glass			
DG9B	40mL bisulfate clear vial	WGKU	8oz clear soil jar
DG9H	40mL HCl amber voa vial	WGFU	4oz clear soil jar
DG9M	40mL MeOH clear vial	WG2U	2oz clear soil jar
DG9Q	40mL TSP amber vial	JGFU	4oz unpreserved amber wide
DG9S	40mL H2SO4 amber vial	AG0U	100mL unores amber glass
DG9T	40mL Na Thio amber vial	AG1H	1L HCl amber glass
DG9U	40mL amber unpreserved	AG1S	1L H2SO4 amber glass
VG9H	40mL HCl clear vial	AG1T	1L Na Thiosulfate clear/amber glass
VG9T	40mL Na Thio. clear vial	AG1U	1liter unpres amber glass
VG9U	40mL unpreserved clear vial	AG2N	500mL HNO3 amber glass
BG1S	1liter H2SO4 clear glass	AG2S	500mL H2SO4 amber glass
BG1U	1liter unpres glass	AG3S	250mL H2SO4 amber glass
BG3H	250mL HCL Clear glass	AG2U	500mL unpres amber glass
BG3U	250mL Unpres Clear glass	AG3U	250mL unpres amber glass
WGDU	16oz clear soil jar	AG4U	125mL unpres amber glass
		AG5U	100mL unpres amber glass

Plastic	
BP1C	1L NAOH plastic
BP1N	1L HNO3 plastic
BP1S	1L H2SO4 plastic
BP1U	1L unpreserved plastic
BP1Z	1L NaOH, Zn Acetate
BP2C	500mL NAOH plastic
BP2N	500mL HNO3 plastic
BP2S	500mL H2SO4 plastic
BP2U	500mL unpreserved plastic
BP2Z	500mL NaOH, Zn Acetate
BP3C	250mL NaOH plastic
BP3F	250mL HNO3 plastic - field filtered
BP3N	250mL HNO3 plastic
BP3U	250mL unpreserved plastic
BP3S	250mL H2SO4 plastic
BP3Z	250mL NaOH, Zn Acetate
BP4U	125mL unpreserved plastic
BP4N	125mL HNO3 plastic
BP4S	125mL H2SO4 plastic
WPDU	16oz unpresserved plstic

Misc.	
I	Wipe/Swab
SP5T	120mL Coliform Na Thiosulfate
ZPLC	Ziploc Bag
AF	Air Filter
C	Air Cassettes
R	Terracore Kit
U	Summa Can

Matrix	
WT	Water
SL	Solid
NAL	Non-aqueous Liquid
OL	OIL
WP	Wipe
DW	Drinking Water

Work Order Number: 60427179

October 2023

Platte River Power Authority - Rawhide
Coal Combustion Residuals (CCR)
Ash Monofills (ASH)
Data Validation Review

Sample Delivery Group: 60439539, 60439820, 60439823, 60439904, 60440184
Sampling Date: October 10-12, 2023
Data Reviewer: Jamie Herman **Date Completed:** December 7, 2023
Peer Reviewer: Katie Abbott **Date Completed:** December 12, 2023

The table below summarizes the data packages and sample identifications discussed in this data validation review.

Field Sample Identification	Sample Type	Laboratory Identification	Matrix	Analyses		
				Total Metals	General Chemistry	Total Radium*
Data Package 60439539						
ASH-08-CCR	N	60439539001	Water	--	--	X
ASH-09-CCR	N	60439539002	Water	--	--	--
ASH-03-CCR	N	60439539003	Water	--	--	X
DUP-01-CCR	FD	60439539004	Water	--	--	X
Data Package 60439820						
ASH-01-CCR	N	60439820001	Water	X	X	--
ASH-06-CCR	N	60439820002	Water	X	X	--
ERB-01-CCR	EB	60439820003	Water	X	X	--
ASH-05-CCR	N	60439820004	Water	X	X	--
ASH-04-CCR	N	60439820005	Water	X	X	--
Data Package 60439823						
ASH-08-CCR	N	60439823001	Water	X	X	--
ASH-09-CCR	N	60439823002	Water	--	--	
ASH-03-CCR	N	60439823003	Water	X	X	--
DUP-01-CCR	FD	60439823004	Water	X	X	--
Data Package 60439904						
ASH-02-CCR	N	60439904001	Water	X	X	--
ASH-07-CCR	N	60439904002	Water	X	X	--
Data Package 60440184						
ASH-01-CCR	N	60440184001	Water	--	--	X
ASH-06-CCR	N	60440184002	Water	--	--	X
ERB-01-CCR	EB	60440184003	Water	--	--	X
ASH-05-CCR	N	60440184004	Water	--	--	X
ASH-04-CCR	N	60440184005	Water	--	--	X
ASH-02-CCR	N	60440184006	Water	--	--	X
ASH-07-CCR	N	60440184007	Water	--	--	X

Sample Type: -- – Not analyzed for this parameter EB – Equipment Blank
FD – Field Duplicate N – Normal Sample
Analyses: General Chemistry – Anions: chloride, fluoride, sulfate (Method 9056), and total dissolved solids (TDS) (SM 2540C).
Total Metals – Boron, calcium, lithium (6010), antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, molybdenum, selenium, thallium (6020), mercury (7470A)
Total Radium* – Includes radium-226 (Method 903.1), radium-228 (Method 904.0), and total radium combined (TRC)

This report contains the final results of the data validation conducted for water samples collected October 2023 for the Platte River Power Authority – Rawhide CCR sampling event. The sample results were presented in five data packages. The data validation review was conducted in accordance with *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA November 2020), and evaluation of laboratory criteria, as applicable.

General Overall Assessment:

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below, summarized in Attachment A).
_____ Some or all data are unusable for any purpose (noted below, summarized in Attachment A).

Case Narrative Comments:

Any case narrative comments concerning data qualification were addressed as noted in the table below.

Review Parameter	Criteria Met?	Comments
Chain of Custody & Sample Receipt	No	With the exceptions noted below, the samples were received by Pace Analytical Services, LLC in Lenexa, Kansas and Greensburg, Pennsylvania in good condition and were consistent with the accompanying chain of custody (COC). The cooler temperatures upon receipt were within the recommended ≤6 degrees Celsius (°C) temperature range as applicable to the method. **Data Packages 60439539 and 60439823** The sample collection time for sample DUP-01-CCR was not documented on the COC. As the sample was submitted as a blind duplicate, the time was omitted by the field sampling team to preserve anonymity of the sample. Further action was not considered necessary. The laboratory revised and reissued the data packages to exclude sample ASH-09-CCR as this sample was collected in error. The sample was not evaluated and is not included in this validation report.
Holding Times	Yes	The analyses were conducted within the method required holding time.
Laboratory Blanks • Method Blank (MB)	No	With the exception listed in Table 1 and comment below, the target analytes were not detected within the method blanks or the associated radium concentrations were reported at concentrations less than the minimum detectable concentration (MDC). **Data Package 60439823** **Method SM2540C** The laboratory noted total dissolved solids was detected in the instrument blank associated with samples ASH-03-CCR, ASH-08-CCR, and DUP-01-CCR. The instrument blanks are not evaluated with this level of validation and were not provided by the laboratory; therefore, the data was qualified as estimated (J+ bl) to reflect the high bias indicated by the blank contamination.
Matrix Quality Control • Matrix Spike/ Matrix Spike Duplicate None	NA	**Matrix Spike/ Matrix Spike Duplicate (MS/MSD)** A site-specific MS/MSD sample was not analyzed and reported for the associated data packages and could not be evaluated.

Review Parameter	Criteria Met?	Comments
• Laboratory Duplicate None		**Laboratory Duplicate** A laboratory duplicate was not reported for the associated data packages.
Laboratory Performance • Laboratory Control Sample	Yes	There was one laboratory control sample (LCS) and/or laboratory control sample duplicate (LCSD) per method per analytical method, prepared and analyzed, with the exception of the calculated total radium result. The available LCS recoveries and LCS/LCSD RPDs were within the laboratory acceptance limits. These results are indicative of an acceptable level of accuracy and precision with respect to the analytical method.
Field Quality Control • Field Blank None • Equipment Blank **Data Packages 60439820, 60440184** ERB-01-CCR • Field Duplicate **Data Packages 60427315/ 60427378** ASH-03-CCR/ DUP-01-CCR	No	**Field Blank** A field blank was not submitted with the samples associated with this sampling event. **Equipment Blank** With the exception listed in Table 2, the target analytes were not detected within the equipment blank or the associated radium concentrations were reported at concentrations less than the MDC. **Field Duplicate** The field duplicate sample results satisfied the evaluation criteria below: • When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%. • Where the result for one or both analytes of the field duplicate pair is <5xRL, satisfactory precision is indicated if the absolute difference between the field duplicate results is <2xRL. • For radiological parameters, the agreement between parent sample results and field duplicate sample results were evaluated. The duplicate error ratio (DER) met the criterion of a DER ≤2.
Tracer and/or Carrier Recovery	Yes	The sample specific recoveries were within the laboratory limits (30-110%).
Reporting Limits	No	For non-radiological parameters, several analytes were reported as non-detect at elevated reporting limits. These non-detect results will need to be evaluated by the end user of the data with respect to project objectives. With the exception listed in Table 3, for radiological parameters, if the associated uncertainty was greater than the reported result, then the 2 sigma (σ) uncertainty multiplied by 1.65 was less than or equal to the specified detection limit.
Package Completeness	Yes	The results are usable as qualified for the project objective. The data are considered 100% complete.

ºC – Degrees Celsius
% – Percent
≥ – Greater Than or Equal To
≤ – Less Than or Equal To
> – Greater Than
< – Less Than
± – Plus or Minus
σ – Sigma
COC – Chain of Custody
DER – Duplicate Error Ratio
ID – Identification
LCS – Laboratory Control Sample

LCSD – Laboratory Control Sample Duplicate
MDC – Minimum Detectable Concentration
MDL – Method Detection Limit
MS – Matrix Spike
MSD – Matrix Spike Duplicate
RL – Reporting Limit
RPDs – Relative Percent Differences
VOCs – Volatile Organic Compounds

Table 1: Laboratory Blank Outliers and Resultant Data Qualification

Laboratory Blank/ Associated Samples	Analyte	Concentration	Qualification
Data Package 60440184			
MB 3041608 ASH-01-CCR ASH-06-CCR ERB-01-CCR ASH-05-CCR ASH-04-CCR ASH-02-CCR ASH-07-CCR	Radium 228	0.784 ± 0.404 pCi/L	The associated result for sample ASH-01-CCR was reported at a concentration greater than the minimum detectable concentration (MDC) and <10x the blank concentration; therefore, the data was qualified as estimated (J+ bl) to reflect the high bias indicated by the blank contamination.

± – Plus or Minus
< – Less than
bl – Laboratory Blank Contamination
J+ – Estimated, High Bias
MB – Method Blank
MDC – Minimum Detectable Concentration
pCi/L – Picocuries per Liter

Table 2: Equipment Blank Outliers and Resultant Data Qualification

Equipment Blank/ Associated Samples	Analyte	Concentration	Qualification
Data Package 60439820			
ERB-01-CCR ASH-01-CCR ASH-02-CCR ASH-03-CCR ASH-04-CCR ASH-05-CCR ASH-06-CCR ASH-07-CCR ASH-08-CCR DUP-01-CCR	Total Dissolved Solids	7.0 mg/L	As the associated sample results were reported at concentrations greater the reporting limit (RL) and >10x the blank concentration, data qualification was not considered necessary.

> – Greater than
mg/L – Milligrams per Liter
RL – Reporting Limit

Table 3: Uncertainty Outliers and Resultant Data Qualification

Associated Samples	Analyte	Result (pCi/L)	2 Sigma (σ) Uncertainty	MDC (pCi/L)	Qualification
Data Package 60440184					
ASH-05-CCR	Radium 226	0.649	± 0.653	1.03	As the 2σ uncertainty multiplied by 1.65 was greater than the reported minimum detectable concentration (MDC), the associated results were qualified as estimated (J v).

MDC – Minimum Detectable Concentration
pCi/L – Picocuries per Liter
v – Compound Identification Issue

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

November 07, 2023

Vasanta Kalluri
AECOM
6200 South Quebec Street
Greenwood Village, CO 80111

RE: Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 11, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Greensburg

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Heather M. Wilson

Heather Wilson
heather.wilson@pacelabs.com
1(913)563-1407
Project Manager

Enclosures

cc: Ann Cinabro, AECOM
Jamie Herman, AECOM
Jeremy Hurshman, AECOM
Brian Rothmeyer, AECOM

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Pace Analytical Services Pennsylvania
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
ANABISO/IEC 17025:2017 Rad Cert#: L24170
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 2950
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA010
Louisiana DEQ/TNI Certification #: 04086
Maine Certification #: 2023021
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572023-03
New Hampshire/TNI Certification #: 297622
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-015
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: TN02867
Texas/TNI Certification #: T104704188-22-18
Utah/TNI Certification #: PA014572223-14
USDA Soil Permit #: 525-23-67-77263
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60439539001	**ASH-08-CCR**	Water	10/10/23 10:55	10/11/23 09:50
60439539002	**ASH-09-CCR**	Water	10/10/23 12:40	10/11/23 09:50
60439539003	**ASH-03-CCR**	Water	10/10/23 14:10	10/11/23 09:50
60439539004	**DUP-01-CCR**	Water	10/10/23 00:00	10/11/23 09:50
60439539005	**ASH-09-CCR MS**	Water	10/10/23 12:40	10/11/23 09:50
60439539006	**ASH-09-CCR MSD**	Water	10/10/23 12:40	10/11/23 09:50

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60439539001	**ASH-08-CCR**	EPA 903.1	MAR1	1	PASI-PA
		EPA 904.0	ZPC	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60439539002	**ASH-09-CCR**	EPA 903.1	MAR1	1	PASI-PA
		EPA 904.0	ZPC	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60439539003	**ASH-03-CCR**	EPA 903.1	MAR1	1	PASI-PA
		EPA 904.0	ZPC	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60439539004	**DUP-01-CCR**	EPA 903.1	MAR1	1	PASI-PA
		EPA 904.0	ZPC	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60439539005	**ASH-09-CCR MS**	EPA 903.1	MAR1	1	PASI-PA
		EPA 904.0	ZPC	1	PASI-PA
60439539006	**ASH-09-CCR MSD**	EPA 903.1	MAR1	1	PASI-PA
		EPA 904.0	ZPC	1	PASI-PA

PASI-PA = Pace Analytical Services - Greensburg

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Sample: ASH-08-CCR **Lab ID: 60439539001** Collected: 10/10/23 10:55 Received: 10/11/23 09:50 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.155 ± 0.393 (0.728) C:NA T:86%**	pCi/L	11/06/23 14:20	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.520 ± 0.415 (0.833) C:87% T:86%**	pCi/L	10/25/23 14:35	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.675 ± 0.808 (1.56)**	pCi/L	11/06/23 16:20	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Sample: ASH-09-CCR **Lab ID: 60439539002** Collected: 10/10/23 12:40 Received: 10/11/23 09:50 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.0436 ± 0.392 (0.759) C:NA T:82%**	pCi/L	11/06/23 14:20	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.656 ± 0.364 (0.649) C:88% T:82%**	pCi/L	10/25/23 14:35	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.700 ± 0.756 (1.41)**	pCi/L	11/06/23 16:20	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Sample: ASH-03-CCR **Lab ID: 60439539003** Collected: 10/10/23 14:10 Received: 10/11/23 09:50 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.220 ± 0.413 (0.731) C:NA T:84%**	pCi/L	11/06/23 14:34	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**1.02 ± 0.431 (0.688) C:86% T:84%**	pCi/L	10/25/23 14:35	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**1.24 ± 0.844 (1.42)**	pCi/L	11/06/23 16:20	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Sample: DUP-01-CCR **Lab ID: 60439539004** Collected: 10/10/23 00:00 Received: 10/11/23 09:50 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.196 ± 0.452 (0.817) C:NA T:84%**	pCi/L	11/06/23 14:34	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.980 ± 0.439 (0.723) C:83% T:84%**	pCi/L	10/25/23 14:36	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**1.18 ± 0.891 (1.54)**	pCi/L	11/06/23 16:20	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Sample: ASH-09-CCR MS **Lab ID: 60439539005** Collected: 10/10/23 12:40 Received: 10/11/23 09:50 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
		Pace Analytical Services - Greensburg				
Radium-226	EPA 903.1	**110.63 %REC ± NA (NA) C:NA T:NA**	pCi/L	11/06/23 15:20	13982-63-3	
		Pace Analytical Services - Greensburg				
Radium-228	EPA 904.0	**119.5 %REC ± NA (NA) C:NA T:NA**	pCi/L	10/25/23 14:36	15262-20-1	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Sample: ASH-09-CCR MSD **Lab ID: 60439539006** Collected: 10/10/23 12:40 Received: 10/11/23 09:50 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**113.32 %REC 2.40RPD ± NA (NA) C:NA T:NA**	pCi/L	11/06/23 14:34	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**141.73 %REC 17.02RPD ± NA (NA) C:NA T:NA**	pCi/L	10/25/23 14:36	15262-20-1	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

QC Batch: 622866
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60439539001, 60439539002, 60439539003, 60439539004, 60439539005, 60439539006

METHOD BLANK: 3036041 Matrix: Water
Associated Lab Samples: 60439539001, 60439539002, 60439539003, 60439539004, 60439539005, 60439539006

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.391 ± 0.328 (0.652) C:83% T:83%	pCi/L	10/25/23 11:31	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

QC Batch: 622864
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60439539001, 60439539002, 60439539003, 60439539004, 60439539005, 60439539006

METHOD BLANK: 3036039 Matrix: Water
Associated Lab Samples: 60439539001, 60439539002, 60439539003, 60439539004, 60439539005, 60439539006

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.0866 ± 0.240 (0.466) C:NA T:83%	pCi/L	11/06/23 14:04	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval). Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60709371 PRPA CCR
Pace Project No.: 60439539

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60439539001	**ASH-08-CCR**	EPA 903.1	622864		
60439539002	**ASH-09-CCR**	EPA 903.1	622864		
60439539003	**ASH-03-CCR**	EPA 903.1	622864		
60439539004	**DUP-01-CCR**	EPA 903.1	622864		
60439539005	**ASH-09-CCR MS**	EPA 903.1	622864		
60439539006	**ASH-09-CCR MSD**	EPA 903.1	622864		
60439539001	**ASH-08-CCR**	EPA 904.0	622866		
60439539002	**ASH-09-CCR**	EPA 904.0	622866		
60439539003	**ASH-03-CCR**	EPA 904.0	622866		
60439539004	**DUP-01-CCR**	EPA 904.0	622866		
60439539005	**ASH-09-CCR MS**	EPA 904.0	622866		
60439539006	**ASH-09-CCR MSD**	EPA 904.0	622866		
60439539001	**ASH-08-CCR**	Total Radium Calculation	627629		
60439539002	**ASH-09-CCR**	Total Radium Calculation	627629		
60439539003	**ASH-03-CCR**	Total Radium Calculation	627629		
60439539004	**DUP-01-CCR**	Total Radium Calculation	627629		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

CCR PA

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Pace Analytical
www.pacelabs.com

Page: 1 of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	AECOM	Report To:	Vasanta Kalluri	Attention:	Accounts Payable
Address:	6200 South Quebec St	Copy To:	Brian Rothmeyer	Company Name:	AECOM
	Greenwood Village, CO 80111			Address:	Same as Section A
Email To:	brian.rothmeyer@aecom.com	Purchase Order No.:	1599462	Pace Quote Reference:	42700
Phone:	(303) 740-2614 Fax:	Project Name:	60709371 PRPA CCR	Pace Project Manager:	Heather Wilson
Requested Due Date/TAT:	Standard	Project Number:	60709371	Pace Profile #:	11033, 3

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☑ OTHER CCR

Site Location STATE: CO

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Requested Analysis Filtered (Y/N) Y/N	Analysis Test: Radium-226	Radium-228	Total Radium	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		N	N	N			
1	ASH-05-CCR	WT	G	[illegible]	—	10/4/23	1055		2			X						X	X	X		N	
2	ASH-09-CCR	WT	G	—	—	10/10/23	1240		6			X						X	X	X		N	
3	ASH-03-CCR	WT	G	—	—	10/10/23	1410		2			X						X	X	X		N	
4	DUP-01-CCR	WT	G	—	—	10/10/23	—		2			X						X	X	X		N	
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
MS/MSD collected for ASH-09-CCR.	[signature] / AECOM	10/10/23	1655	[signature]	10/4/23	950	—	N	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kara Hoppes & Olivia Helinski

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 10/10/23

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

CCR PA

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed ac

WO# : 30630903

30630903

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	AECOM	Report To:	Vasanta Kalluri	Attention:	Accounts Payable
Address:	6200 South Quebec St	Copy To:	Brian Rothmeyer	Company Name:	AECOM
	Greenwood Village, CO 80111			Address:	Same as Section A
Email To:	brian.rothmeyer@aecom.com	Purchase Order No.:	1599462	Pace Quote Reference:	42700
Phone:	(303) 740-2614 Fax:	Project Name:	60709371 PRPA CCR	Pace Project Manager:	Heather Wilson
Requested Due Date/TAT:	Standard	Project Number:	60709371	Pace Profile #:	11033, 3

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☑ OTHER CCR

Site Location STATE: CO

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test: Radium-226	Radium-228	Total Radium	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	ASH-08-CCR	WT	G	10/10/23	—	10/10/23	1055		2			X						N	X	X	X	N	
2	ASH-09-CCR	WT	G	—	—	10/10/23	1240		6			X						N	X	X	X	N	
3	ASH-03-CCR	WT	G	—	—	10/10/23	1410		2			X						N	X	X	X	N	
4	DUP-01-CCR	WT	G	—	—	10/10/23	—		2			X						N	X	X	X	N	
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
MS/MSD collected for ASH-09-CCR.	AECOM	10/10/23	1655		10/6/23	950	—	N	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kara Hoppes & Olivia Helinski

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY): 10/10/23

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Internal Transfer Chain of Custody

Rush Multiplier____X
Samples Pre-Logged into eCOC

State Of Origin: CO
Cert. Needed: ☐ Yes ☒ No

Workorder: 60439539 **Workorder Name:** 60709371 PRPA CCR

Owner Received Date: 10/11/2023 **Results Requested By:** 11/1/2023

Report To	Subcontract To
Heather Wilson Pace Analytical Kansas 9608 Loiret Blvd. Lenexa, KS 66219 Phone 1(913)563-1407	Pace Analytical Pittsburgh 1638 Roseytown Road Suites 2,3, & 4 Greensburg, PA 15601 Phone (724)850-5600

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Other	Requested Analysis: Radium-226 & Total Sum Radium	Radium-226	Radium-228	LAB USE ONLY
1	ASH-08-CCR	PS	10/10/2023 10:55	60439539001	Water	1	X	X	X	
2	ASH-09-CCR	PS	10/10/2023 12:40	60439539002	Water	1	X	X	X	
3	ASH-03-CCR	PS	10/10/2023 14:10	60439539003	Water	1	X	X	X	
4	DUP-01-CCR	PS	10/10/2023 00:00	60439539004	Water	1	X	X	X	
5	ASH-09-CCR MS	PS	10/10/2023 12:40	60439539005	Water	1		X	X	
6	ASH-09-CCR MSD	PS	10/10/2023 12:40	60439539006	Water	1		X	X	

Transfers	Released By	Date/Time	Received By	Date/Time
1				
2				
3				

Comments

IR30- Radium QC Sheets Required

Cooler Temperature on Receipt ____ °C	Custody Seal Y or N	Received on Ice Y or N	Samples Intact Y or N

****In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document. This chain of custody is considered complete as is since this information is available in the owner laboratory.*

WO# : 30630903

PM: MAR **Due Date: 11/06/23**

CLIENT: PACE_60_LEKS

DC#_Title: ENV-FRM-GBUR-0088 v06_Sample Condition Upon Receipt-Pittsburgh

Effective Date: 09/20/2023

WO# : 30630903

PM: MAR Due Date: 11/06/23

CLIENT: PACE_60_LEKS

Client Name: AECOM

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

Tracking Number: 6432 1392 9958

Initial / Date

Examined By: LA 10/5/23

Labeled By: LA 10-16-23

Temped By: —

Custody Seal on Cooler/Box Present: ☐ Yes ☒ No Seals Intact: ☐ Yes ☒ No

Thermometer Used: — Type of Ice: Wet Blue (None)

Cooler Temperature: Observed Temp — °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

Comments:	Yes	No	NA	pH paper Lot# P114-6 / D.P.D. Residual Chlorine Lot #
Chain of Custody Present	X			1.
Chain of Custody Filled Out:	X			2.
-Were client corrections present on COC	X			Date collection correction
Chain of Custody Relinquished	X			3.
Sampler Name & Signature on COC:	X			4.
Sample Labels match COC:	X			5.
-Includes date/time/ID Matrix: WT				
Samples Arrived within Hold Time:	X			6.
Short Hold Time Analysis (<72hr remaining):		X		7.
Rush Turn Around Time Requested:		X		8.
Sufficient Volume:	X			9.
Correct Containers Used:	X			10.
-Pace Containers Used	X			
Containers Intact:	X			11.
Orthophosphate field filtered:			X	12.
Hex Cr Aqueous samples field filtered:			X	13.
Organic Samples checked for dechlorination			X	14:
Filtered volume received for dissolved tests:			X	15:
All containers checked for preservation: exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix	X			16. pH<2
All containers meet method preservation requirements:	X			Initial when completed LA / Date/Time of Preservation / Lot# of added Preservative
8260C/D: Headspace in VOA Vials (> 6mm)			X	17.
624.1: Headspace in VOA Vials (0mm)			X	18.
Trip Blank Present:			X	Trip blank custody seal present? YES or NO
Rad Samples Screened <.05 mrem/hr.	✓			Initial when completed JS / Date: 10/11/23 / Survey Meter SN: 1563

Comments:

Note: For NC compliance samples with discrepancies, a copy of this form must be sent to the DEHNR Certification office.
PM Review is documented electronically in LIMS through the SRF Review schedule in the Workorder Edit Screen.

Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Test:	Ra-226
Analyst:	MAR1
Date:	10/18/2023
Batch ID:	75834
Matrix:	DW

Method Blank Assessment	
MB Sample ID	3036039
MB concentration:	0.087
M/B Counting Uncertainty:	0.240
MB MDC:	0.466
MB Numerical Performance Indicator:	0.71
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment	LCSD (Y or N)?	N
	LCS75834	**LCSD75834**
Count Date:	11/6/2023	
Spike I.D.:	21-031	
Spike Concentration (pCi/mL):	39.866	
Volume Used (mL):	0.10	
Aliquot Volume (L, g, F):	0.817	
Target Conc. (pCi/L, g, F):	4.882	
Uncertainty (Calculated):	0.229	
Result (pCi/L, g, F):	5.914	
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	1.185	
Numerical Performance Indicator:	1.68	
Percent Recovery:	121.15%	
Status vs Numerical Indicator:	N/A	
Status vs Recovery:	Pass	
Upper % Recovery Limits:	133%	
Lower % Recovery Limits:	73%	

Sample Matrix Spike Control Assessment	MS/MSD 1	MS/MSD 2
Sample Collection Date:	10/10/2023	
Sample I.D.	60439539003	
Sample MS I.D.	60439539005	
Sample MSD I.D.	60439539006	
Spike I.D.:	21-031	
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	39.867	
Spike Volume Used in MS (mL):	0.20	
Spike Volume Used in MSD (mL):	0.20	
MS Aliquot (L, g, F):	0.802	
MS Target Conc.(pCi/L, g, F):	9.943	
MSD Aliquot (L, g, F):	0.802	
MSD Target Conc. (pCi/L, g, F):	9.943	
MS Spike Uncertainty (calculated):	0.467	
MSD Spike Uncertainty (calculated):	0.467	
Sample Result:	0.220	
Sample Result Counting Uncertainty (pCi/L, g, F):	0.413	
Sample Matrix Spike Result:	11.219	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.404	
Sample Matrix Spike Duplicate Result:	11.486	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.450	
MS Numerical Performance Indicator:	1.348	
MSD Numerical Performance Indicator:	1.644	
MS Percent Recovery:	110.63%	
MSD Percent Recovery:	113.32%	
MS Status vs Numerical Indicator:	N/A	
MSD Status vs Numerical Indicator:	N/A	
MS Status vs Recovery:	Pass	
MSD Status vs Recovery:	Pass	
MS/MSD Upper % Recovery Limits:	136%	
MS/MSD Lower % Recovery Limits:	71%	

Duplicate Sample Assessment		
Sample I.D.:		Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.		
Sample Result (pCi/L, g, F):		
Sample Result Counting Uncertainty (pCi/L, g, F):		
Sample Duplicate Result (pCi/L, g, F):		
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):		
Are sample and/or duplicate results below RL?	See Below ##	
Duplicate Numerical Performance Indicator:		
Duplicate RPD:		
Duplicate Status vs Numerical Indicator:		
Duplicate Status vs RPD:		
% RPD Limit:		

Matrix Spike/Matrix Spike Duplicate Sample Assessment	
Sample I.D.	60439539003
Sample MS I.D.	60439539005
Sample MSD I.D.	60439539006
Sample Matrix Spike Result:	11.219
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.404
Sample Matrix Spike Duplicate Result:	11.486
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.450
Duplicate Numerical Performance Indicator:	-0.260
(Based on the Percent Recoveries) MS/ MSD Duplicate RPD:	2.40%
MS/ MSD Duplicate Status vs Numerical Indicator:	N/A
MS/ MSD Duplicate Status vs RPD:	Pass
% RPD Limit:	32%

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the RL.

Comments:

CLM 11/6/23

LL 110623

Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

Test: Ra-228
Analyst: ZPC
Date: 10/19/2023
Worklist: 75835
Matrix: WT

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment	
MB Sample ID	3036041
MB concentration:	0.391
M/B 2 Sigma CSU:	0.328
MB MDC:	0.652
MB Numerical Performance Indicator:	2.34
MB Status vs Numerical Indicator:	Warning
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment	LCSD (Y or N)?	N
	LCS75835	LCSD75835
Count Date:	10/25/2023	
Spike I.D.:	23-043	
Decay Corrected Spike Concentration (pCi/mL):	39.291	
Volume Used (mL):	0.10	
Aliquot Volume (L, g, F):	0.817	
Target Conc. (pCi/L, g, F):	4.811	
Uncertainty (Calculated):	0.236	
Result (pCi/L, g, F):	5.715	
LCS/LCSD 2 Sigma CSU (pCi/L, g, F):	1.201	
Numerical Performance Indicator:	1.45	
Percent Recovery:	118.77%	
Status vs Numerical Indicator:	N/A	
Status vs Recovery:	Pass	
Upper % Recovery Limits:	135%	
Lower % Recovery Limits:	60%	

Sample Matrix Spike Control Assessment	MS/MSD 1	MS/MSD 2
Sample Collection Date:	10/10/2023	
Sample I.D.	60439539002	
Sample MS I.D.	60439539005	
Sample MSD I.D.	60439539006	
Spike I.D.:	23-043	
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	39.487	
Spike Volume Used in MS (mL):	0.20	
Spike Volume Used in MSD (mL):	0.20	
MS Aliquot (L, g, F):	0.802	
MS Target Conc.(pCi/L, g, F):	9.848	
MSD Aliquot (L, g, F):	0.802	
MSD Target Conc. (pCi/L, g, F):	9.848	
MS Spike Uncertainty (calculated):	0.483	
MSD Spike Uncertainty (calculated):	0.483	
Sample Result:	0.656	
Sample Result 2 Sigma CSU (pCi/L, g, F):	0.364	
Sample Matrix Spike Result:	12.424	
Matrix Spike Result 2 Sigma CSU (pCi/L, g, F):	2.410	
Sample Matrix Spike Duplicate Result:	14.614	
Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F):	2.829	
MS Numerical Performance Indicator:	1.515	
MSD Numerical Performance Indicator:	2.784	
MS Percent Recovery:	119.50%	
MSD Percent Recovery:	141.73%	
MS Status vs Numerical Indicator:	Pass	
MSD Status vs Numerical Indicator:	Warning	
MS Status vs Recovery:	Pass	
MSD Status vs Recovery:	MSD High****	
MS/MSD Upper % Recovery Limits:	135%	
MS/MSD Lower % Recovery Limits:	60%	

OK - sample < RL

RPD acceptable
JH 10/27/23

Duplicate Sample Assessment		Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Sample I.D.:		
Duplicate Sample I.D.		
Sample Result (pCi/L, g, F):		
Sample Result 2 Sigma CSU (pCi/L, g, F):		
Sample Duplicate Result (pCi/L, g, F):		
Sample Duplicate Result 2 Sigma CSU (pCi/L, g, F):		
Are sample and/or duplicate results below RL?	See Below ##	
Duplicate Numerical Performance Indicator:		
Duplicate RPD:		
Duplicate Status vs Numerical Indicator:		
Duplicate Status vs RPD:		
% RPD Limit:		

Matrix Spike/Matrix Spike Duplicate Sample Assessment	
Sample I.D.	60439539002
Sample MS I.D.	60439539005
Sample MSD I.D.	60439539006
Sample Matrix Spike Result:	12.424
Matrix Spike Result 2 Sigma CSU (pCi/L, g, F):	2.410
Sample Matrix Spike Duplicate Result:	14.614
Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F):	2.829
Duplicate Numerical Performance Indicator:	-1.154
(Based on the Percent Recoveries) MS/ MSD Duplicate RPD:	17.02%
MS/ MSD Duplicate Status vs Numerical Indicator:	Pass
MS/ MSD Duplicate Status vs RPD:	Pass
% RPD Limit:	36%

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

10/26/23

VAL
10/26/23

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

November 03, 2023

Vasanta Kalluri
AECOM
6200 South Quebec Street
Greenwood Village, CO 80111

RE: Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 12, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Kansas City

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Heather M. Wilson

Heather Wilson
heather.wilson@pacelabs.com
1(913)563-1407
Project Manager

Enclosures

cc: Ann Cinabro, AECOM
Jamie Herman, AECOM
Jeremy Hurshman, AECOM
Brian Rothmeyer, AECOM

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Pace Analytical Services Kansas

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 88-00679
Illinois Certification #: 2000302023-5
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212023-1
Oklahoma Certification #: 2022-057
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-22-16
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60439820001	**ASH-01-CCR**	Water	10/11/23 10:45	10/12/23 08:40
60439820002	**ASH-06-CCR**	Water	10/11/23 11:50	10/12/23 08:40
60439820003	**ERB-01-CCR**	Water	10/11/23 12:00	10/12/23 08:40
60439820004	**ASH-05-CCR**	Water	10/11/23 13:35	10/12/23 08:40
60439820005	**ASH-04-CCR**	Water	10/11/23 14:30	10/12/23 08:40

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60439820001	**ASH-01-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	BDH1	1	PASI-K
		EPA 9056	MLD	3	PASI-K
60439820002	**ASH-06-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	BDH1	1	PASI-K
		EPA 9056	MLD	3	PASI-K
60439820003	**ERB-01-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	BDH1	1	PASI-K
		EPA 9056	MLD	3	PASI-K
60439820004	**ASH-05-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	BDH1	1	PASI-K
		EPA 9056	MLD	3	PASI-K
60439820005	**ASH-04-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	BDH1	1	PASI-K
		EPA 9056	MLD	3	PASI-K

PASI-K = Pace Analytical Services - Kansas City

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Sample: ASH-01-CCR **Lab ID: 60439820001** Collected: 10/11/23 10:45 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	**494**	ug/L	100	1	10/19/23 14:04	10/25/23 13:05	7440-42-8	
Calcium	**395000**	ug/L	200	1	10/19/23 14:04	10/25/23 13:05	7440-70-2	
Lithium	**450**	ug/L	10.0	1	10/19/23 14:04	10/25/23 13:05	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7440-36-0	
Arsenic	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7440-38-2	
Barium	**9.3**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7440-39-3	
Beryllium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:11	7440-41-7	
Cadmium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:11	7440-43-9	
Chromium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7440-47-3	
Cobalt	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7440-48-4	
Lead	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7439-92-1	
Molybdenum	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7439-98-7	
Selenium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7782-49-2	
Thallium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:11	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 12:42	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**3400**	mg/L	66.7	1		10/18/23 15:53		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	**18.7**	mg/L	1.0	1		10/18/23 16:18	16887-00-6	
Fluoride	ND	mg/L	0.20	1		10/18/23 16:18	16984-48-8	
Sulfate	**1880**	mg/L	400	400		10/18/23 16:31	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Sample: ASH-06-CCR **Lab ID: 60439820002** Collected: 10/11/23 11:50 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	**305**	ug/L	100	1	10/19/23 14:04	10/25/23 13:14	7440-42-8	
Calcium	**25500**	ug/L	200	1	10/19/23 14:04	10/25/23 13:14	7440-70-2	
Lithium	**53.5**	ug/L	10.0	1	10/19/23 14:04	10/25/23 13:14	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7440-36-0	
Arsenic	**1.0**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7440-38-2	
Barium	**38.0**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7440-39-3	
Beryllium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:19	7440-41-7	
Cadmium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:19	7440-43-9	
Chromium	**2.8**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7440-47-3	
Cobalt	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7440-48-4	
Lead	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7439-92-1	
Molybdenum	**13.3**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7439-98-7	
Selenium	**25.2**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7782-49-2	
Thallium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 12:44	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**417**	mg/L	10.0	1		10/18/23 15:53		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	**8.0**	mg/L	1.0	1		10/18/23 16:45	16887-00-6	
Fluoride	**0.72**	mg/L	0.20	1		10/18/23 16:45	16984-48-8	
Sulfate	**75.7**	mg/L	10.0	10		10/18/23 16:58	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Sample: ERB-01-CCR **Lab ID: 60439820003** Collected: 10/11/23 12:00 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	ND	ug/L	100	1	10/19/23 14:04	10/25/23 13:16	7440-42-8	
Calcium	ND	ug/L	200	1	10/19/23 14:04	10/25/23 13:16	7440-70-2	
Lithium	ND	ug/L	10.0	1	10/19/23 14:04	10/25/23 13:16	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7440-36-0	
Arsenic	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7440-38-2	
Barium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7440-39-3	
Beryllium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:30	7440-41-7	
Cadmium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:30	7440-43-9	
Chromium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7440-47-3	
Cobalt	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7440-48-4	
Lead	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7439-92-1	
Molybdenum	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7439-98-7	
Selenium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7782-49-2	
Thallium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 12:47	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**7.0**	mg/L	5.0	1		10/18/23 15:53		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	ND	mg/L	1.0	1		10/18/23 17:11	16887-00-6	
Fluoride	ND	mg/L	0.20	1		10/18/23 17:11	16984-48-8	
Sulfate	ND	mg/L	1.0	1		10/18/23 17:11	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Sample: ASH-05-CCR **Lab ID: 60439820004** Collected: 10/11/23 13:35 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	**916**	ug/L	100	1	10/19/23 14:04	10/25/23 13:18	7440-42-8	
Calcium	**520000**	ug/L	200	1	10/19/23 14:04	10/25/23 13:18	7440-70-2	
Lithium	**344**	ug/L	10.0	1	10/19/23 14:04	10/25/23 13:18	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7440-36-0	
Arsenic	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7440-38-2	
Barium	**13.8**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7440-39-3	
Beryllium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:37	7440-41-7	
Cadmium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:37	7440-43-9	
Chromium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7440-47-3	
Cobalt	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7440-48-4	
Lead	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7439-92-1	
Molybdenum	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7439-98-7	
Selenium	**15.3**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7782-49-2	
Thallium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:37	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 12:49	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**4760**	mg/L	100	1		10/18/23 15:53		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	**226**	mg/L	100	100		10/18/23 17:38	16887-00-6	
Fluoride	**0.36**	mg/L	0.20	1		10/18/23 17:25	16984-48-8	
Sulfate	**2390**	mg/L	400	400		10/18/23 17:51	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Sample: ASH-04-CCR **Lab ID: 60439820005** Collected: 10/11/23 14:30 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	**665**	ug/L	100	1	10/19/23 14:04	10/25/23 13:20	7440-42-8	
Calcium	**483000**	ug/L	200	1	10/19/23 14:04	10/25/23 13:20	7440-70-2	
Lithium	**420**	ug/L	10.0	1	10/19/23 14:04	10/25/23 13:20	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:48	7440-36-0	
Arsenic	**1.1**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:48	7440-38-2	
Barium	**9.3**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:48	7440-39-3	
Beryllium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:48	7440-41-7	
Cadmium	ND	ug/L	0.50	1	10/19/23 14:04	11/01/23 10:48	7440-43-9	
Chromium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:48	7440-47-3	
Cobalt	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:48	7440-48-4	
Lead	ND	ug/L	3.0	3	10/19/23 14:04	11/01/23 10:53	7439-92-1	D3
Molybdenum	**1.1**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:48	7439-98-7	
Selenium	**125**	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:48	7782-49-2	
Thallium	ND	ug/L	3.0	3	10/19/23 14:04	11/01/23 10:53	7440-28-0	D3
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 12:51	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**6060**	mg/L	125	1		10/18/23 15:53		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	**197**	mg/L	100	100		10/18/23 18:18	16887-00-6	
Fluoride	**0.25**	mg/L	0.20	1		10/18/23 18:04	16984-48-8	
Sulfate	**3580**	mg/L	500	500		10/18/23 18:58	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

QC Batch: 870263
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

METHOD BLANK: 3446202 Matrix: Water
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	10/25/23 12:38	

LABORATORY CONTROL SAMPLE: 3446203

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3446204 3446205

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	4.4	4.4	88	88	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

QC Batch: 869917
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

METHOD BLANK: 3444755 Matrix: Water
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	ND	100	10/25/23 12:48	
Calcium	ug/L	ND	200	10/25/23 12:48	
Lithium	ug/L	ND	10.0	10/25/23 12:48	

LABORATORY CONTROL SAMPLE: 3444756

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	1010	101	80-120	
Calcium	ug/L	10000	10800	108	80-120	
Lithium	ug/L	1000	990	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444757 3444758

Parameter	Units	60439767002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	659	1000	1000	1640	1640	98	98	75-125	0	20	
Calcium	ug/L	524000	10000	10000	524000	527000	7	29	75-125	0	20	M1
Lithium	ug/L	467	1000	1000	1600	1610	114	114	75-125	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

QC Batch: 869915
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

METHOD BLANK: 3444741 Matrix: Water
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	ND	1.0	10/26/23 14:40	
Arsenic	ug/L	ND	1.0	10/26/23 14:40	
Barium	ug/L	ND	1.0	10/26/23 14:40	
Beryllium	ug/L	ND	0.50	10/26/23 14:40	
Cadmium	ug/L	ND	0.50	10/26/23 14:40	
Chromium	ug/L	ND	1.0	10/26/23 14:40	
Cobalt	ug/L	ND	1.0	10/26/23 14:40	
Lead	ug/L	ND	1.0	10/26/23 14:40	
Molybdenum	ug/L	ND	1.0	10/26/23 14:40	
Selenium	ug/L	ND	1.0	10/26/23 14:40	
Thallium	ug/L	ND	1.0	10/26/23 14:40	

LABORATORY CONTROL SAMPLE: 3444742

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	41.0	102	80-120	
Arsenic	ug/L	40	39.7	99	80-120	
Barium	ug/L	40	41.1	103	80-120	
Beryllium	ug/L	40	39.1	98	80-120	
Cadmium	ug/L	40	40.2	101	80-120	
Chromium	ug/L	40	40.8	102	80-120	
Cobalt	ug/L	40	39.8	99	80-120	
Lead	ug/L	40	41.1	103	80-120	
Molybdenum	ug/L	40	40.1	100	80-120	
Selenium	ug/L	40	41.9	105	80-120	
Thallium	ug/L	40	39.3	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444743 3444744

Parameter	Units	60439767002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	ND	40	40	36.3	36.4	91	91	75-125	0	20	
Arsenic	ug/L	ND	40	40	40.3	40.7	98	99	75-125	1	20	
Barium	ug/L	9.4	40	40	48.0	48.3	96	97	75-125	1	20	
Beryllium	ug/L	ND	40	40	33.1	32.7	83	82	75-125	1	20	
Cadmium	ug/L	ND	40	40	32.4	32.5	81	81	75-125	0	20	
Chromium	ug/L	ND	40	40	36.7	36.5	89	88	75-125	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444743 3444744

Parameter	Units	60439767002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cobalt	ug/L	ND	40	40	37.3	37.6	92	93	75-125	1	20	
Lead	ug/L	ND	40	40	35.3	35.5	88	88	75-125	1	20	
Molybdenum	ug/L	ND	40	40	41.6	42.2	101	103	75-125	1	20	
Selenium	ug/L	149	40	40	190	192	104	110	75-125	1	20	
Thallium	ug/L	ND	40	40	34.9	35.2	87	88	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

QC Batch: 869526 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

METHOD BLANK: 3443296 Matrix: Water
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	5.0	10/18/23 15:51	

LABORATORY CONTROL SAMPLE: 3443297

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	990	99	80-120	

SAMPLE DUPLICATE: 3443298

Parameter	Units	60439528002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	2010	1960	3	10	

SAMPLE DUPLICATE: 3443299

Parameter	Units	60439847001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1930	1900	1	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

QC Batch: 869558 | Analysis Method: EPA 9056
QC Batch Method: EPA 9056 | Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

METHOD BLANK: 3443402 Matrix: Water
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	10/18/23 11:09	
Fluoride	mg/L	ND	0.20	10/18/23 11:09	
Sulfate	mg/L	ND	1.0	10/18/23 11:09	

METHOD BLANK: 3444753 Matrix: Water
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	10/19/23 09:15	
Fluoride	mg/L	ND	0.20	10/19/23 09:15	
Sulfate	mg/L	ND	1.0	10/19/23 09:15	

LABORATORY CONTROL SAMPLE: 3443403

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	98	80-120	
Fluoride	mg/L	2.5	2.5	98	80-120	
Sulfate	mg/L	5	5.0	100	80-120	

LABORATORY CONTROL SAMPLE: 3444754

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	97	80-120	
Fluoride	mg/L	2.5	2.5	102	80-120	
Sulfate	mg/L	5	5.1	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3443404 3443405

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	278	100	100	321	343	43	65	80-120	7	15	M1
Fluoride	mg/L	ND	2.5	2.5	2.0	2.1	75	77	80-120	2	15	M1
Sulfate	mg/L	3640	2000	2000	4940	6200	65	128	80-120	23	15	M1,R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

SAMPLE DUPLICATE: 3443406

Parameter	Units	60439823002 Result	Dup Result	RPD	Max RPD	Qualifiers
Chloride	mg/L	278	236	17	15	D6
Fluoride	mg/L	ND	ND		15	
Sulfate	mg/L	3640	4550	22	15	D6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60709371 PRPA CCR
Pace Project No.: 60439820

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60439820001	**ASH-01-CCR**	EPA 3010	869917	EPA 6010	869934
60439820002	**ASH-06-CCR**	EPA 3010	869917	EPA 6010	869934
60439820003	**ERB-01-CCR**	EPA 3010	869917	EPA 6010	869934
60439820004	**ASH-05-CCR**	EPA 3010	869917	EPA 6010	869934
60439820005	**ASH-04-CCR**	EPA 3010	869917	EPA 6010	869934
60439820001	**ASH-01-CCR**	EPA 3010	869915	EPA 6020	869933
60439820002	**ASH-06-CCR**	EPA 3010	869915	EPA 6020	869933
60439820003	**ERB-01-CCR**	EPA 3010	869915	EPA 6020	869933
60439820004	**ASH-05-CCR**	EPA 3010	869915	EPA 6020	869933
60439820005	**ASH-04-CCR**	EPA 3010	869915	EPA 6020	869933
60439820001	**ASH-01-CCR**	EPA 7470	870263	EPA 7470	870520
60439820002	**ASH-06-CCR**	EPA 7470	870263	EPA 7470	870520
60439820003	**ERB-01-CCR**	EPA 7470	870263	EPA 7470	870520
60439820004	**ASH-05-CCR**	EPA 7470	870263	EPA 7470	870520
60439820005	**ASH-04-CCR**	EPA 7470	870263	EPA 7470	870520
60439820001	**ASH-01-CCR**	SM 2540C	869526		
60439820002	**ASH-06-CCR**	SM 2540C	869526		
60439820003	**ERB-01-CCR**	SM 2540C	869526		
60439820004	**ASH-05-CCR**	SM 2540C	869526		
60439820005	**ASH-04-CCR**	SM 2540C	869526		
60439820001	**ASH-01-CCR**	EPA 9056	869558		
60439820002	**ASH-06-CCR**	EPA 9056	869558		
60439820003	**ERB-01-CCR**	EPA 9056	869558		
60439820004	**ASH-05-CCR**	EPA 9056	869558		
60439820005	**ASH-04-CCR**	EPA 9056	869558		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-LENE-0010_Sampl (SCUR_ESI)	WO# : 60439820
	Revision: 3	Effective Date: 01/12/202

60439820

Client Name: AECOM

Courier: FedEx ☑ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☐ Other ☐

Tracking #: 6432 1393 0403 Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ ZPLC

Thermometer Used: T298 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 1.4 **Corr. Factor** -0.3 **Corrected** 1.1

Date and initials of person examining contents: 10/14/23 JA

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 67187	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.	
Start:	Start:
End:	End:
Temp:	Temp:

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

Section A Required Client Information:

Company:	AECOM
Address:	6200 South Quebec St
	Greenwood Village, CO 80111
Email To:	brian.rothmeyer@aecom.com
Phone: (303) 740-2614	Fax:
Requested Due Date/TAT:	Standard

Section B Required Project Information:

Report To:	Vasanta Kalluri
Copy To:	Brian Rothmeyer
Purchase Order No.:	1599462
Project Name:	60709371 PRPA CCR
Project Number:	60709371

Section C Invoice Information:

Attention:	Accounts Payable
Company Name:	AECOM
Address:	Same as Section A
Pace Quote Reference:	42700
Pace Project Manager:	Heather Wilson
Pace Profile #:	11033, 3

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☑ OTHER CCR

Site Location STATE: CO

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test: 9056 Cl, F, SO4	6020 Total Metals*	6010 Total Metals**	7470 Total Mercury	2540C TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	ASH-01-CCR	WT	G	—	—	10/11/23	1045		3	2		1						N	X	X	X	X	X	N	60439820
2	ASH-06-CCR	WT	G	—	—	10/11/23	1150		3	2		1							X	X	X	X	X	N	
3	ERB-01-CCR	WT	G	—	—	10/11/23	1200		3	2		1							X	X	X	X	X	N	
4	ASH-05-CCR	WT	G	—	—	10/11/23	1335		3	2		1							X	X	X	X	X	N	
5	ASH-04-CCR	WT	G	—	—	10/11/23	1430		3	2		1							X	X	X	X	X	N	
6																									
7																									
8																									
9																									
10																									
11																									
12																									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl	AECOM	10/11/23	1745							
**B, Ca, Li				VPace	10/12	0840	1.1	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kara Hoppess, Olivia Helinski

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY): 10/11/23

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.08, 12-Oct-2007

Client: AECOM

Profile # 11033, 3

Site: 60709371 PRPA CCR

Notes

COC Line item	Matrix	VG9H	DG9H	DG9Q	VG9U	DG9U	DG9M	DG9B	BG1U	AG1H	AG1U	AG2U	AG3S	AG4U	AG5U	JGFU	WGKU	WGDU	BP1U	BP2U	BP3U	BP1N	BP3N	BP3F	BP3S	BP3C	BP3Z	WPDU	ZPLC	Other		
1	WT																		1		1	1										
2	↓																		↓		↓	↓										
3																																
4																																
5	↓																															
6																																
7																																
8																																
9																																
10																																
11																																
12																																

Container Codes

Glass			
DG9B	40mL bisulfate clear vial	WGKU	8oz clear soil jar
DG9H	40mL HCl amber voa vial	WGFU	4oz clear soil jar
DG9M	40mL MeOH clear vial	WG2U	2oz clear soil jar
DG9Q	40mL TSP amber vial	JGFU	4oz unpreserved amber wide
DG9S	40mL H2SO4 amber vial	AG0U	100mL unores amber glass
DG9T	40mL Na Thio amber vial	AG1H	1L HCl amber glass
DG9U	40mL amber unpreserved	AG1S	1L H2SO4 amber glass
VG9H	40mL HCl clear vial	AG1T	1L Na Thiosulfate clear/amber glass
VG9T	40mL Na Thio. clear vial	AG1U	1liter unpres amber glass
VG9U	40mL unpreserved clear vial	AG2N	500mL HNO3 amber glass
BG1S	1liter H2SO4 clear glass	AG2S	500mL H2SO4 amber glass
BG1U	1liter unpres glass	AG3S	250mL H2SO4 amber glass
BG3H	250mL HCL Clear glass	AG2U	500mL unpres amber glass
BG3U	250mL Unpres Clear glass	AG3U	250mL unpres amber glass
WGDU	16oz clear soil jar	AG4U	125mL unpres amber glass
		AG5U	100mL unpres amber glass

Plastic	
BP1C	1L NAOH plastic
BP1N	1L HNO3 plastic
BP1S	1L H2SO4 plastic
BP1U	1L unpreserved plastic
BP1Z	1L NaOH, Zn Acetate
BP2C	500mL NAOH plastic
BP2N	500mL HNO3 plastic
BP2S	500mL H2SO4 plastic
BP2U	500mL unpreserved plastic
BP2Z	500mL NaOH, Zn Acetate
BP3C	250mL NaOH plastic
BP3F	250mL HNO3 plastic - field filtered
BP3N	250mL HNO3 plastic
BP3U	250mL unpreserved plastic
BP3S	250mL H2SO4 plastic
BP3Z	250mL NaOH, Zn Acetate
BP4U	125mL unpreserved plastic
BP4N	125mL HNO3 plastic
BP4S	125mL H2SO4 plastic
WPDU	16oz unpresserved plstic

Misc.	
I	Wipe/Swab
SP5T	120mL Coliform Na Thiosulfate
ZPLC	Ziploc Bag
AF	Air Filter
C	Air Cassettes
R	Terracore Kit
U	Summa Can

Matrix	
WT	Water
SL	Solid
NAL	Non-aqueous Liquid
OL	OIL
WP	Wipe
DW	Drinking Water

Work Order Number: 60439820

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

November 15, 2023

Vasanta Kalluri
AECOM
6200 South Quebec Street
Greenwood Village, CO 80111

RE: Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 12, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Kansas City

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Heather M. Wilson

Heather Wilson
heather.wilson@pacelabs.com
1(913)563-1407
Project Manager

Enclosures

cc: Ann Cinabro, AECOM
Jamie Herman, AECOM
Jeremy Hurshman, AECOM
Brian Rothmeyer, AECOM

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Pace Analytical Services Kansas

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 88-00679
Illinois Certification #: 2000302023-5
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212023-1
Oklahoma Certification #: 2022-057
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-22-16
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60439823001	**ASH-08-CCR**	Water	10/10/23 10:55	10/12/23 08:40
60439823002	**ASH-09-CCR**	Water	10/10/23 12:40	10/12/23 08:40
60439823003	**ASH-03-CCR**	Water	10/10/23 14:10	10/12/23 08:40
60439823004	**DUP-01-CCR**	Water	10/10/23 00:00	10/12/23 08:40

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60439823001	**ASH-08-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	ZVF	1	PASI-K
		EPA 9056	BMT	3	PASI-K
60439823002	**ASH-09-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	ZVF	1	PASI-K
		EPA 9056	BMT, MLD	3	PASI-K
60439823003	**ASH-03-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	ZVF	1	PASI-K
		EPA 9056	BMT	3	PASI-K
60439823004	**DUP-01-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	ZVF	1	PASI-K
		EPA 9056	BMT	3	PASI-K

PASI-K = Pace Analytical Services - Kansas City

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Sample: ASH-08-CCR **Lab ID: 60439823001** Collected: 10/10/23 10:55 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Boron	**919**	ug/L	100	1	10/19/23 14:04	10/25/23 14:22	7440-42-8	
Calcium	**460000**	ug/L	200	1	10/19/23 14:04	10/25/23 14:22	7440-70-2	
Lithium	**326**	ug/L	10.0	1	10/19/23 14:04	10/25/23 14:22	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7440-36-0	D3
Arsenic	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7440-38-2	D3
Barium	**11.6**	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7440-39-3	
Beryllium	ND	ug/L	1.0	2	10/19/23 14:04	10/26/23 13:22	7440-41-7	D3
Cadmium	ND	ug/L	1.0	2	10/19/23 14:04	10/26/23 13:22	7440-43-9	D3
Chromium	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7440-47-3	D3
Cobalt	**2.0**	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7440-48-4	
Lead	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7439-92-1	D3
Molybdenum	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7439-98-7	D3
Selenium	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7782-49-2	D3
Thallium	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7440-28-0	D3
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
	Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 12:54	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
	Pace Analytical Services - Kansas City							
Total Dissolved Solids	**4400**	mg/L	100	1		10/17/23 15:09		BH
9056 IC Anions	Analytical Method: EPA 9056							
	Pace Analytical Services - Kansas City							
Chloride	**28.9**	mg/L	5.0	5		10/18/23 19:25	16887-00-6	
Fluoride	ND	mg/L	0.20	1		10/18/23 19:11	16984-48-8	
Sulfate	**2080**	mg/L	400	400		10/18/23 19:38	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Sample: ASH-09-CCR **Lab ID: 60439823002** Collected: 10/10/23 12:40 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Boron	**665**	ug/L	100	1	10/19/23 14:04	10/25/23 14:24	7440-42-8	
Calcium	**531000**	ug/L	200	1	10/19/23 14:04	10/25/23 14:24	7440-70-2	M1
Lithium	**466**	ug/L	10.0	1	10/19/23 14:04	10/25/23 14:24	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7440-36-0	D3
Arsenic	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7440-38-2	D3
Barium	**10.0**	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7440-39-3	
Beryllium	ND	ug/L	1.0	2	10/19/23 14:04	10/26/23 13:27	7440-41-7	D3
Cadmium	ND	ug/L	1.0	2	10/19/23 14:04	10/26/23 13:27	7440-43-9	D3
Chromium	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7440-47-3	D3
Cobalt	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7440-48-4	D3
Lead	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7439-92-1	D3
Molybdenum	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7439-98-7	
Selenium	**149**	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7782-49-2	
Thallium	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:27	7440-28-0	D3
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
	Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 12:56	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
	Pace Analytical Services - Kansas City							
Total Dissolved Solids	**5440**	mg/L	125	1		10/17/23 15:09		BH
9056 IC Anions	Analytical Method: EPA 9056							
	Pace Analytical Services - Kansas City							
Chloride	**278**	mg/L	20.0	20		10/18/23 20:45	16887-00-6	D6,M1
Fluoride	ND	mg/L	0.20	1		10/18/23 19:51	16984-48-8	M1
Sulfate	**3640**	mg/L	400	400		10/19/23 11:18	14808-79-8	D6,M1, R1

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Sample: ASH-03-CCR **Lab ID: 60439823003** Collected: 10/10/23 14:10 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Boron	**805**	ug/L	100	1	10/19/23 14:04	10/25/23 14:30	7440-42-8	
Calcium	**468000**	ug/L	200	1	10/19/23 14:04	10/25/23 14:30	7440-70-2	
Lithium	**434**	ug/L	10.0	1	10/19/23 14:04	10/25/23 14:30	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7440-36-0	D3
Arsenic	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7440-38-2	D3
Barium	**9.1**	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7440-39-3	
Beryllium	ND	ug/L	1.0	2	10/19/23 14:04	10/26/23 16:27	7440-41-7	D3
Cadmium	ND	ug/L	1.0	2	10/19/23 14:04	10/26/23 15:54	7440-43-9	D3
Chromium	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7440-47-3	D3
Cobalt	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7440-48-4	D3
Lead	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7439-92-1	D3
Molybdenum	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7439-98-7	D3
Selenium	**111**	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7782-49-2	
Thallium	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 15:54	7440-28-0	D3
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
	Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 13:07	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
	Pace Analytical Services - Kansas City							
Total Dissolved Solids	**5320**	mg/L	125	1		10/17/23 15:10		BH
9056 IC Anions	Analytical Method: EPA 9056							
	Pace Analytical Services - Kansas City							
Chloride	**100**	mg/L	10.0	10		10/18/23 22:18	16887-00-6	
Fluoride	ND	mg/L	0.20	1		10/18/23 22:05	16984-48-8	
Sulfate	**3000**	mg/L	400	400		10/18/23 22:32	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Sample: DUP-01-CCR **Lab ID: 60439823004** Collected: 10/10/23 00:00 Received: 10/12/23 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	**783**	ug/L	100	1	10/19/23 14:04	10/25/23 14:33	7440-42-8	
Calcium	**467000**	ug/L	200	1	10/19/23 14:04	10/25/23 14:33	7440-70-2	
Lithium	**430**	ug/L	10.0	1	10/19/23 14:04	10/25/23 14:33	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	1.0	1	10/19/23 14:04	10/26/23 15:59	7440-36-0	
Arsenic	ND	ug/L	1.0	1	10/19/23 14:04	10/26/23 15:59	7440-38-2	
Barium	**8.6**	ug/L	1.0	1	10/19/23 14:04	10/26/23 15:59	7440-39-3	
Beryllium	ND	ug/L	0.50	1	10/19/23 14:04	10/26/23 16:28	7440-41-7	
Cadmium	ND	ug/L	0.50	1	10/19/23 14:04	10/26/23 15:59	7440-43-9	
Chromium	ND	ug/L	1.0	1	10/19/23 14:04	10/26/23 15:59	7440-47-3	
Cobalt	ND	ug/L	1.0	1	10/19/23 14:04	10/26/23 15:59	7440-48-4	
Lead	ND	ug/L	2.0	2	10/19/23 14:04	10/27/23 12:07	7439-92-1	D3
Molybdenum	ND	ug/L	1.0	1	10/19/23 14:04	10/26/23 15:59	7439-98-7	
Selenium	**121**	ug/L	1.0	1	10/19/23 14:04	10/26/23 15:59	7782-49-2	
Thallium	ND	ug/L	2.0	2	10/19/23 14:04	10/27/23 12:07	7440-28-0	D3
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 13:10	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**5510**	mg/L	100	1		10/17/23 15:10		BH
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	**108**	mg/L	20.0	20		10/18/23 22:58	16887-00-6	
Fluoride	ND	mg/L	0.20	1		10/18/23 22:45	16984-48-8	
Sulfate	**3690**	mg/L	400	400		10/18/23 23:12	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

QC Batch: 870263
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

METHOD BLANK: 3446202 Matrix: Water
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	10/25/23 12:38	

LABORATORY CONTROL SAMPLE: 3446203

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3446204 3446205

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	4.4	4.4	88	88	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

QC Batch: 869918
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

METHOD BLANK: 3444762 Matrix: Water
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	ND	100	10/25/23 14:18	
Calcium	ug/L	ND	200	10/25/23 14:18	
Lithium	ug/L	ND	10.0	10/25/23 14:18	

LABORATORY CONTROL SAMPLE: 3444763

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	985	98	80-120	
Calcium	ug/L	10000	10700	107	80-120	
Lithium	ug/L	1000	966	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444764 3444765

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	665	1000	1000	1660	1670	100	101	75-125	1	20	
Calcium	ug/L	531000	10000	10000	539000	536000	83	49	75-125	1	20	M1
Lithium	ug/L	466	1000	1000	1600	1620	114	116	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

QC Batch: 869916
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

METHOD BLANK: 3444747 Matrix: Water
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	ND	1.0	10/26/23 13:00	
Arsenic	ug/L	ND	1.0	10/26/23 13:00	
Barium	ug/L	ND	1.0	10/26/23 13:00	
Beryllium	ug/L	ND	0.50	10/26/23 13:00	
Cadmium	ug/L	ND	0.50	10/26/23 13:00	
Chromium	ug/L	ND	1.0	10/26/23 13:00	
Cobalt	ug/L	ND	1.0	10/26/23 13:00	
Lead	ug/L	ND	1.0	10/26/23 13:00	
Molybdenum	ug/L	ND	1.0	10/26/23 13:00	
Selenium	ug/L	ND	1.0	10/26/23 13:00	
Thallium	ug/L	ND	1.0	10/26/23 13:00	

LABORATORY CONTROL SAMPLE: 3444748

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	40.7	102	80-120	
Arsenic	ug/L	40	40.9	102	80-120	
Barium	ug/L	40	40.2	101	80-120	
Beryllium	ug/L	40	41.5	104	80-120	
Cadmium	ug/L	40	41.1	103	80-120	
Chromium	ug/L	40	40.6	101	80-120	
Cobalt	ug/L	40	40.9	102	80-120	
Lead	ug/L	40	40.5	101	80-120	
Molybdenum	ug/L	40	41.5	104	80-120	
Selenium	ug/L	40	41.1	103	80-120	
Thallium	ug/L	40	39.5	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444749 3444750

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	ND	40	40	36.0	35.8	90	89	75-125	1	20	
Arsenic	ug/L	ND	40	40	40.7	41.2	99	100	75-125	1	20	
Barium	ug/L	10.0	40	40	48.1	47.8	95	95	75-125	1	20	
Beryllium	ug/L	ND	40	40	35.0	34.8	87	87	75-125	1	20	
Cadmium	ug/L	ND	40	40	32.8	32.5	82	81	75-125	1	20	
Chromium	ug/L	ND	40	40	32.4	33.0	80	81	75-125	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444749 3444750

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cobalt	ug/L	ND	40	40	37.7	37.8	93	94	75-125	0	20	
Lead	ug/L	ND	40	40	35.6	35.9	88	89	75-125	1	20	
Molybdenum	ug/L	ND	40	40	42.4	42.2	103	103	75-125	1	20	
Selenium	ug/L	149	40	40	192	192	107	107	75-125	0	20	
Thallium	ug/L	ND	40	40	34.9	35.4	87	88	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

QC Batch: 869350 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

METHOD BLANK: 3442741 Matrix: Water
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	7.0	5.0	10/17/23 15:03	1e,BH

LABORATORY CONTROL SAMPLE: 3442742

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1000	100	80-120	1e,BH

SAMPLE DUPLICATE: 3442743

Parameter	Units	60439767002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	5640	5480	3	10	1e,BH

SAMPLE DUPLICATE: 3442744

Parameter	Units	60439769004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	202	173	16	10	BH,D6

SAMPLE DUPLICATE: 3442745

Parameter	Units	60439823002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	5440	5650	4	10	1e,BH

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

QC Batch: 869558
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

METHOD BLANK: 3443402 Matrix: Water
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	10/18/23 11:09	
Fluoride	mg/L	ND	0.20	10/18/23 11:09	
Sulfate	mg/L	ND	1.0	10/18/23 11:09	

METHOD BLANK: 3444753 Matrix: Water
Associated Lab Samples: 60439823001, 60439823002, 60439823003, 60439823004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	10/19/23 09:15	
Fluoride	mg/L	ND	0.20	10/19/23 09:15	
Sulfate	mg/L	ND	1.0	10/19/23 09:15	

LABORATORY CONTROL SAMPLE: 3443403

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	98	80-120	
Fluoride	mg/L	2.5	2.5	98	80-120	
Sulfate	mg/L	5	5.0	100	80-120	

LABORATORY CONTROL SAMPLE: 3444754

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	97	80-120	
Fluoride	mg/L	2.5	2.5	102	80-120	
Sulfate	mg/L	5	5.1	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3443404 3443405

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	278	100	100	321	343	43	65	80-120	7	15	M1
Fluoride	mg/L	ND	2.5	2.5	2.0	2.1	75	77	80-120	2	15	M1
Sulfate	mg/L	3640	2000	2000	4940	6200	65	128	80-120	23	15	M1,R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

SAMPLE DUPLICATE: 3443406

Parameter	Units	60439823002 Result	Dup Result	RPD	Max RPD	Qualifiers
Chloride	mg/L	278	236	17	15	D6
Fluoride	mg/L	ND	ND		15	
Sulfate	mg/L	3640	4550	22	15	D6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

1e	Achieving a constant weight was not met with this sample.
BH	Analyte was detected in an instrument blank. The result may be biased high.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60709371 PRPA CCR
Pace Project No.: 60439823

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60439823001	**ASH-08-CCR**	EPA 3010	869918	EPA 6010	869936
60439823002	**ASH-09-CCR**	EPA 3010	869918	EPA 6010	869936
60439823003	**ASH-03-CCR**	EPA 3010	869918	EPA 6010	869936
60439823004	**DUP-01-CCR**	EPA 3010	869918	EPA 6010	869936
60439823001	**ASH-08-CCR**	EPA 3010	869916	EPA 6020	869935
60439823002	**ASH-09-CCR**	EPA 3010	869916	EPA 6020	869935
60439823003	**ASH-03-CCR**	EPA 3010	869916	EPA 6020	869935
60439823004	**DUP-01-CCR**	EPA 3010	869916	EPA 6020	869935
60439823001	**ASH-08-CCR**	EPA 7470	870263	EPA 7470	870520
60439823002	**ASH-09-CCR**	EPA 7470	870263	EPA 7470	870520
60439823003	**ASH-03-CCR**	EPA 7470	870263	EPA 7470	870520
60439823004	**DUP-01-CCR**	EPA 7470	870263	EPA 7470	870520
60439823001	**ASH-08-CCR**	SM 2540C	869350		
60439823002	**ASH-09-CCR**	SM 2540C	869350		
60439823003	**ASH-03-CCR**	SM 2540C	869350		
60439823004	**DUP-01-CCR**	SM 2540C	869350		
60439823001	**ASH-08-CCR**	EPA 9056	869558		
60439823002	**ASH-09-CCR**	EPA 9056	869558		
60439823003	**ASH-03-CCR**	EPA 9056	869558		
60439823004	**DUP-01-CCR**	EPA 9056	869558		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-LENE-0010_San (SCUR_ESI)	
	Revision: 3	Effective Date: 01/12/2022

WO# : 60439823

60439823

Client Name: AECOM

Courier: FedEx ☑ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☐ Other ☐

Tracking #: 6432 1393 0756 Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ 2PLC

Thermometer Used: T298 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 1.7 **Corr. Factor** -0.3 **Corrected** 1.4

Date and initials of person examining contents: 10/14/23 JA

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: W	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 67184	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.

Start:	Start:
End:	End:
Temp:	Temp:

Qualtrax Document ID: 30473

Page 1 of 1

CCR KS

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

Section A Required Client Information:

Company:	AECOM
Address:	6200 South Quebec St
	Greenwood Village, CO 80111
Email To:	brian.rothmeyer@aecom.com
Phone: (303) 740-2614	Fax:
Requested Due Date/TAT:	Standard

Section B Required Project Information:

Report To:	Vasanta Kalluri
Copy To:	Brian Rothmeyer
Purchase Order No.:	1599462
Project Name:	60709371 PRPA CCR
Project Number:	60709371

Section C Invoice Information:

Attention:	Accounts Payable
Company Name:	AECOM
Address:	Same as Section A
Pace Quote Reference:	42700
Pace Project Manager:	Heather Wilson
Pace Profile #:	11033, 3

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ✓ OTHER CCR

Site Location STATE: CO

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	Valid Matrix Codes: MATRIX / CODE — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED: COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test ↓ Y/N	9056 Cl, F, SO4	6020 Total Metals*	6010 Total Metals**	7470 Total Mercury	2540C TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	ASH-08-CCR		WT	G	—	—	10/10/23	1055		3	2		1						N	X	X	X	X	X	N	6043923
2	ASH-09-CCR		WT	G	—	—	10/10/23	1240		7	4		3						N	X	X	X	X	X	N	
3	ASH-03-CCR		WT	G	—	—	10/10/23	1410		3	2		1						N	X	X	X	X	X	N	
4	DUP-01-CCR		WT	G	—	—	10/10/23	—		3	2		1						N	X	X	X	X	X	N	
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl	AECOM	10/10/23	1655							
**B, Ca, Li					10/12	0840	1.4	4	Y	4
MS/MSD collected for ASH-09-CCR.										

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kara Hoppes & Olivia Helinski

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY): 10/10/23

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Client: AECom

Profile #: 11033, 3

Site: 60709371 PRPA CCR

Notes:

COC Line Item	Matrix	VG9H	DG9H	DG9Q	VG9U	DG9U	DG9M	DG9B	BG1U	AG1H	AG1U	AG2U	AG3S	AG4U	AG5U	JGFU	WGKU	WGDU	BP1U	BP2U	BP3U	BP1N	BP3N	BP3F	BP3S	BP3C	BP3Z	WPDU	ZPLC	Other		
1	WT																		1		1	1										
2																			1		3	3										
3																			1		1	1										
4																			1		1	1										
5																																
6																																
7																																
8																																
9																																
10																																
11																																
12																																

Container Codes

Glass				Plastic		Misc.	
DG9B	40mL bisulfate clear vial	WGKU	8oz clear soil jar	BP1C	1L NAOH plastic	I	Wipe/Swab
DG9H	40mL HCl amber voa vial	WGFU	4oz clear soil jar	BP1N	1L HNO3 plastic	SP5T	120mL Coliform Na Thiosulfate
DG9M	40mL MeOH clear vial	WG2U	2oz clear soil jar	BP1S	1L H2SO4 plastic	ZPLC	Ziploc Bag
DG9Q	40mL TSP amber vial	JGFU	4oz unpreserved amber wide	BP1U	1L unpreserved plastic	AF	Air Filter
DG9S	40mL H2SO4 amber vial	AG0U	100mL unores amber glass	BP1Z	1L NaOH, Zn Acetate	C	Air Cassettes
DG9T	40mL Na Thio amber vial	AG1H	1L HCl amber glass	BP2C	500mL NAOH plastic	R	Terracore Kit
DG9U	40mL amber unpreserved	AG1S	1L H2SO4 amber glass	BP2N	500mL HNO3 plastic	U	Summa Can
VG9H	40mL HCl clear vial	AG1T	1L Na Thiosulfate clear/amber glass	BP2S	500mL H2SO4 plastic		
VG9T	40mL Na Thio. clear vial	AG1U	1liter unpres amber glass	BP2U	500mL unpreserved plastic		
VG9U	40mL unpreserved clear vial	AG2N	500mL HNO3 amber glass	BP2Z	500mL NaOH, Zn Acetate	**Matrix**	
BG1S	1liter H2SO4 clear glass	AG2S	500mL H2SO4 amber glass	BP3C	250mL NaOH plastic		
BG1U	1liter unpres glass	AG3S	250mL H2SO4 amber glass	BP3F	250mL HNO3 plastic - field filtered	WT	Water
BG3H	250mL HCL Clear glass	AG2U	500mL unpres amber glass	BP3N	250mL HNO3 plastic	SL	Solid
BG3U	250mL Unpres Clear glass	AG3U	250mL unpres amber glass	BP3U	250mL unpreserved plastic	NAL	Non-aqueous Liquid
WGDU	16oz clear soil jar	AG4U	125mL unpres amber glass	BP3S	250mL H2SO4 plastic	OL	OIL
		AG5U	100mL unpres amber glass	BP3Z	250mL NaOH, Zn Acetate	WP	Wipe
				BP4U	125mL unpreserved plastic	DW	Drinking Water
				BP4N	125mL HNO3 plastic		
				BP4S	125mL H2SO4 plastic		
				WPDU	16oz unpresserved plstic		

Work Order Number: 60439823

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

November 13, 2023

Vasanta Kalluri
AECOM
6200 South Quebec Street
Greenwood Village, CO 80111

RE: Project: 60709371 PRPA CCR
Pace Project No.: 60439904

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 13, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Kansas City

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Heather M. Wilson

Heather Wilson
heather.wilson@pacelabs.com
1(913)563-1407
Project Manager

Enclosures

cc: Ann Cinabro, AECOM
Jamie Herman, AECOM
Jeremy Hurshman, AECOM
Brian Rothmeyer, AECOM

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

Pace Analytical Services Kansas
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 88-00679
Illinois Certification #: 2000302023-5
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212023-1
Oklahoma Certification #: 2022-057
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-22-16
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60439904001	**ASH-02-CCR**	Water	10/12/23 08:45	10/13/23 08:30
60439904002	**ASH-07-CCR**	Water	10/12/23 10:25	10/13/23 08:30

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60439904001	**ASH-02-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	BDH1	1	PASI-K
		EPA 9056	BMT	3	PASI-K
60439904002	**ASH-07-CCR**	EPA 6010	JXD	3	PASI-K
		EPA 6020	JGP	11	PASI-K
		EPA 7470	MRV	1	PASI-K
		SM 2540C	BDH1	1	PASI-K
		EPA 9056	BMT	3	PASI-K

PASI-K = Pace Analytical Services - Kansas City

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

Sample: ASH-02-CCR **Lab ID: 60439904001** Collected: 10/12/23 08:45 Received: 10/13/23 08:30 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Boron	**2010**	ug/L	100	1	10/19/23 14:04	10/25/23 14:35	7440-42-8	
Calcium	**177000**	ug/L	200	1	10/19/23 14:04	10/25/23 14:35	7440-70-2	
Lithium	**325**	ug/L	10.0	1	10/19/23 14:04	10/25/23 14:35	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010							
	Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7440-36-0	D3
Arsenic	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7440-38-2	D3
Barium	**23.6**	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7440-39-3	
Beryllium	ND	ug/L	1.5	3	10/19/23 14:04	11/05/23 15:28	7440-41-7	D3
Cadmium	ND	ug/L	1.5	3	10/19/23 14:04	11/05/23 15:28	7440-43-9	D3
Chromium	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7440-47-3	D3
Cobalt	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7440-48-4	D3
Lead	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7439-92-1	D3
Molybdenum	**7.7**	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7439-98-7	
Selenium	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7782-49-2	D3
Thallium	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7440-28-0	D3
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
	Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 13:12	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
	Pace Analytical Services - Kansas City							
Total Dissolved Solids	**3330**	mg/L	100	1		10/19/23 12:25		
9056 IC Anions	Analytical Method: EPA 9056							
	Pace Analytical Services - Kansas City							
Chloride	**22.8**	mg/L	5.0	5		10/18/23 23:38	16887-00-6	
Fluoride	ND	mg/L	0.20	1		10/18/23 23:25	16984-48-8	
Sulfate	**2330**	mg/L	200	200		10/19/23 00:18	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

Sample: ASH-07-CCR **Lab ID: 60439904002** Collected: 10/12/23 10:25 Received: 10/13/23 08:30 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Boron	**845**	ug/L	100	1	10/19/23 14:04	10/25/23 14:43	7440-42-8	
Calcium	**435000**	ug/L	200	1	10/19/23 14:04	10/25/23 14:43	7440-70-2	
Lithium	**543**	ug/L	10.0	1	10/19/23 14:04	10/25/23 14:43	7439-93-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Kansas City							
Antimony	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7440-36-0	D3
Arsenic	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7440-38-2	D3
Barium	**11.1**	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7440-39-3	
Beryllium	ND	ug/L	1.5	3	10/19/23 14:04	11/05/23 15:32	7440-41-7	D3
Cadmium	ND	ug/L	1.5	3	10/19/23 14:04	11/05/23 15:32	7440-43-9	D3
Chromium	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7440-47-3	D3
Cobalt	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7440-48-4	D3
Lead	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7439-92-1	D3
Molybdenum	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7439-98-7	D3
Selenium	**101**	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7782-49-2	
Thallium	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7440-28-0	D3
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Kansas City							
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 13:14	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Kansas City							
Total Dissolved Solids	**7110**	mg/L	143	1		10/19/23 12:25		
9056 IC Anions	Analytical Method: EPA 9056 Pace Analytical Services - Kansas City							
Chloride	**214**	mg/L	200	200		10/19/23 00:45	16887-00-6	
Fluoride	ND	mg/L	0.20	1		10/19/23 00:32	16984-48-8	
Sulfate	**3440**	mg/L	1000	1000		10/19/23 00:59	14808-79-8	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

QC Batch: 870263
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439904001, 60439904002

METHOD BLANK: 3446202 Matrix: Water
Associated Lab Samples: 60439904001, 60439904002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	10/25/23 12:38	

LABORATORY CONTROL SAMPLE: 3446203

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3446204 3446205

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	4.4	4.4	88	88	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

QC Batch: 869918
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439904001, 60439904002

METHOD BLANK: 3444762 Matrix: Water
Associated Lab Samples: 60439904001, 60439904002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	ND	100	10/25/23 14:18	
Calcium	ug/L	ND	200	10/25/23 14:18	
Lithium	ug/L	ND	10.0	10/25/23 14:18	

LABORATORY CONTROL SAMPLE: 3444763

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	985	98	80-120	
Calcium	ug/L	10000	10700	107	80-120	
Lithium	ug/L	1000	966	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444764 3444765

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	665	1000	1000	1660	1670	100	101	75-125	1	20	
Calcium	ug/L	531000	10000	10000	539000	536000	83	49	75-125	1	20	M1
Lithium	ug/L	466	1000	1000	1600	1620	114	116	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

QC Batch: 869916
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439904001, 60439904002

METHOD BLANK: 3444747 Matrix: Water
Associated Lab Samples: 60439904001, 60439904002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	ND	1.0	10/26/23 13:00	
Arsenic	ug/L	ND	1.0	10/26/23 13:00	
Barium	ug/L	ND	1.0	10/26/23 13:00	
Beryllium	ug/L	ND	0.50	10/26/23 13:00	
Cadmium	ug/L	ND	0.50	10/26/23 13:00	
Chromium	ug/L	ND	1.0	10/26/23 13:00	
Cobalt	ug/L	ND	1.0	10/26/23 13:00	
Lead	ug/L	ND	1.0	10/26/23 13:00	
Molybdenum	ug/L	ND	1.0	10/26/23 13:00	
Selenium	ug/L	ND	1.0	10/26/23 13:00	
Thallium	ug/L	ND	1.0	10/26/23 13:00	

LABORATORY CONTROL SAMPLE: 3444748

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	40.7	102	80-120	
Arsenic	ug/L	40	40.9	102	80-120	
Barium	ug/L	40	40.2	101	80-120	
Beryllium	ug/L	40	41.5	104	80-120	
Cadmium	ug/L	40	41.1	103	80-120	
Chromium	ug/L	40	40.6	101	80-120	
Cobalt	ug/L	40	40.9	102	80-120	
Lead	ug/L	40	40.5	101	80-120	
Molybdenum	ug/L	40	41.5	104	80-120	
Selenium	ug/L	40	41.1	103	80-120	
Thallium	ug/L	40	39.5	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444749 3444750

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	ND	40	40	36.0	35.8	90	89	75-125	1	20	
Arsenic	ug/L	ND	40	40	40.7	41.2	99	100	75-125	1	20	
Barium	ug/L	10.0	40	40	48.1	47.8	95	95	75-125	1	20	
Beryllium	ug/L	ND	40	40	35.0	34.8	87	87	75-125	1	20	
Cadmium	ug/L	ND	40	40	32.8	32.5	82	81	75-125	1	20	
Chromium	ug/L	ND	40	40	32.4	33.0	80	81	75-125	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444749 3444750

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cobalt	ug/L	ND	40	40	37.7	37.8	93	94	75-125	0	20	
Lead	ug/L	ND	40	40	35.6	35.9	88	89	75-125	1	20	
Molybdenum	ug/L	ND	40	40	42.4	42.2	103	103	75-125	1	20	
Selenium	ug/L	149	40	40	192	192	107	107	75-125	0	20	
Thallium	ug/L	ND	40	40	34.9	35.4	87	88	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

QC Batch: 869801
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439904001, 60439904002

METHOD BLANK: 3444342 Matrix: Water
Associated Lab Samples: 60439904001, 60439904002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	5.0	10/19/23 12:23	

LABORATORY CONTROL SAMPLE: 3444343

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	998	100	80-120	

SAMPLE DUPLICATE: 3444344

Parameter	Units	60439695001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	854	894	5	10	

SAMPLE DUPLICATE: 3444345

Parameter	Units	60439956004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	6040	5900	2	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

QC Batch: 869558
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60439904001, 60439904002

METHOD BLANK: 3443402 Matrix: Water
Associated Lab Samples: 60439904001, 60439904002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	10/18/23 11:09	
Fluoride	mg/L	ND	0.20	10/18/23 11:09	
Sulfate	mg/L	ND	1.0	10/18/23 11:09	

METHOD BLANK: 3444753 Matrix: Water
Associated Lab Samples: 60439904001, 60439904002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	10/19/23 09:15	
Fluoride	mg/L	ND	0.20	10/19/23 09:15	
Sulfate	mg/L	ND	1.0	10/19/23 09:15	

LABORATORY CONTROL SAMPLE: 3443403

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	98	80-120	
Fluoride	mg/L	2.5	2.5	98	80-120	
Sulfate	mg/L	5	5.0	100	80-120	

LABORATORY CONTROL SAMPLE: 3444754

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	97	80-120	
Fluoride	mg/L	2.5	2.5	102	80-120	
Sulfate	mg/L	5	5.1	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3443404 3443405

Parameter	Units	60439823002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	278	100	100	321	343	43	65	80-120	7	15	M1
Fluoride	mg/L	ND	2.5	2.5	2.0	2.1	75	77	80-120	2	15	M1
Sulfate	mg/L	3640	2000	2000	4940	6200	65	128	80-120	23	15	M1,R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

SAMPLE DUPLICATE: 3443406

Parameter	Units	60439823002 Result	Dup Result	RPD	Max RPD	Qualifiers
Chloride	mg/L	278	236	17	15	D6
Fluoride	mg/L	ND	ND		15	
Sulfate	mg/L	3640	4550	22	15	D6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60709371 PRPA CCR
Pace Project No.: 60439904

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60439904001	**ASH-02-CCR**	EPA 3010	869918	EPA 6010	869936
60439904002	**ASH-07-CCR**	EPA 3010	869918	EPA 6010	869936
60439904001	**ASH-02-CCR**	EPA 3010	869916	EPA 6020	869935
60439904002	**ASH-07-CCR**	EPA 3010	869916	EPA 6020	869935
60439904001	**ASH-02-CCR**	EPA 7470	870263	EPA 7470	870520
60439904002	**ASH-07-CCR**	EPA 7470	870263	EPA 7470	870520
60439904001	**ASH-02-CCR**	SM 2540C	869801		
60439904002	**ASH-07-CCR**	SM 2540C	869801		
60439904001	**ASH-02-CCR**	EPA 9056	869558		
60439904002	**ASH-07-CCR**	EPA 9056	869558		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

WO# : 60439904

60439904

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-LENE-0009_Sample Co		
	Revision: 2	Effective Date: 01/12/2022	Issued By: Lenexa

Client Name: AECOM

Courier: FedEx ☑ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☐ Other ☐

Tracking #: 6432 13930447 Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☑ Other ☐

Thermometer Used: T298 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): **As-read** 0.1-3 **Corr. Factor** -0.3 **Corrected** 1.0

Temperature should be above freezing to 6°C PW 10/17/23

Date and initials of person examining contents: PW 10/17/23

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☑No ☐N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 67187	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

CCR KS

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:

Company:	AECOM
Address:	6200 South Quebec St
	Greenwood Village, CO 80111
Email To:	brian.rothmeyer@aecom.com
Phone: (303) 740-2614	Fax:
Requested Due Date/TAT:	Standard

Section B Required Project Information:

Report To:	Vasanta Kalluri
Copy To:	Brian Rothmeyer
Purchase Order No.:	1599462
Project Name:	60709371 PRPA CCR
Project Number:	60709371

Section C Invoice Information:

Attention:	Accounts Payable
Company Name:	AECOM
Address:	Same as Section A
Pace Quote Reference:	42700
Pace Project Manager:	Heather Wilson
Pace Profile #:	11033, 3

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☑ OTHER CCR

Site Location STATE: CO

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	9056 Cl, F, SO4	6020 Total Metals*	6010 Total Metals**	7470 Total Mercury	2540C TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Requested Analysis Filtered (Y/N)	N →						
1	ASH-02-CCR	WT	G	—	—	10/12/23	0845		3	2		1							X	X	X	X	X	N	60439904
2	ASH-07-CCR	WT	G	—	—	10/12/23	1025		5	2		1							X	X	X	X	X	N	
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									

Pace Project No./ Lab I.D.

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl	/AECOM	10/12/23	1730							
**B, Ca, Li				VKPaul	10/13	0830	1.0	Y	Y	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Olivia Helinski

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 10/12/23

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Client: AECOM Profile # 11033-3

Site: Notes

COC Line Item	Matrix	VG9H	DG9H	DG9Q	VG9U	DG9U	DG9M	DG9B	BG1U	AG1H	AG1U	AG2U	AG3S	AG4U	AG5U	JGFU	WGKU	WGDU	BP1U	BP2U	BP3U	BP1N	BP3N	BP3F	BP3S	BP3C	BP3Z	WPDU	ZPLC	Other		
1	WT																		1		1	1										
2	1																		1		1	1										
3																																
4																																
5																																
6																																
7																																
8																																
9																																
10																																
11																																
12																																

Container Codes

Glass			
DG9B	40mL bisulfate clear vial	WGKU	8oz clear soil jar
DG9H	40mL HCl amber voa vial	WGFU	4oz clear soil jar
DG9M	40mL MeOH clear vial	WG2U	2oz clear soil jar
DG9Q	40mL TSP amber vial	JGFU	4oz unpreserved amber wide
DG9S	40mL H2SO4 amber vial	AG0U	100mL unores amber glass
DG9T	40mL Na Thio amber vial	AG1H	1L HCl amber glass
DG9U	40mL amber unpreserved	AG1S	1L H2SO4 amber glass
VG9H	40mL HCl clear vial	AG1T	1L Na Thiosulfate clear/amber glass
VG9T	40mL Na Thio. clear vial	AG1U	1liter unpres amber glass
VG9U	40mL unpreserved clear vial	AG2N	500mL HNO3 amber glass
BG1S	1liter H2SO4 clear glass	AG2S	500mL H2SO4 amber glass
BG1U	1liter unpres glass	AG3S	250mL H2SO4 amber glass
BG3H	250mL HCL Clear glass	AG2U	500mL unpres amber glass
BG3U	250mL Unpres Clear glass	AG3U	250mL unpres amber glass
WGDU	16oz clear soil jar	AG4U	125mL unpres amber glass
		AG5U	100mL unpres amber glass

Plastic	
BP1C	1L NAOH plastic
BP1N	1L HNO3 plastic
BP1S	1L H2SO4 plastic
BP1U	1L unpreserved plastic
BP1Z	1L NaOH, Zn Acetate
BP2C	500mL NAOH plastic
BP2N	500mL HNO3 plastic
BP2S	500mL H2SO4 plastic
BP2U	500mL unpreserved plastic
BP2Z	500mL NaOH, Zn Acetate
BP3C	250mL NaOH plastic
BP3F	250mL HNO3 plastic - field filtered
BP3N	250mL HNO3 plastic
BP3U	250mL unpreserved plastic
BP3S	250mL H2SO4 plastic
BP3Z	250mL NaOH, Zn Acetate
BP4U	125mL unpreserved plastic
BP4N	125mL HNO3 plastic
BP4S	125mL H2SO4 plastic
WPDU	16oz unpresserved plstic

Misc.	
I	Wipe/Swab
SP5T	120mL Coliform Na Thiosulfate
ZPLC	Ziploc Bag
AF	Air Filter
C	Air Cassettes
R	Terracore Kit
U	Summa Can

Matrix	
WT	Water
SL	Solid
NAL	Non-aqueous Liquid
OL	OIL
WP	Wipe
DW	Drinking Water

Work Order Number: 60439904

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

November 03, 2023

Vasanta Kalluri
AECOM
6200 South Quebec Street
Greenwood Village, CO 80111

RE: Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 13, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Greensburg

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Heather M. Wilson

Heather Wilson
heather.wilson@pacelabs.com
1(913)563-1407
Project Manager

Enclosures

cc: Ann Cinabro, AECOM
Jamie Herman, AECOM
Jeremy Hurshman, AECOM
Brian Rothmeyer, AECOM

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Pace Analytical Services Pennsylvania
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
ANABISO/IEC 17025:2017 Rad Cert#: L24170
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 2950
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA010
Louisiana DEQ/TNI Certification #: 04086
Maine Certification #: 2023021
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572023-03
New Hampshire/TNI Certification #: 297622
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-015
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: TN02867
Texas/TNI Certification #: T104704188-22-18
Utah/TNI Certification #: PA014572223-14
USDA Soil Permit #: 525-23-67-77263
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60440184001	**ASH-01-CCR**	Water	10/11/23 10:45	10/13/23 09:10
60440184002	**ASH-06-CCR**	Water	10/11/23 11:50	10/13/23 09:10
60440184003	**ERB-01-CCR**	Water	10/11/23 12:00	10/13/23 09:10
60440184004	**ASH-05-CCR**	Water	10/11/23 13:35	10/13/23 09:10
60440184005	**ASH-04-CCR**	Water	10/11/23 14:30	10/13/23 09:10
60440184006	**ASH-02-CCR**	Water	10/12/23 08:45	10/13/23 09:10
60440184007	**ASH-07-CCR**	Water	10/12/23 10:25	10/13/23 09:10

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60440184001	**ASH-01-CCR**	EPA 903.1	CLM	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60440184002	**ASH-06-CCR**	EPA 903.1	CLM	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60440184003	**ERB-01-CCR**	EPA 903.1	CLM	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60440184004	**ASH-05-CCR**	EPA 903.1	CLM	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60440184005	**ASH-04-CCR**	EPA 903.1	CLM	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60440184006	**ASH-02-CCR**	EPA 903.1	CLM	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
60440184007	**ASH-07-CCR**	EPA 903.1	CLM	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA

PASI-PA = Pace Analytical Services - Greensburg

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Sample: ASH-01-CCR **Lab ID: 60440184001** Collected: 10/11/23 10:45 Received: 10/13/23 09:10 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.121 ± 0.443 (0.851) C:NA T:89%**	pCi/L	10/31/23 15:19	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**1.08 ± 0.513 (0.902) C:82% T:80%**	pCi/L	10/26/23 12:47	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**1.20 ± 0.956 (1.75)**	pCi/L	11/01/23 10:57	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Sample: ASH-06-CCR **Lab ID: 60440184002** Collected: 10/11/23 11:50 Received: 10/13/23 09:10 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.000 ± 0.584 (1.16) C:NA T:86%**	pCi/L	10/31/23 14:02	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.397 ± 0.427 (0.893) C:79% T:80%**	pCi/L	10/26/23 12:47	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.397 ± 1.01 (2.05)**	pCi/L	11/01/23 10:57	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Sample: ERB-01-CCR **Lab ID: 60440184003** Collected: 10/11/23 12:00 Received: 10/13/23 09:10 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.0739 ± 0.435 (0.888) C:NA T:90%**	pCi/L	10/31/23 14:02	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.462 ± 0.433 (0.892) C:79% T:83%**	pCi/L	10/26/23 12:48	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.536 ± 0.868 (1.78)**	pCi/L	11/01/23 10:57	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Sample: ASH-05-CCR **Lab ID: 60440184004** Collected: 10/11/23 13:35 Received: 10/13/23 09:10 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.649 ± 0.653 (1.03) C:NA T:94%**	pCi/L	10/31/23 14:02	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.547 ± 0.465 (0.948) C:77% T:84%**	pCi/L	10/26/23 12:48	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**1.20 ± 1.12 (1.98)**	pCi/L	11/01/23 10:57	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Sample: ASH-04-CCR **Lab ID: 60440184005** Collected: 10/11/23 14:30 Received: 10/13/23 09:10 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**1.68 ± 0.823 (0.946) C:NA T:90%**	pCi/L	10/31/23 14:16	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**-0.00464 ± 0.278 (0.653) C:80% T:84%**	pCi/L	10/26/23 12:49	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**1.68 ± 1.10 (1.60)**	pCi/L	11/01/23 10:57	7440-14-4	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Sample: ASH-02-CCR **Lab ID: 60440184006** Collected: 10/12/23 08:45 Received: 10/13/23 09:10 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**-0.143 ± 0.444 (1.01) C:NA T:88%**	pCi/L	10/31/23 14:16	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.188 ± 0.306 (0.664) C:82% T:83%**	pCi/L	10/26/23 12:49	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.188 ± 0.750 (1.67)**	pCi/L	11/01/23 10:57	7440-14-4	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Sample: ASH-07-CCR **Lab ID: 60440184007** Collected: 10/12/23 10:25 Received: 10/13/23 09:10 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.378 ± 0.581 (0.999) C:NA T:88%**	pCi/L	10/31/23 14:16	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.539 ± 0.373 (0.717) C:85% T:82%**	pCi/L	10/26/23 12:49	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.917 ± 0.954 (1.72)**	pCi/L	11/01/23 10:57	7440-14-4	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

QC Batch: 623938
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60440184001, 60440184002, 60440184003, 60440184004, 60440184005, 60440184006, 60440184007

METHOD BLANK: 3041606 Matrix: Water
Associated Lab Samples: 60440184001, 60440184002, 60440184003, 60440184004, 60440184005, 60440184006, 60440184007

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.267 ± 0.378 (0.641) C:NA T:89%	pCi/L	10/31/23 14:02	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL - RADIOCHEMISTRY

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

QC Batch: 623941 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60440184001, 60440184002, 60440184003, 60440184004, 60440184005, 60440184006, 60440184007

METHOD BLANK: 3041608 Matrix: Water
Associated Lab Samples: 60440184001, 60440184002, 60440184003, 60440184004, 60440184005, 60440184006, 60440184007

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.784 ± 0.404 (0.703) C:77% T:82%	pCi/L	10/26/23 12:51	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval). Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60709371 PRPA CCR
Pace Project No.: 60440184

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60440184001	**ASH-01-CCR**	EPA 903.1	623938		
60440184002	**ASH-06-CCR**	EPA 903.1	623938		
60440184003	**ERB-01-CCR**	EPA 903.1	623938		
60440184004	**ASH-05-CCR**	EPA 903.1	623938		
60440184005	**ASH-04-CCR**	EPA 903.1	623938		
60440184006	**ASH-02-CCR**	EPA 903.1	623938		
60440184007	**ASH-07-CCR**	EPA 903.1	623938		
60440184001	**ASH-01-CCR**	EPA 904.0	623941		
60440184002	**ASH-06-CCR**	EPA 904.0	623941		
60440184003	**ERB-01-CCR**	EPA 904.0	623941		
60440184004	**ASH-05-CCR**	EPA 904.0	623941		
60440184005	**ASH-04-CCR**	EPA 904.0	623941		
60440184006	**ASH-02-CCR**	EPA 904.0	623941		
60440184007	**ASH-07-CCR**	EPA 904.0	623941		
60440184001	**ASH-01-CCR**	Total Radium Calculation	626359		
60440184002	**ASH-06-CCR**	Total Radium Calculation	626359		
60440184003	**ERB-01-CCR**	Total Radium Calculation	626359		
60440184004	**ASH-05-CCR**	Total Radium Calculation	626359		
60440184005	**ASH-04-CCR**	Total Radium Calculation	626359		
60440184006	**ASH-02-CCR**	Total Radium Calculation	626359		
60440184007	**ASH-07-CCR**	Total Radium Calculation	626359		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Internal Transfer Chain of Custody

☐ Rush Multiplier____X
☐ Samples Pre-Logged into eCOC

State Of Origin: CO
Cert. Needed: ☐ Yes ☒ No

Workorder: 60440184 **Workorder Name:** 60709371 PRPA CCR

Owner Received Date: 10/13/2023 **Results Requested By:** 11/3/2023

Report To	Subcontract To
Heather Wilson Pace Analytical Kansas 9608 Loiret Blvd. Lenexa, KS 66219 Phone 1(913)563-1407	Pace Analytical Pittsburgh 1638 Roseytown Road Suites 2,3, & 4 Greensburg, PA 15601 Phone (724)850-5600

						Preserved Containers						Requested Analysis												
Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Other						Radium-226 & Total Sum Radium	Radium-228											LAB USE ONLY
1	ASH-01-CCR	PS	10/11/2023 10:45	60440184001	Water	1						X	X											001
2	ASH-06-CCR	PS	10/11/2023 11:50	60440184002	Water	1						X	X											002
3	ERB-01-CCR	PS	10/11/2023 12:00	60440184003	Water	1						X	X											003
4	ASH-05-CCR	PS	10/11/2023 13:35	60440184004	Water	1						X	X											004
5	ASH-04-CCR	PS	10/11/2023 14:30	60440184005	Water	1						X	X											005
6	ASH-02-CCR	PS	10/12/2023 08:45	60440184006	Water	1						X	X											006
7	ASH-07-CCR	PS	10/12/2023 10:25	60440184007	Water	1						X	X											007

Transfers	Released By	Date/Time	Received By	Date/Time
1			[signature]	10/13/23 09:10
2				
3				

Comments
IR30- Radium QC Sheets Required

Cooler Temperature on Receipt ___ °C | **Custody Seal** Y or N TH 10/13/23 | **Received on Ice** Y or N | **Samples Intact** Y or N

****In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document. This chain of custody is considered complete as is since this information is available in the owner laboratory.*

WO# : 30632491
30632491

WO#: 30632491

PM: MAR Due Date: 11/03/23

CLIENT: PACE_60_LEKS

CCR PA

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Required Client Information:		Required Project Information:		Section C Invoice Information:	
Company:	AECOM	Report To:	Vasanta Kalluri	Attention:	Accounts Payable
Address:	6200 South Quebec St	Copy To:	Brian Rothmeyer	Company Name:	AECOM
	Greenwood Village, CO 80111			Address:	Same as Section A
Email To:	brian.rothmeyer@aecom.com	Purchase Order No.:	1599462	Pace Quote Reference:	42700
Phone: (303) 740-2614	Fax:	Project Name:	60709371 PRPA CCR	Pace Project Manager:	Heather Wilson
Requested Due Date/TAT:	Standard	Project Number:	60709371	Pace Profile #:	11033, 3

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER

☐ UST ☐ RCRA ☑ OTHER CCR

Site Location STATE: CO

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Radium-226	Radium-228	Total Radium	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Requested Analysis Filtered (Y/N)	N	N	N		
1	ASH-01-CCR	WT	G	—	—	10/11/23	1045		2			X							X	X	X	N	001
2	ASH-06-CCR	WT	G	—	—	10/11/23	1150		2			X							X	X	X	N	002
3	FRB-01-CCR	WT	G	—	—	10/11/23	1200		2			X							X	X	X	N	003
4	ASH-05-CCR	WT	G	—	—	10/11/23	1335		2			X							X	X	X	N	004
5	ASH-04-CCR	WT	G	—	—	10/11/23	1430		2			X							X	X	X	N	005
6	ASH-02-CCR	WT	G	—	—	10/12/23	0845		2			X							X	X	X	N	006
7	ASH-07-CCR	WT	G	—	—	10/12/23	1025		2			X							X	X	X	N	007
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	AECOM	10/12/23	1730	Pace	10/13/23	9:10	N/A	N	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kara Hoppes & Olivia Helinski

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY): 10/12/23

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

DC#_Title: ENV-FRM-GBUR-0088 v06_Sample Condition Upon Receipt

Pittsburgh

Effective Date: 09/20/2023

WO# : 30632491

PM: MAR Due Date: 11/03/23

CLIENT: PACE_60_LEKS

Client Name:

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

Tracking Number: 643213972 9480

Initial / Date

Examined By: TH 10/19/23

Labeled By: TH 10/19/23

Temped By:

Custody Seal on Cooler/Box Present: ☑ Yes ☐No Seals Intact: ☑ Yes ☐No

Thermometer Used: — Type of Ice: Wet Blue (None)

Cooler Temperature: Observed Temp — °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

pH paper Lot# 2073-08 D.P.D. Residual Chlorine Lot # —

Comments:	Yes	No	NA	
Chain of Custody Present	J			1. Received 10/20/23, COC.
Chain of Custody Filled Out:	J			2.
-Were client corrections present on COC		J		
Chain of Custody Relinquished		J		3.
Sampler Name & Signature on COC:		J		4.
Sample Labels match COC:	J			5.
-Includes date/time/ID				
Matrix:	WT			
Samples Arrived within Hold Time:	J			6.
Short Hold Time Analysis (<72hr remaining):		J		7.
Rush Turn Around Time Requested:		J		8.
Sufficient Volume:	J			9.
Correct Containers Used:	J			10.
-Pace Containers Used	J			
Containers Intact:	J			11.
Orthophosphate field filtered:			J	12.
Hex Cr Aqueous samples field filtered:			J	13.
Organic Samples checked for dechlorination			J	14:
Filtered volume received for dissolved tests:			J	15:
All containers checked for preservation:	J			16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix				PH<2
All containers meet method preservation requirements:	J			Initial when completed: TH Date/Time of Preservation:
				Lot# of added Preservative:
8260C/D: Headspace in VOA Vials (> 6mm)			J	17.
624.1: Headspace in VOA Vials (0mm)			J	18.
Trip Blank Present:			J	Trip blank custody seal present? YES or NO
Rad Samples Screened <.05 mrem/hr.	X			Initial when completed: LA Date: 10/23-23 Survey Meter SN: 1563

Comments:

Note: For NC compliance samples with discrepancies, a copy of this form must be sent to the DEHNR Certification office.
PM Review is documented electronically in LIMS through the SRF Review schedule in the Workorder Edit Screen.

Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

Test:	Ra-226
Analyst:	CLM
Date:	10/23/2023
Batch ID:	75904
Matrix:	DW

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment	
MB Sample ID	3041606
MB concentration:	0.267
M/B Counting Uncertainty:	0.377
MB MDC:	0.641
MB Numerical Performance Indicator:	1.39
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment	LCSD (Y or N)?	N
	LCS75904	LCSD75904
Count Date:	10/31/2023	
Spike I.D.:	23-013	
Spike Concentration (pCi/mL):	32.281	
Volume Used (mL):	0.10	
Aliquot Volume (L, g, F):	0.652	
Target Conc. (pCi/L, g, F):	4.948	
Uncertainty (Calculated):	0.233	
Result (pCi/L, g, F):	4.078	
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	0.939	
Numerical Performance Indicator:	-1.76	
Percent Recovery:	82.41%	
Status vs Numerical Indicator:	N/A	
Status vs Recovery:	Pass	
Upper % Recovery Limits:	133%	
Lower % Recovery Limits:	73%	

Sample Matrix Spike Control Assessment	MS/MSD 1	MS/MSD 2
Sample Collection Date:	10/12/2023	
Sample I.D.	30632314001	
Sample MS I.D.	30632314001MS	
Sample MSD I.D.		
Spike I.D.:	23-013	
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	32.281	
Spike Volume Used in MS (mL):	0.20	
Spike Volume Used in MSD (mL):		
MS Aliquot (L, g, F):	0.658	
MS Target Conc.(pCi/L, g, F):	9.819	
MSD Aliquot (L, g, F):		
MSD Target Conc. (pCi/L, g, F):		
MS Spike Uncertainty (calculated):	0.461	
MSD Spike Uncertainty (calculated):		
Sample Result:	-0.106	
Sample Result Counting Uncertainty (pCi/L, g, F):	0.254	
Sample Matrix Spike Result:	9.440	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.410	
Sample Matrix Spike Duplicate Result:		
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):		
MS Numerical Performance Indicator:	-0.355	
MSD Numerical Performance Indicator:		
MS Percent Recovery:	97.22%	
MSD Percent Recovery:		
MS Status vs Numerical Indicator:	N/A	
MSD Status vs Numerical Indicator:		
MS Status vs Recovery:	Pass	
MSD Status vs Recovery:		
MS/MSD Upper % Recovery Limits:	136%	
MS/MSD Lower % Recovery Limits:	71%	

Duplicate Sample Assessment		
Sample I.D.:	35834054001	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.	35834054001DUP	
Sample Result (pCi/L, g, F):	110.235	
Sample Result Counting Uncertainty (pCi/L, g, F):	5.347	
Sample Duplicate Result (pCi/L, g, F):	130.985	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	6.187	
Are sample and/or duplicate results below RL?	See Below ##	
Duplicate Numerical Performance Indicator:	-4.974	35834054001
Duplicate RPD:	17.20%	35834054001DUP
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	
% RPD Limit:	32%	

Matrix Spike/Matrix Spike Duplicate Sample Assessment		
Sample I.D.		
Sample MS I.D.		
Sample MSD I.D.		
Sample Matrix Spike Result:		
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):		
Sample Matrix Spike Duplicate Result:		
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):		
Duplicate Numerical Performance Indicator:		
(Based on the Percent Recoveries) MS/ MSD Duplicate RPD:		
MS/ MSD Duplicate Status vs Numerical Indicator:		
MS/ MSD Duplicate Status vs RPD:		
% RPD Limit:		

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the RL.

Comments:

CLM 11/1/23

LL
10·31·23

Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

Test:	Ra-228
Analyst:	VAL
Date:	10/24/2023
Worklist:	75905
Matrix:	WT

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment	
MB Sample ID	3041608
MB concentration:	0.784
M/B 2 Sigma CSU:	0.404
MB MDC:	0.703
MB Numerical Performance Indicator:	3.80
MB Status vs Numerical Indicator:	Fail*
MB Status vs. MDC:	See Comment*

Laboratory Control Sample Assessment	LCSD (Y or N)?	N
	LCS75905	LCSD75905
Count Date:	10/26/2023	
Spike I.D.:	23-043	
Decay Corrected Spike Concentration (pCi/mL):	39.279	
Volume Used (mL):	0.10	
Aliquot Volume (L, g, F):	0.815	
Target Conc. (pCi/L, g, F):	4.817	
Uncertainty (Calculated):	0.236	
Result (pCi/L, g, F):	3.677	
LCS/LCSD 2 Sigma CSU (pCi/L, g, F):	0.871	
Numerical Performance Indicator:	-2.48	
Percent Recovery:	76.33%	
Status vs Numerical Indicator:	N/A	
Status vs Recovery:	Pass	
Upper % Recovery Limits:	135%	
Lower % Recovery Limits:	60%	

Duplicate Sample Assessment		
Sample I.D.:	30632555001	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.	30632555001DUP	
Sample Result (pCi/L, g, F):	0.806	
Sample Result 2 Sigma CSU (pCi/L, g, F):	0.420	
Sample Duplicate Result (pCi/L, g, F):	0.718	
Sample Duplicate Result 2 Sigma CSU (pCi/L, g, F):	0.355	
Are sample and/or duplicate results below RL?	See Below ##	
Duplicate Numerical Performance Indicator:	0.313	30632555001
Duplicate RPD:	11.51%	30632555001DUP
Duplicate Status vs Numerical Indicator:	Pass	
Duplicate Status vs RPD:	Pass	
% RPD Limit:	36%	

Sample Matrix Spike Control Assessment	MS/MSD 1	MS/MSD 2
Sample Collection Date:	10/12/2023	
Sample I.D.	30632314001	
Sample MS I.D.	30632314001MS	
Sample MSD I.D.		
Spike I.D.:	23-043	
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	39.462	
Spike Volume Used in MS (mL):	0.20	
Spike Volume Used in MSD (mL):		
MS Aliquot (L, g, F):	0.803	
MS Target Conc.(pCi/L, g, F):	9.832	
MSD Aliquot (L, g, F):		
MSD Target Conc. (pCi/L, g, F):		
MS Spike Uncertainty (calculated):	0.482	
MSD Spike Uncertainty (calculated):		
Sample Result:	0.382	
Sample Result 2 Sigma CSU (pCi/L, g, F):	0.345	
Sample Matrix Spike Result:	9.169	
Matrix Spike Result 2 Sigma CSU (pCi/L, g, F):	1.846	
Sample Matrix Spike Duplicate Result:		
Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F):		
MS Numerical Performance Indicator:	-1.056	
MSD Numerical Performance Indicator:		
MS Percent Recovery:	89.37%	
MSD Percent Recovery:		
MS Status vs Numerical Indicator:	Pass	
MSD Status vs Numerical Indicator:		
MS Status vs Recovery:	Pass	
MSD Status vs Recovery:		
MS/MSD Upper % Recovery Limits:	135%	
MS/MSD Lower % Recovery Limits:	60%	

Matrix Spike/Matrix Spike Duplicate Sample Assessment		
Sample I.D.		
Sample MS I.D.		
Sample MSD I.D.		
Sample Matrix Spike Result:		
Matrix Spike Result 2 Sigma CSU (pCi/L, g, F):		
Sample Matrix Spike Duplicate Result:		
Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F):		
Duplicate Numerical Performance Indicator:		
(Based on the Percent Recoveries) MS/ MSD Duplicate RPD:		
MS/ MSD Duplicate Status vs Numerical Indicator:		
MS/ MSD Duplicate Status vs RPD:		
% RPD Limit:		

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:
*The method blank result is below the reporting limit for this analysis and is acceptable.

VAL 10/27/23

ZC 10-27-23

Appendix C

Groundwater Velocity Calculation Sheet

Platte River Power Auhtority, Rawhide Station

Darcy
$V = Ki/n_e$

V = Velocity
K = Average Hydraulic Conductivity in ft/day
i = delta (height) / delta (length) (change in GW elevation / length of line drawn)
n_e = Effective Porosity (15% for fractured Pierre shale)

Average Hydraulic Conductivity

April ASH		October ASH	
K =	0.935	K =	0.935
dH	68.15	dH	70.89
dL	4850	dL	4850
n_e	0.15	n_e	0.15
GW Velocity =	8.759E-02	GW Velocity =	9.111E-02

Average	8.935E-02

Notes:
ASH wells gradient between ASH-01 and ASH-02 for dH and dL

Gradient	ASH-01 to ASH-02
April 2023	0.014051546
October 2023	0.014616495
Average	0.014334021

Low Hydraulic Conductivity

April ASH		October ASH	
K =	0.085	K =	0.085
dH	68.15	dH	70.89
dL	4850	dL	4850
n_e	0.15	n_e	0.15
GW Velocity =	7.963E-03	GW Velocity =	8.283E-03
average:	8.123E-03		

Max Hydraulic Conductivity

April ASH		October ASH	
K =	1.44	K =	1.44
dH	68.15	dH	70.89
dL	4850	dL	4850
n_e	0.15	n_e	0.15
GW Velocity =	1.349E-01	GW Velocity =	1.403E-01
average:	1.376E-01		

Notes:
K values take from following wells: Ash-06, ASH-07, ASH-08
low = 0.085 ft/day
high = 1.44 ft/day
average = 0.935

Appendix D

Statistical Analysis Results and Input/Output Files

Location_ID	Date	Boron	D_Boron	Calcium	D_Calcium	Chloride	D_Chloride	Fluoride	D_Fluoride	pH	D_pH	Sulfate	D_Sulfate	TDS	D_TDS
ASH-01	9/13/16	500	1	380000	1	29	1	0.12	1	6.74	1	2100	1	3600	1
ASH-01	11/3/16	460	1	360000	1	25	1	0.2	0	6.92	1	2100	1	3400	1
ASH-01	12/20/16	450	1	330000	1	24	1	1.65	1	7.03	1	2100	1	3500	1
ASH-01	2/8/17	500	1	350000	1	25	1	0.39	1	6.94	1	2100	1	3500	1
ASH-01	4/5/17	580	1	370000	1	25	1	0.2	1	7.3	1	2200	1	3600	1
ASH-01	5/10/17	540	1	340000	1	22	1	0.29	1	7.2	1	2000	1	3600	1
ASH-01	6/15/17	630	1	370000	1	21	1	0.56	1	6.55	1	2000	1	3600	1
ASH-01	7/12/17	470	1	320000	1	20	1	0.2	0	7.22	1	1900	1	3900	1
ASH-01	6/21/18	520	1	339000	1	19	1	0.33	1	7.14	1	2520	1	3350	1
ASH-01	10/10/18	471	1	355000	1	19.4	1	0.23	1			1710	1	3190	1
ASH-01	5/2/19	489	1	363000	1	20.2	1	0.2	0	7.31	1	1	0	3250	1
ASH-01	7/10/19	474	1	375000	1	19.6	1	0.2	0	9.63	1	2000	1	3450	1
ASH-01	10/8/19	462	1	346000	1			0.2	0					3290	1
ASH-01	4/14/20	486	1	381000	1	23.1	1	0.24	1	7.93	1	2000	1	3250	1
ASH-01	10/5/20	487	1	329000	1	23	1	0.24	1	7.31	1	2100	1	3330	1
ASH-01	4/21/21	457	1	326000	1	23.6	1	0.2	0	7.29	1	1950	1	3250	1
ASH-01	10/19/21	494	1	369000	1	25.4	1	0.2	0	7.07	1	2040	1	3420	1
ASH-06	1/24/19	288	1	27500	1	7.8	1	0.84	1	9.25	1	104	1	487	1
ASH-06	5/6/19	283	1	26700	1	7.8	1	0.79	1	8	1	75.7	1	384	1
ASH-06	7/18/19	326	1	28900	1	9.7	1	0.69	1	8.28	1	197	1	634	1
ASH-06	10/8/19	324	1	26700	1			0.81	1					515	1
ASH-06	1/15/20	304	1	24300	1	7	1	0.72	1	7.47	1	68.3	1	500	1
ASH-06	4/20/20	308	1	24100	1	7	1	0.69	1	8.19	1	63.6	1	443	1
ASH-06	7/22/20					7.9	1	0.77	1	7.71	1	101	1	472	1
ASH-06	7/24/20	334	1	37600	1					7.71	1				
ASH-06	10/16/20	312	1	24500	1	7.7	1	0.84	1	7.22	1	82.8	1	417	1
ASH-06	10/20/20														
ASH-06	1/6/21	334	1	27000	1	7.9	1	0.76	1	7.95	1	77.8	1	449	1
ASH-06	4/7/21	310	1	25800	1	7	1	0.2	1	8.04	1	81.8	1	485	1
ASH-06	4/12/21														
ASH-06	10/11/21	290	1	23200	1	6.9	1	0.82	1	7.9	1	68.8	1	446	1

Location_ID	Date	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium	D_Chromium	Cobalt	D_Cobalt	Fluoride	D_Fluoride	Lead	D_Lead	Lithium	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum	Radium	D_Radium	Radium-226	D_Radium-226	Radium-228	D_Radium-228	Selenium	D_Selenium	Thallium	D_Thallium
ASH-01	9/13/16	1	0	1	0	11	1	1	0	0.1	0	1	0	1	0	0.12	1	1	0	410	1	0.1	0	1	0	3	1					2	1	1	0
ASH-01	11/3/16	1	0	1	0	11	1	1	0	0.1	0	1	0	1	0	0.2	0	1	0	407	1	0.1	0	1	0	0.91	1					2	1	1	0
ASH-01	12/20/16	1	0	1	0	9	1	1	0	0.1	0	1	0	1	0	1.65	1	1	0	570	1	0.1	0	1	0	1.2	1					3	1	1	0
ASH-01	2/8/17	1	0	1	0	9	1	1	0	0.1	0	1	0	1	0	0.39	1	1	0	440	1	0.1	0	1	0	1.9	1					1	1	1	0
ASH-01	4/5/17	1	0	1	0	8	1	1	0	0.1	0	1	0	1	0	0.2	1	2	1	399	1	0.1	0	1	0	0.48	0					2	1	1	0
ASH-01	5/10/17	1	0	1	0	10	1	1	0	0.1	0	1	0	1	0	0.29	1	1	0	405	1	0.1	0	2	1	0.96	1					1	0	1	0
ASH-01	6/15/17	1	0	1	0	10	1	1	0	0.1	0	1	0	1	0	0.56	1	1	0	525	1	0.1	0	1	0	1.1	1					2	1	1	0
ASH-01	7/12/17	1	0	1	0	10	1	1	0	0.1	0	1	0	1	0	0.2	0	1	0	399	1	0.1	0	1	0	0.71	0					2	1	1	0
ASH-01	6/21/18	3	0	3	0	9.6	1	0.5	0	1.5	0	3	0	3	0	0.33	1	3	0	433	1	0.2	0	3	0	0.797	1	0.285	1	0.512	1	3	0	3	0
ASH-01	10/10/18	0.5	0	0.5	0	11.9	1	0.2	0	0.08	0	0.93	0	0.5	0	0.23	1	0.5	1	409	1	0.2	0	0.5	0							0.5	0	0.1	0
ASH-01	5/2/19	1	0	1	0	8.3	1	0.5	0	0.5	0	1	0	1	0	0.2	0	1	0	398	1	0.2	0	1	0	1.62	1	0.947	1	0.676	1	1	0	1	0
ASH-01	7/10/19	1	0	1	0	9	1	0.5	0	5	0	1	0	1	0	0.2	0	1	0	402	1	0.2	0	1	0							1	0	1	0
ASH-01	10/8/19	4	0	4	0	9.7	1	2	0	2	0	4	0	4	0	0.2	0	4	0	387	1	0.2	0	4	0	0.282	1	0.187	1	1.08	1	4	0	4	0
ASH-01	4/14/20	1	0	1	0	9.6	1	0.5	0	0.5	0	1	0	1	0	0.24	1	1	0	439	1	0.2	0	1	0	0.981	1	0.238	1	0.743	1	1	0	1	0
ASH-01	10/5/20	1	0	1	0	9.3	1	0.5	0	0.5	0	1	0	1	0	0.24	1	1	0	413	1	0.2	0	1	0	1.32	1	0.202	1	1.12	1	1	0	1	0
ASH-01	4/21/21	1	0	1	0	9.1	1	0.5	0	0.5	0	1	0	1	0	0.2	0	1	0	390	1	0.2	0	1	0	2.71	1	0.818	1	1.89	1	1	0	1	0
ASH-01	10/19/21	1	0	1	0	9.8	1	0.5	0	0.5	0	1	0	1	0	0.2	0	1	0	435	1	0.2	0	1	0	2.12	1	0.364	1	1.76	1	1	0	1	0
ASH-06	1/24/19	1	0	1.3	1	72.2	1	0.5	0	0.5	0	42.2	1	1	0	0.84	1	1	0	89.5	1	0.2	0	41	1							20.6	1	1	0
ASH-06	5/6/19	1	0	1.2	1	67	1	0.5	0	0.5	0	3.4	1	1	0	0.79	1	1	0	56	1	0.2	0	29.1	1	0.873	1	0.639	1	0.234	1	22.8	1	1	0
ASH-06	7/18/19	1	0	1	0	66.6	1	0.5	0	0.5	0	1	0	1	0	0.69	1	1	0	63.9	1	0.2	0	55.8	1	2.74	1	1.71	1	1.03	1	24.2	1	1	0
ASH-06	10/8/19	1	0	1	0	60.5	1	0.5	0	0.5	0	1.6	1	1	0	0.81	1	1	0	51.9	1	0.2	0	48.2	1	0.901	1	-0.0627	1	0.969	1	33.7	1	1	0
ASH-06	1/15/20	1	0	1.2	1	61.6	1	0.5	0	0.5	0	2.3	1	1	0	0.72	1	1	0	56.3	1	0.2	0	17.3	1	0.812	1	0.122	1	0.69	1	23.5	1	1	0
ASH-06	4/20/20	1	0	1.2	1	58.8	1	0.5	0	0.5	0	2.6	0	1	0	0.69	1	1	0	60.2	1	0.2	0	15.4	1	0.481	1	0.0661	1	0.415	1	24.5	1	1	0
ASH-06	7/22/20															0.77	1																		
ASH-06	7/24/20	5	0	5	0	64.7	1	2.5	0	2.5	0	12.6	1	5	0			5	0	57.5	1	0.2	0	22.4	1							25.9	1	5	0
ASH-06	10/16/20	3	0	3	0	47.7	1	1.5	0	1.5	0	5.1	1	3	0	0.84	1	3	0	51.6	1	0.2	0	17.7	1							27.6	1	3	0
ASH-06	10/20/20																									1.11	1	0.213	1	0.899	1				
ASH-06	1/6/21	1	0	1	0	56.1	1	0.5	0	0.5	0	8.3	1	1	0	0.76	1	1	0	55.9	1	0.2	0	13.7	1	0.584	1	-0.0582	1	0.584	1	24.9	1	1	0
ASH-06	4/7/21	1	0	1	0	45.5	1	0.5	0	0.5	0	21.9	1	1	0	0.2	1	1	0	51.8	1	0.2	0	17.9	1							45	1	1	0
ASH-06	4/12/21																									0.908	1	-0.0505	1	0.908	1				
ASH-06	10/11/21	2	0	2	0	40.7	1	1	0	1	0	2.6	1	2	0	0.82	1	2	0	54.9	1	0.2	0	11.8	1	1.5	1	0.718	1	0.786	1	21	1	2	0

1				**Background Statistics for Data Sets with Non-Detects**								
2			**User Selected Options**									
3			Date/Time of Computation	ProUCL 5.11/18/2022 3:57:30 PM								
4			From File	ProUCL Input PRPA CCR ASH Appendix III Total 2016-2021.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	95%								
7			Coverage	95%								
8			Different or Future K Observations	1								
9			Number of Bootstrap Operations	2000								
10												
11	**Boron**											
12												
13	**General Statistics**											
14						Total Number of Observations	28			Number of Distinct Observations	26		
15										Number of Missing Observations	3	
16						Minimum	283			First Quartile	321	
17						Second Largest	580			Median	461	
18						Maximum	630			Third Quartile	490.3	
19						Mean	424.4			SD	100.9	
20						Coefficient of Variation	0.238			Skewness	-0.00677	
21						Mean of logged Data	6.022			SD of logged Data	0.247	
22												
23						**Critical Values for Background Threshold Values (BTVs)**							
24						Tolerance Factor K (For UTL)	2.246			d2max (for USL)	2.714	
25												
26						**Normal GOF Test**						
27						Shapiro Wilk Test Statistic	0.888			**Shapiro Wilk GOF Test**		
28						5% Shapiro Wilk Critical Value	0.924			Data Not Normal at 5% Significance Level		
29						Lilliefors Test Statistic	0.208			**Lilliefors GOF Test**		
30						5% Lilliefors Critical Value	0.164			Data Not Normal at 5% Significance Level		
31						**Data Not Normal at 5% Significance Level**						
32												
33						**Background Statistics Assuming Normal Distribution**						
34						95% UTL with 95% Coverage	651			90% Percentile (z)	553.7	
35						95% UPL (t)	599.3			95% Percentile (z)	590.3	
36						95% USL	698.2			99% Percentile (z)	659.1	
37												
38						**Gamma GOF Test**						
39						A-D Test Statistic	1.67			**Anderson-Darling Gamma GOF Test**		
40						5% A-D Critical Value	0.745			Data Not Gamma Distributed at 5% Significance Level		
41						K-S Test Statistic	0.236			**Kolmogorov-Smirnov Gamma GOF Test**		
42						5% K-S Critical Value	0.165			Data Not Gamma Distributed at 5% Significance Level		
43						**Data Not Gamma Distributed at 5% Significance Level**						
44												
45						**Gamma Statistics**						
46						k hat (MLE)	17.64			k star (bias corrected MLE)	15.77	
47						Theta hat (MLE)	24.06			Theta star (bias corrected MLE)	26.91	
48						nu hat (MLE)	987.7			nu star (bias corrected)	883.2	
49						MLE Mean (bias corrected)	424.4			MLE Sd (bias corrected)	106.9	
50												
51						**Background Statistics Assuming Gamma Distribution**						
52						95% Wilson Hilferty (WH) Approx. Gamma UPL	618.8			90% Percentile	565.8	
53						95% Hawkins Wixley (HW) Approx. Gamma UPL	621.9			95% Percentile	614.1	
54						95% WH Approx. Gamma UTL with 95% Coverage	689.1			99% Percentile	711.7	

55				95% HW Approx. Gamma UTL with	95% Coverage	695.5						
56					95% WH USL	758				95% HW USL	768.4	
57												
58					**Lognormal GOF Test**							
59					Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk Lognormal GOF Test**					
60					5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level					
61					Lilliefors Test Statistic	0.245	**Lilliefors Lognormal GOF Test**					
62					5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level					
63					**Data Not Lognormal at 5% Significance Level**							
64												
65					**Background Statistics assuming Lognormal Distribution**							
66				95% UTL with	95% Coverage	717.9				90% Percentile (z)	565.8	
67					95% UPL (t)	632.6				95% Percentile (z)	618.9	
68					95% USL	805.9				99% Percentile (z)	732.3	
69												
70					**Nonparametric Distribution Free Background Statistics**							
71					**Data do not follow a Discernible Distribution (0.05)**							
72												
73					**Nonparametric Upper Limits for Background Threshold Values**							
74					Order of Statistic, r	28				95% UTL with	95% Coverage	630
75					Approx, f used to compute achieved CC	1.474				Approximate Actual Confidence Coefficient achieved by UTL		0.762
76										Approximate Sample Size needed to achieve specified CC		59
77				95% Percentile Bootstrap UTL with	95% Coverage	630				95% BCA Bootstrap UTL with	95% Coverage	630
78					95% UPL	607.5				90% Percentile		526
79					90% Chebyshev UPL	732.4				95% Percentile		566
80					95% Chebyshev UPL	871.9				99% Percentile		616.5
81					95% USL	630						
82												
83					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
84					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
85					and consists of observations collected from clean unimpacted locations.							
86					The use of USL tends to provide a balance between false positives and false negatives provided the data							
87					represents a background data set and when many onsite observations need to be compared with the BTV.							
88												
89	**Calcium**											
90												
91	**General Statistics**											
92					Total Number of Observations	28				Number of Distinct Observations	26	
93										Number of Missing Observations	3	
94					Minimum	23200				First Quartile	26925	
95					Second Largest	380000				Median	329500	
96					Maximum	381000				Third Quartile	360750	
97					Mean	224975				SD	162964	
98					Coefficient of Variation	0.724				Skewness	-0.436	
99					Mean of logged Data	11.76				SD of logged Data	1.286	
100												
101					**Critical Values for Background Threshold Values (BTVs)**							
102					Tolerance Factor K (For UTL)	2.246				d2max (for USL)	2.714	
103												
104					**Normal GOF Test**							
105					Shapiro Wilk Test Statistic	0.69	**Shapiro Wilk GOF Test**					
106					5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level					
107					Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**					
108					5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level					

109	**Data Not Normal at 5% Significance Level**											
110												
111	**Background Statistics Assuming Normal Distribution**											
112				95% UTL with	95% Coverage	590992				90% Percentile (z)	433822	
113					95% UPL (t)	507463				95% Percentile (z)	493027	
114					95% USL	667334				99% Percentile (z)	604086	
115												
116	**Gamma GOF Test**											
117					A-D Test Statistic	4.48	**Anderson-Darling Gamma GOF Test**					
118					5% A-D Critical Value	0.773	Data Not Gamma Distributed at 5% Significance Level					
119					K-S Test Statistic	0.366	**Kolmogorov-Smirnov Gamma GOF Test**					
120					5% K-S Critical Value	0.17	Data Not Gamma Distributed at 5% Significance Level					
121	**Data Not Gamma Distributed at 5% Significance Level**											
122												
123	**Gamma Statistics**											
124					k hat (MLE)	1.02				k star (bias corrected MLE)	0.935	
125					Theta hat (MLE)	220477				Theta star (bias corrected MLE)	240645	
126					nu hat (MLE)	57.14				nu star (bias corrected)	52.35	
127					MLE Mean (bias corrected)	224975				MLE Sd (bias corrected)	232678	
128												
129	**Background Statistics Assuming Gamma Distribution**											
130				95% Wilson Hilferty (WH) Approx. Gamma UPL		725340				90% Percentile	526675	
131				95% Hawkins Wixley (HW) Approx. Gamma UPL		791249				95% Percentile	690250	
132				95% WH Approx. Gamma UTL with	95% Coverage	1007705				99% Percentile	1071952	
133				95% HW Approx. Gamma UTL with	95% Coverage	1155021						
134					95% WH USL	1322586				95% HW USL	1585803	
135												
136	**Lognormal GOF Test**											
137					Shapiro Wilk Test Statistic	0.667	**Shapiro Wilk Lognormal GOF Test**					
138					5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level					
139					Lilliefors Test Statistic	0.369	**Lilliefors Lognormal GOF Test**					
140					5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level					
141	**Data Not Lognormal at 5% Significance Level**											
142												
143	**Background Statistics assuming Lognormal Distribution**											
144				95% UTL with	95% Coverage	2300940				90% Percentile (z)	665363	
145					95% UPL (t)	1189958				95% Percentile (z)	1061791	
146					95% USL	4203759				99% Percentile (z)	2551505	
147												
148	**Nonparametric Distribution Free Background Statistics**											
149	**Data do not follow a Discernible Distribution (0.05)**											
150												
151	**Nonparametric Upper Limits for Background Threshold Values**											
152					Order of Statistic, r	28				95% UTL with	95% Coverage	381000
153					Approx, f used to compute achieved CC	1.474	Approximate Actual Confidence Coefficient achieved by UTL					0.762
154							Approximate Sample Size needed to achieve specified CC					59
155				95% Percentile Bootstrap UTL with	95% Coverage	381000				95% BCA Bootstrap UTL with	95% Coverage	381000
156					95% UPL	380550				90% Percentile		371500
157					90% Chebyshev UPL	722520				95% Percentile		378250
158					95% Chebyshev UPL	947892				99% Percentile		380730
159					95% USL	381000						
160												
161	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
162	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											

163	and consists of observations collected from clean unimpacted locations.											
164	The use of USL tends to provide a balance between false positives and false negatives provided the data											
165	represents a background data set and when many onsite observations need to be compared with the BTV.											
166												
167	**Chloride**											
168												
169	**General Statistics**											
170						Total Number of Observations	26			Number of Distinct Observations	20	
171										Number of Missing Observations	5	
172						Minimum	6.9			First Quartile	7.825	
173						Second Largest	25.4			Median	19.8	
174						Maximum	29			Third Quartile	23.48	
175						Mean	16.96			SD	7.812	
176						Coefficient of Variation	0.461			Skewness	-0.263	
177						Mean of logged Data	2.701			SD of logged Data	0.55	
178												
179	**Critical Values for Background Threshold Values (BTVs)**											
180						Tolerance Factor K (For UTL)	2.275			d2max (for USL)	2.681	
181												
182	**Normal GOF Test**											
183						Shapiro Wilk Test Statistic	0.825			**Shapiro Wilk GOF Test**		
184						5% Shapiro Wilk Critical Value	0.92			Data Not Normal at 5% Significance Level		
185						Lilliefors Test Statistic	0.223			**Lilliefors GOF Test**		
186						5% Lilliefors Critical Value	0.17			Data Not Normal at 5% Significance Level		
187	**Data Not Normal at 5% Significance Level**											
188												
189	**Background Statistics Assuming Normal Distribution**											
190						95% UTL with 95% Coverage	34.73			90% Percentile (z)	26.97	
191						95% UPL (t)	30.56			95% Percentile (z)	29.81	
192						95% USL	37.91			99% Percentile (z)	35.14	
193												
194	**Gamma GOF Test**											
195						A-D Test Statistic	2.429			**Anderson-Darling Gamma GOF Test**		
196						5% A-D Critical Value	0.748			Data Not Gamma Distributed at 5% Significance Level		
197						K-S Test Statistic	0.27			**Kolmogorov-Smirnov Gamma GOF Test**		
198						5% K-S Critical Value	0.172			Data Not Gamma Distributed at 5% Significance Level		
199	**Data Not Gamma Distributed at 5% Significance Level**											
200												
201	**Gamma Statistics**											
202						k hat (MLE)	4			k star (bias corrected MLE)	3.564	
203						Theta hat (MLE)	4.24			Theta star (bias corrected MLE)	4.759	
204						nu hat (MLE)	208			nu star (bias corrected)	185.3	
205						MLE Mean (bias corrected)	16.96			MLE Sd (bias corrected)	8.984	
206												
207	**Background Statistics Assuming Gamma Distribution**											
208						95% Wilson Hilferty (WH) Approx. Gamma UPL	34.68			90% Percentile	29.01	
209						95% Hawkins Wixley (HW) Approx. Gamma UPL	35.51			95% Percentile	33.92	
210						95% WH Approx. Gamma UTL with 95% Coverage	42.69			99% Percentile	44.46	
211						95% HW Approx. Gamma UTL with 95% Coverage	44.45					
212						95% WH USL	49.54			95% HW USL	52.3	
213												
214	**Lognormal GOF Test**											
215						Shapiro Wilk Test Statistic	0.78			**Shapiro Wilk Lognormal GOF Test**		
216						5% Shapiro Wilk Critical Value	0.92			Data Not Lognormal at 5% Significance Level		

217				Lilliefors Test Statistic		0.286	**Lilliefors Lognormal GOF Test**					
218				5% Lilliefors Critical Value		0.17	Data Not Lognormal at 5% Significance Level					
219	**Data Not Lognormal at 5% Significance Level**											
220												
221	**Background Statistics assuming Lognormal Distribution**											
222				95% UTL with 95% Coverage		52.08				90% Percentile (z)		30.15
223				95% UPL (t)		38.81				95% Percentile (z)		36.82
224				95% USL		65.11				99% Percentile (z)		53.57
225												
226	**Nonparametric Distribution Free Background Statistics**											
227	**Data do not follow a Discernible Distribution (0.05)**											
228												
229	**Nonparametric Upper Limits for Background Threshold Values**											
230				Order of Statistic, r		26				95% UTL with 95% Coverage		29
231				Approx, f used to compute achieved CC		1.368				Approximate Actual Confidence Coefficient achieved by UTL		0.736
232										Approximate Sample Size needed to achieve specified CC		59
233			95% Percentile Bootstrap UTL with 95% Coverage			29				95% BCA Bootstrap UTL with 95% Coverage		28.1
234				95% UPL		27.74				90% Percentile		25
235				90% Chebyshev UPL		40.84				95% Percentile		25.3
236				95% Chebyshev UPL		51.66				99% Percentile		28.1
237				95% USL		29						
238												
239	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
240	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
241	and consists of observations collected from clean unimpacted locations.											
242	The use of USL tends to provide a balance between false positives and false negatives provided the data											
243	represents a background data set and when many onsite observations need to be compared with the BTV.											
244												
245	**Fluoride**											
246												
247	**General Statistics**											
248				Total Number of Observations		28				Number of Missing Observations		3
249				Number of Distinct Observations		17						
250				Number of Detects		21				Number of Non-Detects		7
251				Number of Distinct Detects		17				Number of Distinct Non-Detects		1
252				Minimum Detect		0.12				Minimum Non-Detect		0.2
253				Maximum Detect		1.65				Maximum Non-Detect		0.2
254				Variance Detected		0.129				Percent Non-Detects		25%
255				Mean Detected		0.58				SD Detected		0.359
256				Mean of Detected Logged Data		-0.744				SD of Detected Logged Data		0.68
257												
258	**Critical Values for Background Threshold Values (BTVs)**											
259				Tolerance Factor K (For UTL)		2.246				d2max (for USL)		2.714
260												
261	**Normal GOF Test on Detects Only**											
262				Shapiro Wilk Test Statistic		0.857	**Shapiro Wilk GOF Test**					
263				5% Shapiro Wilk Critical Value		0.908	Data Not Normal at 5% Significance Level					
264				Lilliefors Test Statistic		0.187	**Lilliefors GOF Test**					
265				5% Lilliefors Critical Value		0.188	Detected Data appear Normal at 5% Significance Level					
266	**Detected Data appear Approximate Normal at 5% Significance Level**											
267												
268	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
269				KM Mean		0.465				KM SD		0.363
270				95% UTL95% Coverage		1.281				95% KM UPL (t)		1.095

271				90% KM Percentile (z)		0.931				95% KM Percentile (z)		1.063
272				99% KM Percentile (z)		1.31				95% KM USL		1.451
273												
274	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
275				Mean		0.46				SD		0.375
276				95% UTL95% Coverage		1.302				95% UPL (t)		1.11
277				90% Percentile (z)		0.94				95% Percentile (z)		1.077
278				99% Percentile (z)		1.332				95% USL		1.478
279	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
280												
281	**Gamma GOF Tests on Detected Observations Only**											
282				A-D Test Statistic		0.918	**Anderson-Darling GOF Test**					
283				5% A-D Critical Value		0.751	Data Not Gamma Distributed at 5% Significance Level					
284				K-S Test Statistic		0.213	**Kolmogorov-Smirnov GOF**					
285				5% K-S Critical Value		0.191	Data Not Gamma Distributed at 5% Significance Level					
286	**Data Not Gamma Distributed at 5% Significance Level**											
287												
288	**Gamma Statistics on Detected Data Only**											
289				k hat (MLE)		2.66				k star (bias corrected MLE)		2.312
290				Theta hat (MLE)		0.218				Theta star (bias corrected MLE)		0.251
291				nu hat (MLE)		111.7				nu star (bias corrected)		97.1
292				MLE Mean (bias corrected)		0.58						
293				MLE Sd (bias corrected)		0.381				95% Percentile of Chisquare (2kstar)		10.48
294												
295	**Gamma ROS Statistics using Imputed Non-Detects**											
296	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
297	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
298	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
299	This is especially true when the sample size is small.											
300	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
301				Minimum		0.01				Mean		0.452
302				Maximum		1.65				Median		0.31
303				SD		0.384				CV		0.851
304				k hat (MLE)		1.026				k star (bias corrected MLE)		0.94
305				Theta hat (MLE)		0.44				Theta star (bias corrected MLE)		0.481
306				nu hat (MLE)		57.44				nu star (bias corrected)		52.62
307				MLE Mean (bias corrected)		0.452				MLE Sd (bias corrected)		0.466
308				95% Percentile of Chisquare (2kstar)		5.755				90% Percentile		1.056
309				95% Percentile		1.383				99% Percentile		2.147
310	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
311	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
312					WH	HW					WH	HW
313				95% Approx. Gamma UTL with 95% Coverage	1.972	2.264				95% Approx. Gamma UPL	1.426	1.559
314				95% Gamma USL	2.58	3.096						
315												
316	**Estimates of Gamma Parameters using KM Estimates**											
317				Mean (KM)		0.465				SD (KM)		0.363
318				Variance (KM)		0.132				SE of Mean (KM)		0.0703
319				k hat (KM)		1.638				k star (KM)		1.487
320				nu hat (KM)		91.75				nu star (KM)		83.26
321				theta hat (KM)		0.284				theta star (KM)		0.313
322				80% gamma percentile (KM)		0.72				90% gamma percentile (KM)		0.971
323				95% gamma percentile (KM)		1.215				99% gamma percentile (KM)		1.766
324												

325	**The following statistics are computed using gamma distribution and KM estimates**											
326	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
327					WH	HW					WH	HW
328	95% Approx. Gamma UTL with 95% Coverage				1.593	1.684	95% Approx. Gamma UPL				1.212	1.247
329	95% KM Gamma Percentile				1.153	1.182	95% Gamma USL				2.004	2.175
330												
331	**Lognormal GOF Test on Detected Observations Only**											
332	Shapiro Wilk Test Statistic				0.912		**Shapiro Wilk GOF Test**					
333	5% Shapiro Wilk Critical Value				0.908		Detected Data appear Lognormal at 5% Significance Level					
334	Lilliefors Test Statistic				0.232		**Lilliefors GOF Test**					
335	5% Lilliefors Critical Value				0.188		Data Not Lognormal at 5% Significance Level					
336	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
337												
338	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
339	Mean in Original Scale				0.467		Mean in Log Scale				-1.086	
340	SD in Original Scale				0.369		SD in Log Scale				0.857	
341	95% UTL95% Coverage				2.313		95% BCA UTL95% Coverage				1.367	
342	95% Bootstrap (%) UTL95% Coverage				1.65		95% UPL (t)				1.491	
343	90% Percentile (z)				1.012		95% Percentile (z)				1.382	
344	99% Percentile (z)				2.478		95% USL				3.456	
345												
346	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
347	KM Mean of Logged Data				-1.088		95% KM UTL (Lognormal)95% Coverage				2.161	
348	KM SD of Logged Data				0.828		95% KM UPL (Lognormal)				1.414	
349	95% KM Percentile Lognormal (z)				1.314		95% KM USL (Lognormal)				3.184	
350												
351	**Background DL/2 Statistics Assuming Lognormal Distribution**											
352	Mean in Original Scale				0.46		Mean in Log Scale				-1.134	
353	SD in Original Scale				0.375		SD in Log Scale				0.902	
354	95% UTL95% Coverage				2.442		95% UPL (t)				1.538	
355	90% Percentile (z)				1.023		95% Percentile (z)				1.42	
356	99% Percentile (z)				2.626		95% USL				3.727	
357	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
358												
359	**Nonparametric Distribution Free Background Statistics**											
360	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
361												
362	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
363	Order of Statistic, r				28		95% UTL with95% Coverage				1.65	
364	Approx, f used to compute achieved CC				1.474		Approximate Actual Confidence Coefficient achieved by UTL				0.762	
365	Approximate Sample Size needed to achieve specified CC				59		95% UPL				1.286	
366	95% USL				1.65		95% KM Chebyshev UPL				2.077	
367												
368	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
369	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
370	and consists of observations collected from clean unimpacted locations.											
371	The use of USL tends to provide a balance between false positives and false negatives provided the data											
372	represents a background data set and when many onsite observations need to be compared with the BTV.											
373												
374	**pH**											
375												
376	**General Statistics**											
377	Total Number of Observations				26		Number of Distinct Observations				23	
378							Number of Missing Observations				5	

379					Minimum	6.55					First Quartile	7.155
380					Second Largest	9.25					Median	7.31
381					Maximum	9.63					Third Quartile	7.945
382					Mean	7.588					SD	0.714
383					Coefficient of Variation	0.094					Skewness	1.308
384					Mean of logged Data	2.023					SD of logged Data	0.0899
385												
386	**Critical Values for Background Threshold Values (BTVs)**											
387					Tolerance Factor K (For UTL)	2.275					d2max (for USL)	2.681
388												
389	**Normal GOF Test**											
390					Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**					
391					5% Shapiro Wilk Critical Value	0.92	Data Not Normal at 5% Significance Level					
392					Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**					
393					5% Lilliefors Critical Value	0.17	Data Not Normal at 5% Significance Level					
394	**Data Not Normal at 5% Significance Level**											
395												
396	**Background Statistics Assuming Normal Distribution**											
397				95% UTL with	95% Coverage	9.212					90% Percentile (z)	8.503
398					95% UPL (t)	8.83					95% Percentile (z)	8.762
399					95% USL	9.501					99% Percentile (z)	9.248
400												
401	**Gamma GOF Test**											
402					A-D Test Statistic	0.749	**Anderson-Darling Gamma GOF Test**					
403					5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level					
404					K-S Test Statistic	0.189	**Kolmogorov-Smirnov Gamma GOF Test**					
405					5% K-S Critical Value	0.171	Data Not Gamma Distributed at 5% Significance Level					
406	**Data Not Gamma Distributed at 5% Significance Level**											
407												
408	**Gamma Statistics**											
409					k hat (MLE)	125.2					k star (bias corrected MLE)	110.8
410					Theta hat (MLE)	0.0606					Theta star (bias corrected MLE)	0.0685
411					nu hat (MLE)	6512					nu star (bias corrected)	5762
412					MLE Mean (bias corrected)	7.588					MLE Sd (bias corrected)	0.721
413												
414	**Background Statistics Assuming Gamma Distribution**											
415				95% Wilson Hilferty (WH) Approx. Gamma UPL		8.834					90% Percentile	8.526
416				95% Hawkins Wixley (HW) Approx. Gamma UPL		8.835					95% Percentile	8.812
417				95% WH Approx. Gamma UTL with	95% Coverage	9.249					99% Percentile	9.365
418				95% HW Approx. Gamma UTL with	95% Coverage	9.255						
419					95% WH USL	9.573					95% HW USL	9.584
420												
421	**Lognormal GOF Test**											
422					Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk Lognormal GOF Test**					
423					5% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 5% Significance Level					
424					Lilliefors Test Statistic	0.183	**Lilliefors Lognormal GOF Test**					
425					5% Lilliefors Critical Value	0.17	Data Not Lognormal at 5% Significance Level					
426	**Data appear Approximate Lognormal at 5% Significance Level**											
427												
428	**Background Statistics assuming Lognormal Distribution**											
429				95% UTL with	95% Coverage	9.273					90% Percentile (z)	8.481
430					95% UPL (t)	8.838					95% Percentile (z)	8.762
431					95% USL	9.618					99% Percentile (z)	9.316
432												

433	**Nonparametric Distribution Free Background Statistics**											
434	**Data appear Approximate Lognormal at 5% Significance Level**											
435												
436	**Nonparametric Upper Limits for Background Threshold Values**											
437					Order of Statistic, r	26				95% UTL with 95% Coverage		9.63
438					Approx, f used to compute achieved CC	1.368				Approximate Actual Confidence Coefficient achieved by UTL		0.736
439										Approximate Sample Size needed to achieve specified CC		59
440					95% Percentile Bootstrap UTL with 95% Coverage	9.63				95% BCA Bootstrap UTL with 95% Coverage		9.63
441					95% UPL	9.497				90% Percentile		8.235
442					90% Chebyshev UPL	9.77				95% Percentile		9.008
443					95% Chebyshev UPL	10.76				99% Percentile		9.535
444					95% USL	9.63						
445												
446	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
447	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
448	and consists of observations collected from clean unimpacted locations.											
449	The use of USL tends to provide a balance between false positives and false negatives provided the data											
450	represents a background data set and when many onsite observations need to be compared with the BTV.											
451												
452	**Sulfate**											
453												
454	**General Statistics**											
455					Total Number of Observations	26				Number of Missing Observations		5
456					Number of Distinct Observations	19						
457					Number of Detects	25				Number of Non-Detects		1
458					Number of Distinct Detects	18				Number of Distinct Non-Detects		1
459					Minimum Detect	63.6				Minimum Non-Detect		1
460					Maximum Detect	2520				Maximum Non-Detect		1
461					Variance Detected	980753				Percent Non-Detects		3.846%
462					Mean Detected	1270				SD Detected		990.3
463					Mean of Detected Logged Data	6.361				SD of Detected Logged Data		1.594
464												
465	**Critical Values for Background Threshold Values (BTVs)**											
466					Tolerance Factor K (For UTL)	2.275				d2max (for USL)		2.681
467												
468	**Normal GOF Test on Detects Only**											
469					Shapiro Wilk Test Statistic	0.721				**Shapiro Wilk GOF Test**		
470					5% Shapiro Wilk Critical Value	0.918				Data Not Normal at 5% Significance Level		
471					Lilliefors Test Statistic	0.298				**Lilliefors GOF Test**		
472					5% Lilliefors Critical Value	0.173				Data Not Normal at 5% Significance Level		
473	**Data Not Normal at 5% Significance Level**											
474												
475	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
476					KM Mean	1221				KM SD		982.3
477					95% UTL95% Coverage	3455				95% KM UPL (t)		2931
478					90% KM Percentile (z)	2480				95% KM Percentile (z)		2837
479					99% KM Percentile (z)	3506				95% KM USL		3854
480												
481	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
482					Mean	1221				SD		1002
483					95% UTL95% Coverage	3500				95% UPL (t)		2965
484					90% Percentile (z)	2505				95% Percentile (z)		2869
485					99% Percentile (z)	3551				95% USL		3906
486	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											

487												
488	**Gamma GOF Tests on Detected Observations Only**											
489					A-D Test Statistic	3.735	**Anderson-Darling GOF Test**					
490					5% A-D Critical Value	0.783	Data Not Gamma Distributed at 5% Significance Level					
491					K-S Test Statistic	0.343	**Kolmogorov-Smirnov GOF**					
492					5% K-S Critical Value	0.181	Data Not Gamma Distributed at 5% Significance Level					
493	**Data Not Gamma Distributed at 5% Significance Level**											
494												
495	**Gamma Statistics on Detected Data Only**											
496					k hat (MLE)	0.761	k star (bias corrected MLE)	0.696				
497					Theta hat (MLE)	1669	Theta star (bias corrected MLE)	1824				
498					nu hat (MLE)	38.03	nu star (bias corrected)	34.8				
499					MLE Mean (bias corrected)	1270						
500					MLE Sd (bias corrected)	1522	95% Percentile of Chisquare (2kstar)	4.748				
501												
502	**Gamma ROS Statistics using Imputed Non-Detects**											
503	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
504	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
505	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
506	This is especially true when the sample size is small.											
507	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
508					Minimum	63.6	Mean	1241				
509					Maximum	2520	Median	1925				
510					SD	981.5	CV	0.791				
511					k hat (MLE)	0.777	k star (bias corrected MLE)	0.713				
512					Theta hat (MLE)	1597	Theta star (bias corrected MLE)	1740				
513					nu hat (MLE)	40.4	nu star (bias corrected)	37.07				
514					MLE Mean (bias corrected)	1241	MLE Sd (bias corrected)	1469				
515					95% Percentile of Chisquare (2kstar)	4.821	90% Percentile	3101				
516					95% Percentile	4195	99% Percentile	6803				
517	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
518	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
519						WH	HW			WH	HW	
520					95% Approx. Gamma UTL with 95% Coverage	6448	7668	95% Approx. Gamma UPL		4441	4958	
521					95% Gamma USL	8323	10372					
522												
523	**Estimates of Gamma Parameters using KM Estimates**											
524					Mean (KM)	1221	SD (KM)	982.3				
525					Variance (KM)	964830	SE of Mean (KM)	196.6				
526					k hat (KM)	1.545	k star (KM)	1.392				
527					nu hat (KM)	80.33	nu star (KM)	72.39				
528					theta hat (KM)	790.3	theta star (KM)	876.9				
529					80% gamma percentile (KM)	1904	90% gamma percentile (KM)	2591				
530					95% gamma percentile (KM)	3261	99% gamma percentile (KM)	4782				
531												
532	**The following statistics are computed using gamma distribution and KM estimates**											
533	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
534						WH	HW			WH	HW	
535					95% Approx. Gamma UTL with 95% Coverage	6709	8275	95% Approx. Gamma UPL		4544	5208	
536					95% KM Gamma Percentile	4214	4764	95% Gamma USL		8748	11386	
537												
538	**Lognormal GOF Test on Detected Observations Only**											
539					Shapiro Wilk Test Statistic	0.695	**Shapiro Wilk GOF Test**					
540					5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level					

541					Lilliefors Test Statistic	0.352	**Lilliefors GOF Test**					
542					5% Lilliefors Critical Value	0.173	Data Not Lognormal at 5% Significance Level					
543	**Data Not Lognormal at 5% Significance Level**											
544												
545	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
546					Mean in Original Scale	1222				Mean in Log Scale	6.229	
547					SD in Original Scale	1001				SD in Log Scale	1.7	
548					95% UTL95% Coverage	24259				95% BCA UTL95% Coverage	2440	
549					95% Bootstrap (%) UTL95% Coverage	2520				95% UPL (t)	9781	
550					90% Percentile (z)	4482				95% Percentile (z)	8311	
551					99% Percentile (z)	26472				95% USL	48366	
552												
553	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
554					KM Mean of Logged Data	6.116				95% KM UTL (Lognormal)95% Coverage	39139	
555					KM SD of Logged Data	1.96				95% KM UPL (Lognormal)	13735	
556					95% KM Percentile Lognormal (z)	11383				95% KM USL (Lognormal)	86715	
557												
558	**Background DL/2 Statistics Assuming Lognormal Distribution**											
559					Mean in Original Scale	1221				Mean in Log Scale	6.09	
560					SD in Original Scale	1002				SD in Log Scale	2.086	
561					95% UTL95% Coverage	50803				95% UPL (t)	16664	
562					90% Percentile (z)	6394				95% Percentile (z)	13644	
563					99% Percentile (z)	56547				95% USL	118479	
564	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
565												
566	**Nonparametric Distribution Free Background Statistics**											
567	**Data do not follow a Discernible Distribution (0.05)**											
568												
569	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
570					Order of Statistic, r	26				95% UTL with95% Coverage	2520	
571					Approx, f used to compute achieved CC	1.368				Approximate Actual Confidence Coefficient achieved by UTL	0.736	
572					Approximate Sample Size needed to achieve specified CC	59				95% UPL	2408	
573					95% USL	2520				95% KM Chebyshev UPL	5584	
574												
575	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
576	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
577	and consists of observations collected from clean unimpacted locations.											
578	The use of USL tends to provide a balance between false positives and false negatives provided the data											
579	represents a background data set and when many onsite observations need to be compared with the BTV.											
580												
581	**TDS**											
582												
583	**General Statistics**											
584					Total Number of Observations	28				Number of Distinct Observations	22	
585										Number of Missing Observations	3	
586					Minimum	384				First Quartile	486.5	
587					Second Largest	3600				Median	3250	
588					Maximum	3900				Third Quartile	3463	
589					Mean	2275				SD	1482	
590					Coefficient of Variation	0.651				Skewness	-0.436	
591					Mean of logged Data	7.362				SD of logged Data	0.991	
592												
593	**Critical Values for Background Threshold Values (BTVs)**											
594					Tolerance Factor K (For UTL)	2.246				d2max (for USL)	2.714	

595												
596	**Normal GOF Test**											
597					Shapiro Wilk Test Statistic	0.702	**Shapiro Wilk GOF Test**					
598					5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level					
599					Lilliefors Test Statistic	0.339	**Lilliefors GOF Test**					
600					5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level					
601	**Data Not Normal at 5% Significance Level**											
602												
603	**Background Statistics Assuming Normal Distribution**											
604				95% UTL with	95% Coverage	5603			90% Percentile (z)	4174		
605					95% UPL (t)	4844			95% Percentile (z)	4712		
606					95% USL	6297			99% Percentile (z)	5722		
607												
608	**Gamma GOF Test**											
609					A-D Test Statistic	4.292	**Anderson-Darling Gamma GOF Test**					
610					5% A-D Critical Value	0.763	Data Not Gamma Distributed at 5% Significance Level					
611					K-S Test Statistic	0.367	**Kolmogorov-Smirnov Gamma GOF Test**					
612					5% K-S Critical Value	0.168	Data Not Gamma Distributed at 5% Significance Level					
613	**Data Not Gamma Distributed at 5% Significance Level**											
614												
615	**Gamma Statistics**											
616					k hat (MLE)	1.504			k star (bias corrected MLE)	1.367		
617					Theta hat (MLE)	1513			Theta star (bias corrected MLE)	1665		
618					nu hat (MLE)	84.23			nu star (bias corrected)	76.54		
619					MLE Mean (bias corrected)	2275			MLE Sd (bias corrected)	1946		
620												
621	**Background Statistics Assuming Gamma Distribution**											
622				95% Wilson Hilferty (WH) Approx. Gamma UPL		6369			90% Percentile	4851		
623				95% Hawkins Wixley (HW) Approx. Gamma UPL		6767			95% Percentile	6116		
624				95% WH Approx. Gamma UTL with	95% Coverage	8494			99% Percentile	8991		
625				95% HW Approx. Gamma UTL with	95% Coverage	9358						
626					95% WH USL	10808			95% HW USL	12318		
627												
628	**Lognormal GOF Test**											
629					Shapiro Wilk Test Statistic	0.685	**Shapiro Wilk Lognormal GOF Test**					
630					5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level					
631					Lilliefors Test Statistic	0.369	**Lilliefors Lognormal GOF Test**					
632					5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level					
633	**Data Not Lognormal at 5% Significance Level**											
634												
635	**Background Statistics assuming Lognormal Distribution**											
636				95% UTL with	95% Coverage	14594			90% Percentile (z)	5610		
637					95% UPL (t)	8781			95% Percentile (z)	8043		
638					95% USL	23220			99% Percentile (z)	15804		
639												
640	**Nonparametric Distribution Free Background Statistics**											
641	**Data do not follow a Discernible Distribution (0.05)**											
642												
643	**Nonparametric Upper Limits for Background Threshold Values**											
644					Order of Statistic, r	28			95% UTL with	95% Coverage	3900	
645					Approx, f used to compute achieved CC	1.474			Approximate Actual Confidence Coefficient achieved by UTL		0.762	
646									Approximate Sample Size needed to achieve specified CC		59	
647				95% Percentile Bootstrap UTL with	95% Coverage	3900			95% BCA Bootstrap UTL with	95% Coverage	3600	
648					95% UPL	3765			90% Percentile		3600	

	A	B	C	D	E	F	G	H	I	J	K	L
649					90% Chebyshev UPL	6799					95% Percentile	3600
650					95% Chebyshev UPL	8848					99% Percentile	3819
651					95% USL	3900						
652												
653	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
654	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
655	and consists of observations collected from clean unimpacted locations.											
656	The use of USL tends to provide a balance between false positives and false negatives provided the data											
657	represents a background data set and when many onsite observations need to be compared with the BTV.											
658												

	Background Statistics for Data Sets with Non-Detects	
User Selected Options		
Date/Time of Computation	ProUCL 5.11/19/2022 10:35:53 AM	
From File	ProUCL Input PRPA CCR ASH Appendix IV Total 2016-2021.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Coverage	95%	
Different or Future K Observations	1	
Number of Bootstrap Operations	2000	

Antimony

General Statistics

Total Number of Observations	28	Number of Missing Observations	3
Number of Distinct Observations	6		
Number of Detects	0	Number of Non-Detects	28
Number of Distinct Detects	0	Number of Distinct Non-Detects	6
Minimum Detect	N/A	Minimum Non-Detect	0.5
Maximum Detect	N/A	Maximum Non-Detect	5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony was not processed!

Arsenic

General Statistics

Total Number of Observations	28	Number of Missing Observations	3
Number of Distinct Observations	8		
Number of Detects	4	Number of Non-Detects	24
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	1.2	Minimum Non-Detect	0.5
Maximum Detect	1.3	Maximum Non-Detect	5
Variance Detected	0.0025	Percent Non-Detects	85.71%
Mean Detected	1.225	SD Detected	0.05
Mean of Detected Logged Data	0.202	SD of Detected Logged Data	0.04

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.246	d2max (for USL)	2.714

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.63	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.441	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

55					KM Mean	0.626					KM SD	0.275
56					95% UTL95% Coverage	1.245					95% KM UPL (t)	1.103
57					90% KM Percentile (z)	0.979					95% KM Percentile (z)	1.079
58					99% KM Percentile (z)	1.267					95% KM USL	1.374
59												
60					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
61					Mean	0.809					SD	0.544
62					95% UTL95% Coverage	2.032					95% UPL (t)	1.753
63					90% Percentile (z)	1.507					95% Percentile (z)	1.704
64					99% Percentile (z)	2.075					95% USL	2.287
65					**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**							
66												
67					**Gamma GOF Tests on Detected Observations Only**							
68					A-D Test Statistic	0.96	**Anderson-Darling GOF Test**					
69					5% A-D Critical Value	0.657	Data Not Gamma Distributed at 5% Significance Level					
70					K-S Test Statistic	0.468	**Kolmogorov-Smirnov GOF**					
71					5% K-S Critical Value	0.394	Data Not Gamma Distributed at 5% Significance Level					
72					**Data Not Gamma Distributed at 5% Significance Level**							
73												
74					**Gamma Statistics on Detected Data Only**							
75					k hat (MLE)	821.7	k star (bias corrected MLE)	205.6				
76					Theta hat (MLE)	0.00149	Theta star (bias corrected MLE)	0.00596				
77					nu hat (MLE)	6574	nu star (bias corrected)	1645				
78					MLE Mean (bias corrected)	1.225						
79					MLE Sd (bias corrected)	0.0854	95% Percentile of Chisquare (2kstar)	459.5				
80												
81					**Gamma ROS Statistics using Imputed Non-Detects**							
82					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
83					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
84					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
85					This is especially true when the sample size is small.							
86					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
87					Minimum	0.815	Mean	1.038				
88					Maximum	1.3	Median	1.036				
89					SD	0.11	CV	0.106				
90					k hat (MLE)	92.31	k star (bias corrected MLE)	82.45				
91					Theta hat (MLE)	0.0112	Theta star (bias corrected MLE)	0.0126				
92					nu hat (MLE)	5170	nu star (bias corrected)	4617				
93					MLE Mean (bias corrected)	1.038	MLE Sd (bias corrected)	0.114				
94					95% Percentile of Chisquare (2kstar)	195.9	90% Percentile	1.187				
95					95% Percentile	1.233	99% Percentile	1.323				
96					**The following statistics are computed using Gamma ROS Statistics on Imputed Data**							
97					**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**							
98						WH	HW				WH	HW
99					95% Approx. Gamma UTL with 95% Coverage	1.301	1.304	95% Approx. Gamma UPL	1.237	1.238		
100					95% Gamma USL	1.362	1.366					
101												
102					**Estimates of Gamma Parameters using KM Estimates**							
103					Mean (KM)	0.626	SD (KM)	0.275				
104					Variance (KM)	0.0758	SE of Mean (KM)	0.0663				
105					k hat (KM)	5.168	k star (KM)	4.639				
106					nu hat (KM)	289.4	nu star (KM)	259.8				
107					theta hat (KM)	0.121	theta star (KM)	0.135				
108					80% gamma percentile (KM)	0.849	90% gamma percentile (KM)	1.015				

109				95% gamma percentile (KM)		1.168				99% gamma percentile (KM)		1.491
110												
111	**The following statistics are computed using gamma distribution and KM estimates**											
112	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
113					WH	HW					WH	HW
114				95% Approx. Gamma UTL with 95% Coverage	1.25	1.25				95% Approx. Gamma UPL	1.072	1.067
115				95% KM Gamma Percentile	1.043	1.038				95% Gamma USL	1.428	1.437
116												
117	**Lognormal GOF Test on Detected Observations Only**											
118				Shapiro Wilk Test Statistic		0.63	**Shapiro Wilk GOF Test**					
119				5% Shapiro Wilk Critical Value		0.748	Data Not Lognormal at 5% Significance Level					
120				Lilliefors Test Statistic		0.441	**Lilliefors GOF Test**					
121				5% Lilliefors Critical Value		0.375	Data Not Lognormal at 5% Significance Level					
122	**Data Not Lognormal at 5% Significance Level**											
123												
124	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
125				Mean in Original Scale		1.055	Mean in Log Scale					0.0498
126				SD in Original Scale		0.0968	SD in Log Scale					0.0909
127				95% UTL95% Coverage		1.289	95% BCA UTL95% Coverage					1.2
128				95% Bootstrap (%) UTL95% Coverage		1.3	95% UPL (t)					1.23
129				90% Percentile (z)		1.181	95% Percentile (z)					1.221
130				99% Percentile (z)		1.299	95% USL					1.345
131												
132	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
133				KM Mean of Logged Data		-0.537	95% KM UTL (Lognormal)95% Coverage					1.253
134				KM SD of Logged Data		0.34	95% KM UPL (Lognormal)					1.053
135				95% KM Percentile Lognormal (z)		1.022	95% KM USL (Lognormal)					1.469
136												
137	**Background DL/2 Statistics Assuming Lognormal Distribution**											
138				Mean in Original Scale		0.809	Mean in Log Scale					-0.38
139				SD in Original Scale		0.544	SD in Log Scale					0.556
140				95% UTL95% Coverage		2.385	95% UPL (t)					1.794
141				90% Percentile (z)		1.395	95% Percentile (z)					1.707
142				99% Percentile (z)		2.494	95% USL					3.095
143	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
144												
145	**Nonparametric Distribution Free Background Statistics**											
146	**Data do not follow a Discernible Distribution (0.05)**											
147												
148	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
149				Order of Statistic, r		28	95% UTL with95% Coverage					5
150				Approx, f used to compute achieved CC		1.474	Approximate Actual Confidence Coefficient achieved by UTL					0.762
151				Approximate Sample Size needed to achieve specified CC		59	95% UPL					4.55
152				95% USL		5	95% KM Chebyshev UPL					1.848
153												
154	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
155	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
156	and consists of observations collected from clean unimpacted locations.											
157	The use of USL tends to provide a balance between false positives and false negatives provided the data											
158	represents a background data set and when many onsite observations need to be compared with the BTV.											
159												
160	**Barium**											
161												
162	**General Statistics**											

163	Total Number of Observations					28	Number of Distinct Observations					22
164							Number of Missing Observations					3
165	Minimum					8	First Quartile					9.525
166	Second Largest					67	Median					10.5
167	Maximum					72.2	Third Quartile					56.78
168	Mean					28.78	SD					24.95
169	Coefficient of Variation					0.867	Skewness					0.634
170	Mean of logged Data					2.966	SD of logged Data					0.899
171												
172	**Critical Values for Background Threshold Values (BTVs)**											
173	Tolerance Factor K (For UTL)					2.246	d2max (for USL)					2.714
174												
175	**Normal GOF Test**											
176	Shapiro Wilk Test Statistic					0.725	**Shapiro Wilk GOF Test**					
177	5% Shapiro Wilk Critical Value					0.924	Data Not Normal at 5% Significance Level					
178	Lilliefors Test Statistic					0.358	**Lilliefors GOF Test**					
179	5% Lilliefors Critical Value					0.164	Data Not Normal at 5% Significance Level					
180	**Data Not Normal at 5% Significance Level**											
181												
182	**Background Statistics Assuming Normal Distribution**											
183	95% UTL with 95% Coverage					84.81	90% Percentile (z)					60.75
184	95% UPL (t)					72.02	95% Percentile (z)					69.81
185	95% USL					96.49	99% Percentile (z)					86.81
186												
187	**Gamma GOF Test**											
188	A-D Test Statistic					3.59	**Anderson-Darling Gamma GOF Test**					
189	5% A-D Critical Value					0.765	Data Not Gamma Distributed at 5% Significance Level					
190	K-S Test Statistic					0.339	**Kolmogorov-Smirnov Gamma GOF Test**					
191	5% K-S Critical Value					0.169	Data Not Gamma Distributed at 5% Significance Level					
192	**Data Not Gamma Distributed at 5% Significance Level**											
193												
194	**Gamma Statistics**											
195	k hat (MLE)					1.414	k star (bias corrected MLE)					1.287
196	Theta hat (MLE)					20.35	Theta star (bias corrected MLE)					22.36
197	nu hat (MLE)					79.2	nu star (bias corrected)					72.05
198	MLE Mean (bias corrected)					28.78	MLE Sd (bias corrected)					25.37
199												
200	**Background Statistics Assuming Gamma Distribution**											
201	95% Wilson Hilferty (WH) Approx. Gamma UPL					81.24	90% Percentile					62.26
202	95% Hawkins Wixley (HW) Approx. Gamma UPL					83.33	95% Percentile					78.96
203	95% WH Approx. Gamma UTL with 95% Coverage					109.3	99% Percentile					117
204	95% HW Approx. Gamma UTL with 95% Coverage					115.5						
205	95% WH USL					139.9	95% HW USL					152.3
206												
207	**Lognormal GOF Test**											
208	Shapiro Wilk Test Statistic					0.73	**Shapiro Wilk Lognormal GOF Test**					
209	5% Shapiro Wilk Critical Value					0.924	Data Not Lognormal at 5% Significance Level					
210	Lilliefors Test Statistic					0.314	**Lilliefors Lognormal GOF Test**					
211	5% Lilliefors Critical Value					0.164	Data Not Lognormal at 5% Significance Level					
212	**Data Not Lognormal at 5% Significance Level**											
213												
214	**Background Statistics assuming Lognormal Distribution**											
215	95% UTL with 95% Coverage					146.3	90% Percentile (z)					61.46
216	95% UPL (t)					92.28	95% Percentile (z)					85.21

217					95% USL	222.9				99% Percentile (z)		157.3
218												
219					**Nonparametric Distribution Free Background Statistics**							
220					**Data do not follow a Discernible Distribution (0.05)**							
221												
222					**Nonparametric Upper Limits for Background Threshold Values**							
223					Order of Statistic, r	28				95% UTL with 95% Coverage		72.2
224					Approx, f used to compute achieved CC	1.474				Approximate Actual Confidence Coefficient achieved by UTL		0.762
225										Approximate Sample Size needed to achieve specified CC		59
226					95% Percentile Bootstrap UTL with 95% Coverage	72.2				95% BCA Bootstrap UTL with 95% Coverage		72.2
227					95% UPL	69.86				90% Percentile		65.27
228					90% Chebyshev UPL	104.9				95% Percentile		66.86
229					95% Chebyshev UPL	139.4				99% Percentile		70.8
230					95% USL	72.2						
231												
232					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
233					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
234					and consists of observations collected from clean unimpacted locations.							
235					The use of USL tends to provide a balance between false positives and false negatives provided the data							
236					represents a background data set and when many onsite observations need to be compared with the BTV.							
237												
238	**Beryllium**											
239												
240					**General Statistics**							
241					Total Number of Observations	28				Number of Missing Observations		3
242					Number of Distinct Observations	6						
243					Number of Detects	0				Number of Non-Detects		28
244					Number of Distinct Detects	0				Number of Distinct Non-Detects		6
245					Minimum Detect	N/A				Minimum Non-Detect		0.2
246					Maximum Detect	N/A				Maximum Non-Detect		2.5
247					Variance Detected	N/A				Percent Non-Detects		100%
248					Mean Detected	N/A				SD Detected		N/A
249					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
250												
251					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
252					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
253					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
254												
255					**The data set for variable Beryllium was not processed!**							
256												
257												
258	**Cadmium**											
259												
260					**General Statistics**							
261					Total Number of Observations	28				Number of Missing Observations		3
262					Number of Distinct Observations	8						
263					Number of Detects	0				Number of Non-Detects		28
264					Number of Distinct Detects	0				Number of Distinct Non-Detects		8
265					Minimum Detect	N/A				Minimum Non-Detect		0.08
266					Maximum Detect	N/A				Maximum Non-Detect		5
267					Variance Detected	N/A				Percent Non-Detects		100%
268					Mean Detected	N/A				SD Detected		N/A
269					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
270												

	A	B	C	D	E	F	G	H	I	J	K	L
271	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
272	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
273	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
274												
275	**The data set for variable Cadmium was not processed!**											
276												
277												
278	**Chromium**											
279												
280	**General Statistics**											
281						Total Number of Observations	28				Number of Missing Observations	3	
282						Number of Distinct Observations	13						
283						Number of Detects	9				Number of Non-Detects	19	
284						Number of Distinct Detects	9				Number of Distinct Non-Detects	5	
285						Minimum Detect	1.6				Minimum Non-Detect	0.93	
286						Maximum Detect	42.2				Maximum Non-Detect	4	
287						Variance Detected	178.6				Percent Non-Detects	67.86%	
288						Mean Detected	11.11				SD Detected	13.37	
289						Mean of Detected Logged Data	1.843				SD of Detected Logged Data	1.108	
290													
291	**Critical Values for Background Threshold Values (BTVs)**											
292						Tolerance Factor K (For UTL)	2.246				d2max (for USL)	2.714	
293													
294	**Normal GOF Test on Detects Only**											
295						Shapiro Wilk Test Statistic	0.748				**Shapiro Wilk GOF Test**		
296						5% Shapiro Wilk Critical Value	0.829				Data Not Normal at 5% Significance Level		
297						Lilliefors Test Statistic	0.25				**Lilliefors GOF Test**		
298						5% Lilliefors Critical Value	0.274				Detected Data appear Normal at 5% Significance Level		
299	**Detected Data appear Approximate Normal at 5% Significance Level**											
300													
301	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
302						KM Mean	4.224				KM SD	8.576	
303						95% UTL95% Coverage	23.48				95% KM UPL (t)	19.09	
304						90% KM Percentile (z)	15.21				95% KM Percentile (z)	18.33	
305						99% KM Percentile (z)	24.17				95% KM USL	27.5	
306													
307	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
308						Mean	4.027				SD	8.815	
309						95% UTL95% Coverage	23.83				95% UPL (t)	19.31	
310						90% Percentile (z)	15.32				95% Percentile (z)	18.53	
311						99% Percentile (z)	24.53				95% USL	27.96	
312	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
313													
314	**Gamma GOF Tests on Detected Observations Only**											
315						A-D Test Statistic	0.418				**Anderson-Darling GOF Test**		
316						5% A-D Critical Value	0.743				Detected data appear Gamma Distributed at 5% Significance Level		
317						K-S Test Statistic	0.191				**Kolmogorov-Smirnov GOF**		
318						5% K-S Critical Value	0.287				Detected data appear Gamma Distributed at 5% Significance Level		
319	**Detected data appear Gamma Distributed at 5% Significance Level**											
320													
321	**Gamma Statistics on Detected Data Only**											
322						k hat (MLE)	1.02				k star (bias corrected MLE)	0.754	
323						Theta hat (MLE)	10.89				Theta star (bias corrected MLE)	14.73	
324						nu hat (MLE)	18.36				nu star (bias corrected)	13.57	

325				MLE Mean (bias corrected)		11.11						
326				MLE Sd (bias corrected)		12.8				95% Percentile of Chisquare (2kstar)		4.998
327												
328	**Gamma ROS Statistics using Imputed Non-Detects**											
329	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
330	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
331	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
332	This is especially true when the sample size is small.											
333	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
334				Minimum		0.01				Mean		3.578
335				Maximum		42.2				Median		0.01
336				SD		8.989				CV		2.512
337				k hat (MLE)		0.194				k star (bias corrected MLE)		0.197
338				Theta hat (MLE)		18.43				Theta star (bias corrected MLE)		18.15
339				nu hat (MLE)		10.87				nu star (bias corrected)		11.04
340				MLE Mean (bias corrected)		3.578				MLE Sd (bias corrected)		8.058
341				95% Percentile of Chisquare (2kstar)		2.04				90% Percentile		10.82
342				95% Percentile		18.51				99% Percentile		39.71
343	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
344	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
345					WH	HW					WH	HW
346				95% Approx. Gamma UTL with 95% Coverage	23.83	26.78				95% Approx. Gamma UPL	13.8	13.74
347				95% Gamma USL	36.45	45.31						
348												
349	**Estimates of Gamma Parameters using KM Estimates**											
350				Mean (KM)		4.224				SD (KM)		8.576
351				Variance (KM)		73.54				SE of Mean (KM)		1.719
352				k hat (KM)		0.243				k star (KM)		0.24
353				nu hat (KM)		13.59				nu star (KM)		13.46
354				theta hat (KM)		17.41				theta star (KM)		17.57
355				80% gamma percentile (KM)		6.047				90% gamma percentile (KM)		12.71
356				95% gamma percentile (KM)		20.68				99% gamma percentile (KM)		42.02
357												
358	**The following statistics are computed using gamma distribution and KM estimates**											
359	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
360					WH	HW					WH	HW
361				95% Approx. Gamma UTL with 95% Coverage	19.55	19.3				95% Approx. Gamma UPL	13.41	12.79
362				95% KM Gamma Percentile	12.5	11.86				95% Gamma USL	26.58	27.17
363												
364	**Lognormal GOF Test on Detected Observations Only**											
365				Shapiro Wilk Test Statistic		0.949				**Shapiro Wilk GOF Test**		
366				5% Shapiro Wilk Critical Value		0.829				Detected Data appear Lognormal at 5% Significance Level		
367				Lilliefors Test Statistic		0.156				**Lilliefors GOF Test**		
368				5% Lilliefors Critical Value		0.274				Detected Data appear Lognormal at 5% Significance Level		
369	**Detected Data appear Lognormal at 5% Significance Level**											
370												
371	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
372				Mean in Original Scale		3.764				Mean in Log Scale		-0.649
373				SD in Original Scale		8.916				SD in Log Scale		2.123
374				95% UTL95% Coverage		61.56				95% BCA UTL95% Coverage		42.2
375				95% Bootstrap (%) UTL95% Coverage		42.2				95% UPL (t)		20.73
376				90% Percentile (z)		7.942				95% Percentile (z)		17.18
377				99% Percentile (z)		73.01				95% USL		166.4
378												

379	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
380	KM Mean of Logged Data				0.557	95% KM UTL (Lognormal)95% Coverage						19.35
381	KM SD of Logged Data				1.071	95% KM UPL (Lognormal)						11.18
382	95% KM Percentile Lognormal (z)				10.16	95% KM USL (Lognormal)						31.96
383												
384	**Background DL/2 Statistics Assuming Lognormal Distribution**											
385	Mean in Original Scale				4.027	Mean in Log Scale						0.242
386	SD in Original Scale				8.815	SD in Log Scale						1.323
387	95% UTL95% Coverage				24.89	95% UPL (t)						12.63
388	90% Percentile (z)				6.946	95% Percentile (z)						11.23
389	99% Percentile (z)				27.68	95% USL						46.25
390	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
391												
392	**Nonparametric Distribution Free Background Statistics**											
393	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
394												
395	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
396	Order of Statistic, r				28	95% UTL with95% Coverage						42.2
397	Approx, f used to compute achieved CC				1.474	Approximate Actual Confidence Coefficient achieved by UTL						0.762
398	Approximate Sample Size needed to achieve specified CC				59	95% UPL						33.06
399	95% USL				42.2	95% KM Chebyshev UPL						42.27
400												
401	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
402	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
403	and consists of observations collected from clean unimpacted locations.											
404	The use of USL tends to provide a balance between false positives and false negatives provided the data											
405	represents a background data set and when many onsite observations need to be compared with the BTV.											
406												
407	**Cobalt**											
408												
409	**General Statistics**											
410	Total Number of Observations				28	Number of Missing Observations						3
411	Number of Distinct Observations				6							
412	Number of Detects				0	Number of Non-Detects						28
413	Number of Distinct Detects				0	Number of Distinct Non-Detects						6
414	Minimum Detect				N/A	Minimum Non-Detect						0.5
415	Maximum Detect				N/A	Maximum Non-Detect						5
416	Variance Detected				N/A	Percent Non-Detects						100%
417	Mean Detected				N/A	SD Detected						N/A
418	Mean of Detected Logged Data				N/A	SD of Detected Logged Data						N/A
419												
420	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
421	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
422	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
423												
424	**The data set for variable Cobalt was not processed!**											
425												
426												
427	**Fluoride**											
428												
429	**General Statistics**											
430	Total Number of Observations				28	Number of Missing Observations						3
431	Number of Distinct Observations				17							
432	Number of Detects				21	Number of Non-Detects						7

433				Number of Distinct Detects		17				Number of Distinct Non-Detects		1
434				Minimum Detect		0.12				Minimum Non-Detect		0.2
435				Maximum Detect		1.65				Maximum Non-Detect		0.2
436				Variance Detected		0.129				Percent Non-Detects		25%
437				Mean Detected		0.58				SD Detected		0.359
438				Mean of Detected Logged Data		-0.744				SD of Detected Logged Data		0.68
439												
440				**Critical Values for Background Threshold Values (BTVs)**								
441				Tolerance Factor K (For UTL)		2.246				d2max (for USL)		2.714
442												
443				**Normal GOF Test on Detects Only**								
444				Shapiro Wilk Test Statistic		0.857				**Shapiro Wilk GOF Test**		
445				5% Shapiro Wilk Critical Value		0.908				Data Not Normal at 5% Significance Level		
446				Lilliefors Test Statistic		0.187				**Lilliefors GOF Test**		
447				5% Lilliefors Critical Value		0.188				Detected Data appear Normal at 5% Significance Level		
448				**Detected Data appear Approximate Normal at 5% Significance Level**								
449												
450				**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**								
451				KM Mean		0.465				KM SD		0.363
452				95% UTL95% Coverage		1.281				95% KM UPL (t)		1.095
453				90% KM Percentile (z)		0.931				95% KM Percentile (z)		1.063
454				99% KM Percentile (z)		1.31				95% KM USL		1.451
455												
456				**DL/2 Substitution Background Statistics Assuming Normal Distribution**								
457				Mean		0.46				SD		0.375
458				95% UTL95% Coverage		1.302				95% UPL (t)		1.11
459				90% Percentile (z)		0.94				95% Percentile (z)		1.077
460				99% Percentile (z)		1.332				95% USL		1.478
461				**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**								
462												
463				**Gamma GOF Tests on Detected Observations Only**								
464				A-D Test Statistic		0.918				**Anderson-Darling GOF Test**		
465				5% A-D Critical Value		0.751				Data Not Gamma Distributed at 5% Significance Level		
466				K-S Test Statistic		0.213				**Kolmogorov-Smirnov GOF**		
467				5% K-S Critical Value		0.191				Data Not Gamma Distributed at 5% Significance Level		
468				**Data Not Gamma Distributed at 5% Significance Level**								
469												
470				**Gamma Statistics on Detected Data Only**								
471				k hat (MLE)		2.66				k star (bias corrected MLE)		2.312
472				Theta hat (MLE)		0.218				Theta star (bias corrected MLE)		0.251
473				nu hat (MLE)		111.7				nu star (bias corrected)		97.1
474				MLE Mean (bias corrected)		0.58						
475				MLE Sd (bias corrected)		0.381				95% Percentile of Chisquare (2kstar)		10.48
476												
477				**Gamma ROS Statistics using Imputed Non-Detects**								
478				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
479				GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)								
480				For such situations, GROS method may yield incorrect values of UCLs and BTVs								
481				This is especially true when the sample size is small.								
482				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
483				Minimum		0.01				Mean		0.452
484				Maximum		1.65				Median		0.31
485				SD		0.384				CV		0.851
486				k hat (MLE)		1.026				k star (bias corrected MLE)		0.94

487					Theta hat (MLE)	0.44				Theta star (bias corrected MLE)		0.481
488					nu hat (MLE)	57.44				nu star (bias corrected)		52.62
489					MLE Mean (bias corrected)	0.452				MLE Sd (bias corrected)		0.466
490					95% Percentile of Chisquare (2kstar)	5.755				90% Percentile		1.056
491					95% Percentile	1.383				99% Percentile		2.147
492	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
493	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
494					WH	HW					WH	HW
495	95% Approx. Gamma UTL with 95% Coverage				1.972	2.264	95% Approx. Gamma UPL				1.426	1.559
496	95% Gamma USL				2.58	3.096						
497												
498	**Estimates of Gamma Parameters using KM Estimates**											
499					Mean (KM)	0.465				SD (KM)		0.363
500					Variance (KM)	0.132				SE of Mean (KM)		0.0703
501					k hat (KM)	1.638				k star (KM)		1.487
502					nu hat (KM)	91.75				nu star (KM)		83.26
503					theta hat (KM)	0.284				theta star (KM)		0.313
504					80% gamma percentile (KM)	0.72				90% gamma percentile (KM)		0.971
505					95% gamma percentile (KM)	1.215				99% gamma percentile (KM)		1.766
506												
507	**The following statistics are computed using gamma distribution and KM estimates**											
508	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
509					WH	HW					WH	HW
510	95% Approx. Gamma UTL with 95% Coverage				1.593	1.684	95% Approx. Gamma UPL				1.212	1.247
511	95% KM Gamma Percentile				1.153	1.182	95% Gamma USL				2.004	2.175
512												
513	**Lognormal GOF Test on Detected Observations Only**											
514					Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**					
515					5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level					
516					Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**					
517					5% Lilliefors Critical Value	0.188	Data Not Lognormal at 5% Significance Level					
518	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
519												
520	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
521					Mean in Original Scale	0.467	Mean in Log Scale					-1.086
522					SD in Original Scale	0.369	SD in Log Scale					0.857
523					95% UTL95% Coverage	2.313	95% BCA UTL95% Coverage					1.367
524					95% Bootstrap (%) UTL95% Coverage	1.65	95% UPL (t)					1.491
525					90% Percentile (z)	1.012	95% Percentile (z)					1.382
526					99% Percentile (z)	2.478	95% USL					3.456
527												
528	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
529					KM Mean of Logged Data	-1.088	95% KM UTL (Lognormal)95% Coverage					2.161
530					KM SD of Logged Data	0.828	95% KM UPL (Lognormal)					1.414
531					95% KM Percentile Lognormal (z)	1.314	95% KM USL (Lognormal)					3.184
532												
533	**Background DL/2 Statistics Assuming Lognormal Distribution**											
534					Mean in Original Scale	0.46	Mean in Log Scale					-1.134
535					SD in Original Scale	0.375	SD in Log Scale					0.902
536					95% UTL95% Coverage	2.442	95% UPL (t)					1.538
537					90% Percentile (z)	1.023	95% Percentile (z)					1.42
538					99% Percentile (z)	2.626	95% USL					3.727
539	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
540												

	A	B	C	D	E	F	G	H	I	J	K	L
541	**Nonparametric Distribution Free Background Statistics**											
542	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
543												
544	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
545					Order of Statistic, r	28			95% UTL with95% Coverage			1.65
546					Approx, f used to compute achieved CC	1.474			Approximate Actual Confidence Coefficient achieved by UTL			0.762
547					Approximate Sample Size needed to achieve specified CC	59			95% UPL			1.286
548					95% USL	1.65			95% KM Chebyshev UPL			2.077
549												
550	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
551	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
552	and consists of observations collected from clean unimpacted locations.											
553	The use of USL tends to provide a balance between false positives and false negatives provided the data											
554	represents a background data set and when many onsite observations need to be compared with the BTV.											
555												
556	**Lead**											
557												
558	**General Statistics**											
559					Total Number of Observations	28			Number of Missing Observations			3
560					Number of Distinct Observations	6						
561					Number of Detects	2			Number of Non-Detects			26
562					Number of Distinct Detects	2			Number of Distinct Non-Detects			5
563					Minimum Detect	0.5			Minimum Non-Detect			1
564					Maximum Detect	2			Maximum Non-Detect			5
565					Variance Detected	1.125			Percent Non-Detects			92.86%
566					Mean Detected	1.25			SD Detected			1.061
567					Mean of Detected Logged Data	0			SD of Detected Logged Data			0.98
568												
569	**Warning: Data set has only 2 Detected Values.**											
570	**This is not enough to compute meaningful or reliable statistics and estimates.**											
571												
572												
573	**Critical Values for Background Threshold Values (BTVs)**											
574					Tolerance Factor K (For UTL)	2.246			d2max (for USL)			2.714
575												
576	**Normal GOF Test on Detects Only**											
577	**Not Enough Data to Perform GOF Test**											
578												
579	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
580					KM Mean	0.563			KM SD			0.3
581					95% UTL95% Coverage	1.236			95% KM UPL (t)			1.082
582					90% KM Percentile (z)	0.947			95% KM Percentile (z)			1.056
583					99% KM Percentile (z)	1.26			95% KM USL			1.376
584												
585	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
586					Mean	0.768			SD			0.569
587					95% UTL95% Coverage	2.046			95% UPL (t)			1.754
588					90% Percentile (z)	1.497			95% Percentile (z)			1.704
589					99% Percentile (z)	2.092			95% USL			2.312
590	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
591												
592	**Gamma GOF Tests on Detected Observations Only**											
593	**Not Enough Data to Perform GOF Test**											
594												

595	**Gamma Statistics on Detected Data Only**											
596						k hat (MLE)	2.394			k star (bias corrected MLE)		N/A
597						Theta hat (MLE)	0.522			Theta star (bias corrected MLE)		N/A
598						nu hat (MLE)	9.577			nu star (bias corrected)		N/A
599						MLE Mean (bias corrected)	N/A					
600						MLE Sd (bias corrected)	N/A			95% Percentile of Chisquare (2kstar)		N/A
601												
602	**Estimates of Gamma Parameters using KM Estimates**											
603						Mean (KM)	0.563			SD (KM)		0.3
604						Variance (KM)	0.0898			SE of Mean (KM)		0.0865
605						k hat (KM)	3.522			k star (KM)		3.168
606						nu hat (KM)	197.2			nu star (KM)		177.4
607						theta hat (KM)	0.16			theta star (KM)		0.178
608						80% gamma percentile (KM)	0.797			90% gamma percentile (KM)		0.986
609						95% gamma percentile (KM)	1.162			99% gamma percentile (KM)		1.543
610												
611	**The following statistics are computed using gamma distribution and KM estimates**											
612	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
613							WH	HW			WH	HW
614						95% Approx. Gamma UTL with 95% Coverage	1.069	1.048		95% Approx. Gamma UPL	0.926	0.908
615						95% KM Gamma Percentile	0.902	0.885		95% Gamma USL	1.211	1.19
616												
617	**Lognormal GOF Test on Detected Observations Only**											
618	**Not Enough Data to Perform GOF Test**											
619												
620	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
621						Mean in Original Scale	0.607			Mean in Log Scale		-0.652
622						SD in Original Scale	0.381			SD in Log Scale		0.551
623						95% UTL95% Coverage	1.795			95% BCA UTL95% Coverage		2
624						95% Bootstrap (%) UTL95% Coverage	2			95% UPL (t)		1.354
625						90% Percentile (z)	1.055			95% Percentile (z)		1.289
626						99% Percentile (z)	1.876			95% USL		2.323
627												
628	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
629						KM Mean of Logged Data	-0.635			95% KM UTL (Lognormal)95% Coverage		0.987
630						KM SD of Logged Data	0.277			95% KM UPL (Lognormal)		0.856
631						95% KM Percentile Lognormal (z)	0.835			95% KM USL (Lognormal)		1.124
632												
633	**Background DL/2 Statistics Assuming Lognormal Distribution**											
634						Mean in Original Scale	0.768			Mean in Log Scale		-0.433
635						SD in Original Scale	0.569			SD in Log Scale		0.525
636						95% UTL95% Coverage	2.108			95% UPL (t)		1.61
637						90% Percentile (z)	1.27			95% Percentile (z)		1.537
638						99% Percentile (z)	2.198			95% USL		2.695
639	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
640												
641	**Nonparametric Distribution Free Background Statistics**											
642	**Data do not follow a Discernible Distribution (0.05)**											
643												
644	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
645						Order of Statistic, r	28			95% UTL with95% Coverage		5
646						Approx, f used to compute achieved CC	1.474			Approximate Actual Confidence Coefficient achieved by UTL		0.762
647						Approximate Sample Size needed to achieve specified CC	59			95% UPL		4.55
648						95% USL	5			95% KM Chebyshev UPL		1.892

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.
Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers
and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data
represents a background data set and when many onsite observations need to be compared with the BTV.

Lithium

General Statistics

Total Number of Observations	28	Number of Distinct Observations	27
		Number of Missing Observations	3
Minimum	51.6	First Quartile	57.2
Second Largest	525	Median	398.5
Maximum	570	Third Quartile	410.8
Mean	282.5	SD	187
Coefficient of Variation	0.662	Skewness	-0.317
Mean of logged Data	5.272	SD of logged Data	0.995

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.246	d2max (for USL)	2.714

Normal GOF Test

Shapiro Wilk Test Statistic	0.759	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.319	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	702.5	90% Percentile (z)	522.2
95% UPL (t)	606.7	95% Percentile (z)	590.1
95% USL	790.1	99% Percentile (z)	717.5

Gamma GOF Test

A-D Test Statistic	3.86	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.763	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.357	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.488	k star (bias corrected MLE)	1.353
Theta hat (MLE)	189.8	Theta star (bias corrected MLE)	208.9
nu hat (MLE)	83.34	nu star (bias corrected)	75.74
MLE Mean (bias corrected)	282.5	MLE Sd (bias corrected)	242.9

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	793.4	90% Percentile	603.8
95% Hawkins Wixley (HW) Approx. Gamma UPL	842.6	95% Percentile	762.1
95% WH Approx. Gamma UTL with 95% Coverage	1059	99% Percentile	1122
95% HW Approx. Gamma UTL with 95% Coverage	1167		
95% WH USL	1349	95% HW USL	1537

703	**Lognormal GOF Test**											
704					Shapiro Wilk Test Statistic	0.707	**Shapiro Wilk Lognormal GOF Test**					
705					5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level					
706					Lilliefors Test Statistic	0.362	**Lilliefors Lognormal GOF Test**					
707					5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level					
708	**Data Not Lognormal at 5% Significance Level**											
709												
710	**Background Statistics assuming Lognormal Distribution**											
711					95% UTL with 95% Coverage	1821				90% Percentile (z)	697.2	
712					95% UPL (t)	1093				95% Percentile (z)	1001	
713					95% USL	2903				99% Percentile (z)	1972	
714												
715	**Nonparametric Distribution Free Background Statistics**											
716	**Data do not follow a Discernible Distribution (0.05)**											
717												
718	**Nonparametric Upper Limits for Background Threshold Values**											
719					Order of Statistic, r	28				95% UTL with 95% Coverage	570	
720					Approx, f used to compute achieved CC	1.474				Approximate Actual Confidence Coefficient achieved by UTL	0.762	
721										Approximate Sample Size needed to achieve specified CC	59	
722					95% Percentile Bootstrap UTL with 95% Coverage	570				95% BCA Bootstrap UTL with 95% Coverage	570	
723					95% UPL	549.8				90% Percentile	439.3	
724					90% Chebyshev UPL	853.4				95% Percentile	495.3	
725					95% Chebyshev UPL	1112				99% Percentile	557.9	
726					95% USL	570						
727												
728	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
729	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
730	and consists of observations collected from clean unimpacted locations.											
731	The use of USL tends to provide a balance between false positives and false negatives provided the data											
732	represents a background data set and when many onsite observations need to be compared with the BTV.											
733												
734	**Mercury**											
735												
736	**General Statistics**											
737					Total Number of Observations	28				Number of Missing Observations	3	
738					Number of Distinct Observations	2						
739					Number of Detects	0				Number of Non-Detects	28	
740					Number of Distinct Detects	0				Number of Distinct Non-Detects	2	
741					Minimum Detect	N/A				Minimum Non-Detect	0.1	
742					Maximum Detect	N/A				Maximum Non-Detect	0.2	
743					Variance Detected	N/A				Percent Non-Detects	100%	
744					Mean Detected	N/A				SD Detected	N/A	
745					Mean of Detected Logged Data	N/A				SD of Detected Logged Data	N/A	
746												
747	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
748	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
749	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
750												
751	**The data set for variable Mercury was not processed!**											
752												
753												
754	**Molybdenum**											
755												
756	**General Statistics**											

757				Total Number of Observations		28				Number of Missing Observations		3
758				Number of Distinct Observations		16						
759				Number of Detects		12				Number of Non-Detects		16
760				Number of Distinct Detects		12				Number of Distinct Non-Detects		4
761				Minimum Detect		2				Minimum Non-Detect		0.5
762				Maximum Detect		55.8				Maximum Non-Detect		4
763				Variance Detected		258.9				Percent Non-Detects		57.14%
764				Mean Detected		24.36				SD Detected		16.09
765				Mean of Detected Logged Data		2.934				SD of Detected Logged Data		0.868
766												
767				**Critical Values for Background Threshold Values (BTVs)**								
768				Tolerance Factor K (For UTL)		2.246				d2max (for USL)		2.714
769												
770				**Normal GOF Test on Detects Only**								
771				Shapiro Wilk Test Statistic		0.9				**Shapiro Wilk GOF Test**		
772				5% Shapiro Wilk Critical Value		0.859				Detected Data appear Normal at 5% Significance Level		
773				Lilliefors Test Statistic		0.239				**Lilliefors GOF Test**		
774				5% Lilliefors Critical Value		0.243				Detected Data appear Normal at 5% Significance Level		
775				**Detected Data appear Normal at 5% Significance Level**								
776												
777				**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**								
778				KM Mean		10.73				KM SD		15.52
779				95% UTL95% Coverage		45.6				95% KM UPL (t)		37.64
780				90% KM Percentile (z)		30.63				95% KM Percentile (z)		36.27
781				99% KM Percentile (z)		46.84				95% KM USL		52.87
782												
783				**DL/2 Substitution Background Statistics Assuming Normal Distribution**								
784				Mean		10.81				SD		15.76
785				95% UTL95% Coverage		46.21				95% UPL (t)		38.13
786				90% Percentile (z)		31.01				95% Percentile (z)		36.73
787				99% Percentile (z)		47.47				95% USL		53.59
788				**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**								
789												
790				**Gamma GOF Tests on Detected Observations Only**								
791				A-D Test Statistic		0.407				**Anderson-Darling GOF Test**		
792				5% A-D Critical Value		0.741				Detected data appear Gamma Distributed at 5% Significance Level		
793				K-S Test Statistic		0.162				**Kolmogorov-Smirnov GOF**		
794				5% K-S Critical Value		0.248				Detected data appear Gamma Distributed at 5% Significance Level		
795				**Detected data appear Gamma Distributed at 5% Significance Level**								
796												
797				**Gamma Statistics on Detected Data Only**								
798				k hat (MLE)		2.086				k star (bias corrected MLE)		1.62
799				Theta hat (MLE)		11.68				Theta star (bias corrected MLE)		15.04
800				nu hat (MLE)		50.06				nu star (bias corrected)		38.87
801				MLE Mean (bias corrected)		24.36						
802				MLE Sd (bias corrected)		19.14				95% Percentile of Chisquare (2kstar)		8.226
803												
804				**Gamma ROS Statistics using Imputed Non-Detects**								
805				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
806				GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)								
807				For such situations, GROS method may yield incorrect values of UCLs and BTVs								
808				This is especially true when the sample size is small.								
809				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
810				Minimum		0.01				Mean		10.52

811					Maximum	55.8				Median		0.01
812					SD	15.96				CV		1.517
813					k hat (MLE)	0.207				k star (bias corrected MLE)		0.209
814					Theta hat (MLE)	50.82				Theta star (bias corrected MLE)		50.42
815					nu hat (MLE)	11.59				nu star (bias corrected)		11.68
816					MLE Mean (bias corrected)	10.52				MLE Sd (bias corrected)		23.03
817					95% Percentile of Chisquare (2kstar)	2.126				90% Percentile		31.81
818					95% Percentile	53.6				99% Percentile		113.2
819	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
820	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
821					WH	HW				WH	HW	
822	95% Approx. Gamma UTL with 95% Coverage				81.76	108.2	95% Approx. Gamma UPL			48.86	56.83	
823	95% Gamma USL				122.5	180.3						
824												
825	**Estimates of Gamma Parameters using KM Estimates**											
826					Mean (KM)	10.73				SD (KM)		15.52
827					Variance (KM)	241				SE of Mean (KM)		3.064
828					k hat (KM)	0.478				k star (KM)		0.451
829					nu hat (KM)	26.77				nu star (KM)		25.23
830					theta hat (KM)	22.45				theta star (KM)		23.82
831					80% gamma percentile (KM)	17.52				90% gamma percentile (KM)		29.65
832					95% gamma percentile (KM)	42.78				99% gamma percentile (KM)		75.38
833												
834	**The following statistics are computed using gamma distribution and KM estimates**											
835	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
836					WH	HW				WH	HW	
837	95% Approx. Gamma UTL with 95% Coverage				64.81	73.72	95% Approx. Gamma UPL			41.9	44.26	
838	95% KM Gamma Percentile				38.59	40.24	95% Gamma USL			91.94	111.7	
839												
840	**Lognormal GOF Test on Detected Observations Only**											
841					Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**					
842					5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level					
843					Lilliefors Test Statistic	0.212	**Lilliefors GOF Test**					
844					5% Lilliefors Critical Value	0.243	Detected Data appear Lognormal at 5% Significance Level					
845	**Detected Data appear Lognormal at 5% Significance Level**											
846												
847	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
848					Mean in Original Scale	11.78				Mean in Log Scale		1.616
849					SD in Original Scale	15.16				SD in Log Scale		1.405
850					95% UTL95% Coverage	118.2				95% BCA UTL95% Coverage		55.8
851					95% Bootstrap (%) UTL95% Coverage	55.8				95% UPL (t)		57.52
852					90% Percentile (z)	30.48				95% Percentile (z)		50.78
853					99% Percentile (z)	132.3				95% USL		228.3
854												
855	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
856					KM Mean of Logged Data	0.868				95% KM UTL (Lognormal)95% Coverage		159.9
857					KM SD of Logged Data	1.873				95% KM UPL (Lognormal)		61.22
858					95% KM Percentile Lognormal (z)	51.86				95% KM USL (Lognormal)		384.4
859												
860	**Background DL/2 Statistics Assuming Lognormal Distribution**											
861					Mean in Original Scale	10.81				Mean in Log Scale		0.925
862					SD in Original Scale	15.76				SD in Log Scale		1.89
863					95% UTL95% Coverage	176				95% UPL (t)		66.8
864					90% Percentile (z)	28.44				95% Percentile (z)		56.5

865				99% Percentile (z)	204.9					95% USL	426.6	
866	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
867												
868	**Nonparametric Distribution Free Background Statistics**											
869	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
870												
871	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
872				Order of Statistic, r	28					95% UTL with95% Coverage	55.8	
873				Approx, f used to compute achieved CC	1.474					Approximate Actual Confidence Coefficient achieved by UTL	0.762	
874				Approximate Sample Size needed to achieve specified CC	59					95% UPL	52.38	
875				95% USL	55.8					95% KM Chebyshev UPL	79.59	
876												
877	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
878	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
879	and consists of observations collected from clean unimpacted locations.											
880	The use of USL tends to provide a balance between false positives and false negatives provided the data											
881	represents a background data set and when many onsite observations need to be compared with the BTV.											
882												
883	**Radium**											
884												
885	**General Statistics**											
886				Total Number of Observations	24					Number of Missing Observations	7	
887				Number of Distinct Observations	24							
888				Number of Detects	22					Number of Non-Detects	2	
889				Number of Distinct Detects	22					Number of Distinct Non-Detects	2	
890				Minimum Detect	0.282					Minimum Non-Detect	0.48	
891				Maximum Detect	3					Maximum Non-Detect	0.71	
892				Variance Detected	0.561					Percent Non-Detects	8.333%	
893				Mean Detected	1.31					SD Detected	0.749	
894				Mean of Detected Logged Data	0.117					SD of Detected Logged Data	0.577	
895												
896	**Critical Values for Background Threshold Values (BTVs)**											
897				Tolerance Factor K (For UTL)	2.309					d2max (for USL)	2.644	
898												
899	**Normal GOF Test on Detects Only**											
900				Shapiro Wilk Test Statistic	0.879					**Shapiro Wilk GOF Test**		
901				5% Shapiro Wilk Critical Value	0.911					Data Not Normal at 5% Significance Level		
902				Lilliefors Test Statistic	0.196					**Lilliefors GOF Test**		
903				5% Lilliefors Critical Value	0.184					Data Not Normal at 5% Significance Level		
904	**Data Not Normal at 5% Significance Level**											
905												
906	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
907				KM Mean	1.229					KM SD	0.751	
908				95% UTL95% Coverage	2.962					95% KM UPL (t)	2.542	
909				90% KM Percentile (z)	2.191					95% KM Percentile (z)	2.464	
910				99% KM Percentile (z)	2.975					95% KM USL	3.213	
911												
912	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
913				Mean	1.225					SD	0.771	
914				95% UTL95% Coverage	3.005					95% UPL (t)	2.574	
915				90% Percentile (z)	2.213					95% Percentile (z)	2.493	
916				99% Percentile (z)	3.019					95% USL	3.264	
917	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
918												

	A	B	C	D	E	F	G	H	I	J	K	L
919	**Gamma GOF Tests on Detected Observations Only**											
920				A-D Test Statistic		0.484	**Anderson-Darling GOF Test**					
921				5% A-D Critical Value		0.748	Detected data appear Gamma Distributed at 5% Significance Level					
922				K-S Test Statistic		0.137	**Kolmogorov-Smirnov GOF**					
923				5% K-S Critical Value		0.186	Detected data appear Gamma Distributed at 5% Significance Level					
924	**Detected data appear Gamma Distributed at 5% Significance Level**											
925												
926	**Gamma Statistics on Detected Data Only**											
927				k hat (MLE)		3.442	k star (bias corrected MLE)					3.003
928				Theta hat (MLE)		0.38	Theta star (bias corrected MLE)					0.436
929				nu hat (MLE)		151.4	nu star (bias corrected)					132.1
930				MLE Mean (bias corrected)		1.31						
931				MLE Sd (bias corrected)		0.756	95% Percentile of Chisquare (2kstar)					12.6
932												
933	**Gamma ROS Statistics using Imputed Non-Detects**											
934	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
935	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
936	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
937	This is especially true when the sample size is small.											
938	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
939				Minimum		0.16	Mean					1.22
940				Maximum		3	Median					0.971
941				SD		0.778	CV					0.637
942				k hat (MLE)		2.469	k star (bias corrected MLE)					2.189
943				Theta hat (MLE)		0.494	Theta star (bias corrected MLE)					0.558
944				nu hat (MLE)		118.5	nu star (bias corrected)					105
945				MLE Mean (bias corrected)		1.22	MLE Sd (bias corrected)					0.825
946				95% Percentile of Chisquare (2kstar)		10.09	90% Percentile					2.324
947				95% Percentile		2.814	99% Percentile					3.894
948	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
949	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
950					WH	HW					WH	HW
951				95% Approx. Gamma UTL with 95% Coverage	3.749	3.971	95% Approx. Gamma UPL				2.89	2.985
952				95% Gamma USL	4.337	4.666						
953												
954	**Estimates of Gamma Parameters using KM Estimates**											
955				Mean (KM)		1.229	SD (KM)					0.751
956				Variance (KM)		0.563	SE of Mean (KM)					0.157
957				k hat (KM)		2.682	k star (KM)					2.375
958				nu hat (KM)		128.7	nu star (KM)					114
959				theta hat (KM)		0.458	theta star (KM)					0.518
960				80% gamma percentile (KM)		1.803	90% gamma percentile (KM)					2.297
961				95% gamma percentile (KM)		2.764	99% gamma percentile (KM)					3.789
962												
963	**The following statistics are computed using gamma distribution and KM estimates**											
964	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
965					WH	HW					WH	HW
966				95% Approx. Gamma UTL with 95% Coverage	3.527	3.684	95% Approx. Gamma UPL				2.758	2.821
967				95% KM Gamma Percentile	2.628	2.679	95% Gamma USL				4.05	4.287
968												
969	**Lognormal GOF Test on Detected Observations Only**											
970				Shapiro Wilk Test Statistic		0.961	**Shapiro Wilk GOF Test**					
971				5% Shapiro Wilk Critical Value		0.911	Detected Data appear Lognormal at 5% Significance Level					
972				Lilliefors Test Statistic		0.139	**Lilliefors GOF Test**					

973				5% Lilliefors Critical Value		0.184	Detected Data appear Lognormal at 5% Significance Level					
974	**Detected Data appear Lognormal at 5% Significance Level**											
975												
976	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
977				Mean in Original Scale		1.233				Mean in Log Scale		0.0298
978				SD in Original Scale		0.761				SD in Log Scale		0.627
979				95% UTL95% Coverage		4.383				95% BCA UTL95% Coverage		3
980				95% Bootstrap (%) UTL95% Coverage		3				95% UPL (t)		3.085
981				90% Percentile (z)		2.301				95% Percentile (z)		2.89
982				99% Percentile (z)		4.431				95% USL		5.407
983												
984	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
985				KM Mean of Logged Data		0.0153				95% KM UTL (Lognormal)95% Coverage		4.473
986				KM SD of Logged Data		0.642				95% KM UPL (Lognormal)		3.122
987				95% KM Percentile Lognormal (z)		2.92				95% KM USL (Lognormal)		5.546
988												
989	**Background DL/2 Statistics Assuming Lognormal Distribution**											
990				Mean in Original Scale		1.225				Mean in Log Scale		0.005
991				SD in Original Scale		0.771				SD in Log Scale		0.672
992				95% UTL95% Coverage		4.748				95% UPL (t)		3.259
993				90% Percentile (z)		2.379				95% Percentile (z)		3.038
994				99% Percentile (z)		4.804				95% USL		5.947
995	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
996												
997	**Nonparametric Distribution Free Background Statistics**											
998	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
999												
1000	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1001				Order of Statistic, r		24				95% UTL with95% Coverage		3
1002				Approx, f used to compute achieved CC		1.263				Approximate Actual Confidence Coefficient achieved by UTL		0.708
1003				Approximate Sample Size needed to achieve specified CC		59				95% UPL		2.935
1004				95% USL		3				95% KM Chebyshev UPL		4.568
1005												
1006	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1007	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1008	and consists of observations collected from clean unimpacted locations.											
1009	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1010	represents a background data set and when many onsite observations need to be compared with the BTV.											
1011												
1012	**Radium-226**											
1013												
1014	**General Statistics**											
1015				Total Number of Observations		16				Number of Distinct Observations		16
1016										Number of Missing Observations		15
1017				Minimum		-0.0627				First Quartile		0.108
1018				Second Largest		0.947				Median		0.226
1019				Maximum		1.71				Third Quartile		0.659
1020				Mean		0.396				SD		0.471
1021				Coefficient of Variation		1.188				Skewness		1.603
1022												
1023	**Critical Values for Background Threshold Values (BTVs)**											
1024				Tolerance Factor K (For UTL)		2.524				d2max (for USL)		2.443
1025												
1026	**Normal GOF Test**											

	A	B	C	D	E	F	G	H	I	J	K	L
1027					Shapiro Wilk Test Statistic	0.839	**Shapiro Wilk GOF Test**					
1028					5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level					
1029					Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**					
1030					5% Lilliefors Critical Value	0.213	Data Not Normal at 5% Significance Level					
1031	**Data Not Normal at 5% Significance Level**											
1032												
1033	**Background Statistics Assuming Normal Distribution**											
1034				95% UTL with	95% Coverage	1.584				90% Percentile (z)		0.999
1035					95% UPL (t)	1.247				95% Percentile (z)		1.17
1036					95% USL	1.546				99% Percentile (z)		1.491
1037												
1038	**Gamma Statistics**											
1039	**Gamma Statistics Not Available**											
1040												
1041	**Dataset Contains Values <= 0 - Cannot Compute Gamma Statistics**											
1042												
1043	**Dataset Contains Values <= 0 - Cannot Compute Log Statistics**											
1044												
1045	**Nonparametric Distribution Free Background Statistics**											
1046	**Data do not follow a Discernible Distribution (0.05)**											
1047												
1048	**Nonparametric Upper Limits for Background Threshold Values**											
1049					Order of Statistic, r	16				95% UTL with	95% Coverage	1.71
1050				Approx, f used to compute achieved CC		0.842				Approximate Actual Confidence Coefficient achieved by UTL		0.56
1051										Approximate Sample Size needed to achieve specified CC		59
1052			95% Percentile Bootstrap UTL with		95% Coverage	1.71				95% BCA Bootstrap UTL with	95% Coverage	1.71
1053					95% UPL	1.71				90% Percentile		0.883
1054					90% Chebyshev UPL	1.852				95% Percentile		1.138
1055					95% Chebyshev UPL	2.511				99% Percentile		1.596
1056					95% USL	1.71						
1057												
1058	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1059	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1060	and consists of observations collected from clean unimpacted locations.											
1061	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1062	represents a background data set and when many onsite observations need to be compared with the BTV.											
1063												
1064	**Radium-228**											
1065												
1066	**General Statistics**											
1067					Total Number of Observations	16				Number of Distinct Observations		16
1068										Number of Missing Observations		15
1069					Minimum	0.234				First Quartile		0.653
1070					Second Largest	1.76				Median		0.843
1071					Maximum	1.89				Third Quartile		1.043
1072					Mean	0.894				SD		0.438
1073					Coefficient of Variation	0.491				Skewness		1.046
1074					Mean of logged Data	-0.228				SD of logged Data		0.516
1075												
1076	**Critical Values for Background Threshold Values (BTVs)**											
1077					Tolerance Factor K (For UTL)	2.524				d2max (for USL)		2.443
1078												
1079	**Normal GOF Test**											
1080					Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**					

1081				5% Shapiro Wilk Critical Value		0.887		Data appear Normal at 5% Significance Level				
1082				Lilliefors Test Statistic		0.178		**Lilliefors GOF Test**				
1083				5% Lilliefors Critical Value		0.213		Data appear Normal at 5% Significance Level				
1084				**Data appear Normal at 5% Significance Level**								
1085												
1086				**Background Statistics Assuming Normal Distribution**								
1087				95% UTL with 95% Coverage		2		90% Percentile (z)				1.455
1088				95% UPL (t)		1.686		95% Percentile (z)				1.615
1089				95% USL		1.965		99% Percentile (z)				1.913
1090												
1091				**Gamma GOF Test**								
1092				A-D Test Statistic		0.253		**Anderson-Darling Gamma GOF Test**				
1093				5% A-D Critical Value		0.742		Detected data appear Gamma Distributed at 5% Significance Level				
1094				K-S Test Statistic		0.132		**Kolmogorov-Smirnov Gamma GOF Test**				
1095				5% K-S Critical Value		0.216		Detected data appear Gamma Distributed at 5% Significance Level				
1096				**Detected data appear Gamma Distributed at 5% Significance Level**								
1097												
1098				**Gamma Statistics**								
1099				k hat (MLE)		4.483		k star (bias corrected MLE)				3.684
1100				Theta hat (MLE)		0.199		Theta star (bias corrected MLE)				0.243
1101				nu hat (MLE)		143.4		nu star (bias corrected)				117.9
1102				MLE Mean (bias corrected)		0.894		MLE Sd (bias corrected)				0.466
1103												
1104				**Background Statistics Assuming Gamma Distribution**								
1105				95% Wilson Hilferty (WH) Approx. Gamma UPL		1.824		90% Percentile				1.518
1106				95% Hawkins Wixley (HW) Approx. Gamma UPL		1.86		95% Percentile				1.771
1107				95% WH Approx. Gamma UTL with 95% Coverage		2.374		99% Percentile				2.313
1108				95% HW Approx. Gamma UTL with 95% Coverage		2.47						
1109				95% WH USL		2.307		95% HW USL				2.394
1110												
1111				**Lognormal GOF Test**								
1112				Shapiro Wilk Test Statistic		0.961		**Shapiro Wilk Lognormal GOF Test**				
1113				5% Shapiro Wilk Critical Value		0.887		Data appear Lognormal at 5% Significance Level				
1114				Lilliefors Test Statistic		0.129		**Lilliefors Lognormal GOF Test**				
1115				5% Lilliefors Critical Value		0.213		Data appear Lognormal at 5% Significance Level				
1116				**Data appear Lognormal at 5% Significance Level**								
1117												
1118				**Background Statistics assuming Lognormal Distribution**								
1119				95% UTL with 95% Coverage		2.926		90% Percentile (z)				1.541
1120				95% UPL (t)		2.021		95% Percentile (z)				1.859
1121				95% USL		2.806		99% Percentile (z)				2.642
1122												
1123				**Nonparametric Distribution Free Background Statistics**								
1124				**Data appear Normal at 5% Significance Level**								
1125												
1126				**Nonparametric Upper Limits for Background Threshold Values**								
1127				Order of Statistic, r		16		95% UTL with 95% Coverage				1.89
1128				Approx, f used to compute achieved CC		0.842		Approximate Actual Confidence Coefficient achieved by UTL				0.56
1129								Approximate Sample Size needed to achieve specified CC				59
1130				95% Percentile Bootstrap UTL with 95% Coverage		1.89		95% BCA Bootstrap UTL with 95% Coverage				1.89
1131				95% UPL		1.89		90% Percentile				1.44
1132				90% Chebyshev UPL		2.249		95% Percentile				1.793
1133				95% Chebyshev UPL		2.863		99% Percentile				1.871
1134				95% USL		1.89						

	A	B	C	D	E	F	G	H	I	J	K	L
1135												
1136	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1137	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1138	and consists of observations collected from clean unimpacted locations.											
1139	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1140	represents a background data set and when many onsite observations need to be compared with the BTV.											
1141												
1142	**Selenium**											
1143												
1144	**General Statistics**											
1145						Total Number of Observations	28			Number of Missing Observations	3	
1146						Number of Distinct Observations	16					
1147						Number of Detects	18			Number of Non-Detects	10	
1148						Number of Distinct Detects	14			Number of Distinct Non-Detects	4	
1149						Minimum Detect	1			Minimum Non-Detect	0.5	
1150						Maximum Detect	45			Maximum Non-Detect	4	
1151						Variance Detected	182.7			Percent Non-Detects	35.71%	
1152						Mean Detected	17.09			SD Detected	13.52	
1153						Mean of Detected Logged Data	2.245			SD of Detected Logged Data	1.333	
1154												
1155	**Critical Values for Background Threshold Values (BTVs)**											
1156						Tolerance Factor K (For UTL)	2.246			d2max (for USL)	2.714	
1157												
1158	**Normal GOF Test on Detects Only**											
1159						Shapiro Wilk Test Statistic	0.853			**Shapiro Wilk GOF Test**		
1160						5% Shapiro Wilk Critical Value	0.897			Data Not Normal at 5% Significance Level		
1161						Lilliefors Test Statistic	0.24			**Lilliefors GOF Test**		
1162						5% Lilliefors Critical Value	0.202			Data Not Normal at 5% Significance Level		
1163	**Data Not Normal at 5% Significance Level**											
1164												
1165	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
1166						KM Mean	11.21			KM SD	13.16	
1167						95% UTL95% Coverage	40.78			95% KM UPL (t)	34.03	
1168						90% KM Percentile (z)	28.08			95% KM Percentile (z)	32.87	
1169						99% KM Percentile (z)	41.84			95% KM USL	46.95	
1170												
1171	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1172						Mean	11.25			SD	13.38	
1173						95% UTL95% Coverage	41.29			95% UPL (t)	34.44	
1174						90% Percentile (z)	28.39			95% Percentile (z)	33.25	
1175						99% Percentile (z)	42.37			95% USL	47.56	
1176	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
1177												
1178	**Gamma GOF Tests on Detected Observations Only**											
1179						A-D Test Statistic	1.869			**Anderson-Darling GOF Test**		
1180						5% A-D Critical Value	0.768			Data Not Gamma Distributed at 5% Significance Level		
1181						K-S Test Statistic	0.312			**Kolmogorov-Smirnov GOF**		
1182						5% K-S Critical Value	0.21			Data Not Gamma Distributed at 5% Significance Level		
1183	**Data Not Gamma Distributed at 5% Significance Level**											
1184												
1185	**Gamma Statistics on Detected Data Only**											
1186						k hat (MLE)	0.975			k star (bias corrected MLE)	0.85	
1187						Theta hat (MLE)	17.53			Theta star (bias corrected MLE)	20.11	
1188						nu hat (MLE)	35.11			nu star (bias corrected)	30.59	

1189					MLE Mean (bias corrected)	17.09						
1190					MLE Sd (bias corrected)	18.54				95% Percentile of Chisquare (2kstar)		5.395
1191												
1192	**Gamma ROS Statistics using Imputed Non-Detects**											
1193	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1194	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1195	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1196	This is especially true when the sample size is small.											
1197	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1198					Minimum	0.01				Mean		11.23
1199					Maximum	45				Median		2
1200					SD	13.4				CV		1.194
1201					k hat (MLE)	0.369				k star (bias corrected MLE)		0.353
1202					Theta hat (MLE)	30.42				Theta star (bias corrected MLE)		31.78
1203					nu hat (MLE)	20.67				nu star (bias corrected)		19.78
1204					MLE Mean (bias corrected)	11.23				MLE Sd (bias corrected)		18.89
1205					95% Percentile of Chisquare (2kstar)	3.063				90% Percentile		32.37
1206					95% Percentile	48.66				99% Percentile		90.19
1207	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1208	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1209						WH	HW				WH	HW
1210					95% Approx. Gamma UTL with 95% Coverage	74.3	95.66			95% Approx. Gamma UPL	47.95	56.21
1211					95% Gamma USL	105.5	147.2					
1212												
1213	**Estimates of Gamma Parameters using KM Estimates**											
1214					Mean (KM)	11.21				SD (KM)		13.16
1215					Variance (KM)	173.3				SE of Mean (KM)		2.56
1216					k hat (KM)	0.726				k star (KM)		0.672
1217					nu hat (KM)	40.63				nu star (KM)		37.61
1218					theta hat (KM)	15.45				theta star (KM)		16.69
1219					80% gamma percentile (KM)	18.45				90% gamma percentile (KM)		28.42
1220					95% gamma percentile (KM)	38.74				99% gamma percentile (KM)		63.46
1221												
1222	**The following statistics are computed using gamma distribution and KM estimates**											
1223	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1224						WH	HW				WH	HW
1225					95% Approx. Gamma UTL with 95% Coverage	63.9	73.39			95% Approx. Gamma UPL	42.55	45.7
1226					95% KM Gamma Percentile	39.42	41.85			95% Gamma USL	88.79	108.3
1227												
1228	**Lognormal GOF Test on Detected Observations Only**											
1229					Shapiro Wilk Test Statistic	0.779				**Shapiro Wilk GOF Test**		
1230					5% Shapiro Wilk Critical Value	0.897				Data Not Lognormal at 5% Significance Level		
1231					Lilliefors Test Statistic	0.332				**Lilliefors GOF Test**		
1232					5% Lilliefors Critical Value	0.202				Data Not Lognormal at 5% Significance Level		
1233	**Data Not Lognormal at 5% Significance Level**											
1234												
1235	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1236					Mean in Original Scale	11.26				Mean in Log Scale		1.266
1237					SD in Original Scale	13.37				SD in Log Scale		1.758
1238					95% UTL95% Coverage	183.9				95% BCA UTL95% Coverage		41.05
1239					95% Bootstrap (%) UTL95% Coverage	45				95% UPL (t)		74.69
1240					90% Percentile (z)	33.75				95% Percentile (z)		63.92
1241					99% Percentile (z)	211.8				95% USL		419
1242												

1243	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1244				KM Mean of Logged Data		1.237			95% KM UTL (Lognormal)95% Coverage			164.2
1245				KM SD of Logged Data		1.72			95% KM UPL (Lognormal)			68
1246				95% KM Percentile Lognormal (z)		58.39			95% KM USL (Lognormal)			367.6
1247												
1248	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1249				Mean in Original Scale		11.25			Mean in Log Scale			1.26
1250				SD in Original Scale		13.38			SD in Log Scale			1.747
1251				95% UTL95% Coverage		178.5			95% UPL (t)			72.89
1252				90% Percentile (z)		33.09			95% Percentile (z)			62.43
1253				99% Percentile (z)		205.4			95% USL			404.7
1254	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
1255												
1256	**Nonparametric Distribution Free Background Statistics**											
1257	**Data do not follow a Discernible Distribution (0.05)**											
1258												
1259	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1260				Order of Statistic, r		28			95% UTL with95% Coverage			45
1261				Approx, f used to compute achieved CC		1.474			Approximate Actual Confidence Coefficient achieved by UTL			0.762
1262				Approximate Sample Size needed to achieve specified CC		59			95% UPL			39.92
1263				95% USL		45			95% KM Chebyshev UPL			69.61
1264												
1265	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1266	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1267	and consists of observations collected from clean unimpacted locations.											
1268	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1269	represents a background data set and when many onsite observations need to be compared with the BTV.											
1270												
1271	**Thallium**											
1272												
1273	**General Statistics**											
1274				Total Number of Observations		28			Number of Missing Observations			3
1275				Number of Distinct Observations		6						
1276				Number of Detects		0			Number of Non-Detects			28
1277				Number of Distinct Detects		0			Number of Distinct Non-Detects			6
1278				Minimum Detect		N/A			Minimum Non-Detect			0.1
1279				Maximum Detect		N/A			Maximum Non-Detect			5
1280				Variance Detected		N/A			Percent Non-Detects			100%
1281				Mean Detected		N/A			SD Detected			N/A
1282				Mean of Detected Logged Data		N/A			SD of Detected Logged Data			N/A
1283												
1284	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1285	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1286	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1287												
1288	**The data set for variable Thallium was not processed!**											
1289												
1290												