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FINAL

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

Environment

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

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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

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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.

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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.

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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
рН	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

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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.

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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	рН	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:

sil = 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

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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	Ва	Be	Cd	Cr	Со	F	Pb	Li	Hg	Мо	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	Ва	Be	Cd	Cr	Co	F	Pb	Li	Hg	Мо	Ra	Se	Th
ASH-02															
ASH-03														SSL	
ASH-04														SSL	
ASH-05															
ASH-07														SSL	
ASH-08															

Notes:

= concentration below UPL.

= 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.

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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.

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- 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 1Ash Monofill Monitoring Well Construction DetailsPRPA Ash Monofill Annual Report for 2023PRPA 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 2Ash Monofill Groundwater Level Measurements 2023PRPA Ash Monofill Annual Report for 2023PRPA 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
		_	Groundwater									
		Background Upper	Protection Standard									
Chemical Name	Analytical Method	Prediciton Limit (UPL)	(GWPS)	Unit								
Appendix III Parameter	rs											
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 Parameter	rs											
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 $\ensuremath{\textbf{black}}$ 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	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
			Groundwater	Cample Date	4/21/2025	10/11/2023	4/20/2023	10/11/2023	4/24/2023	10/11/2023	4/21/2023	10/12/2023	4/20/2023	10/10/2023
		Background Upper	Protection Standard											
Chemical Name	Analytical Method	Prediciton Limit (UPL)	(GWPS)	Unit										
Appendix III Parameter			(0111 0)	Unit										
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 Parameter	rs													
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
pН	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	No/No Nonparametric	
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 5Ash Monofill Appendix IV Background Upper Prediction LimitsPRPA Ash Monofill Annual Report for 2023PRPA 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

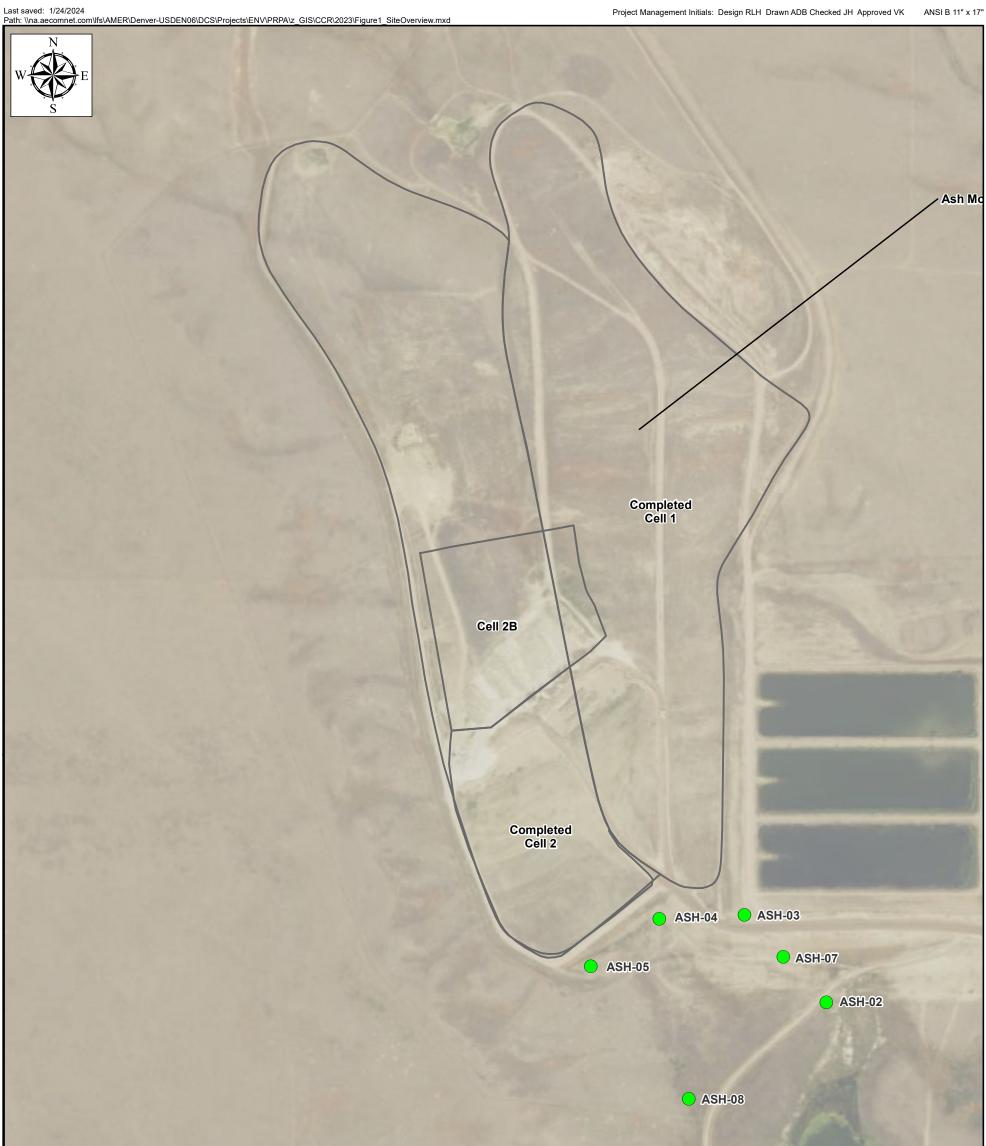
MDL = background limit set at maximum detection or reporting limit

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





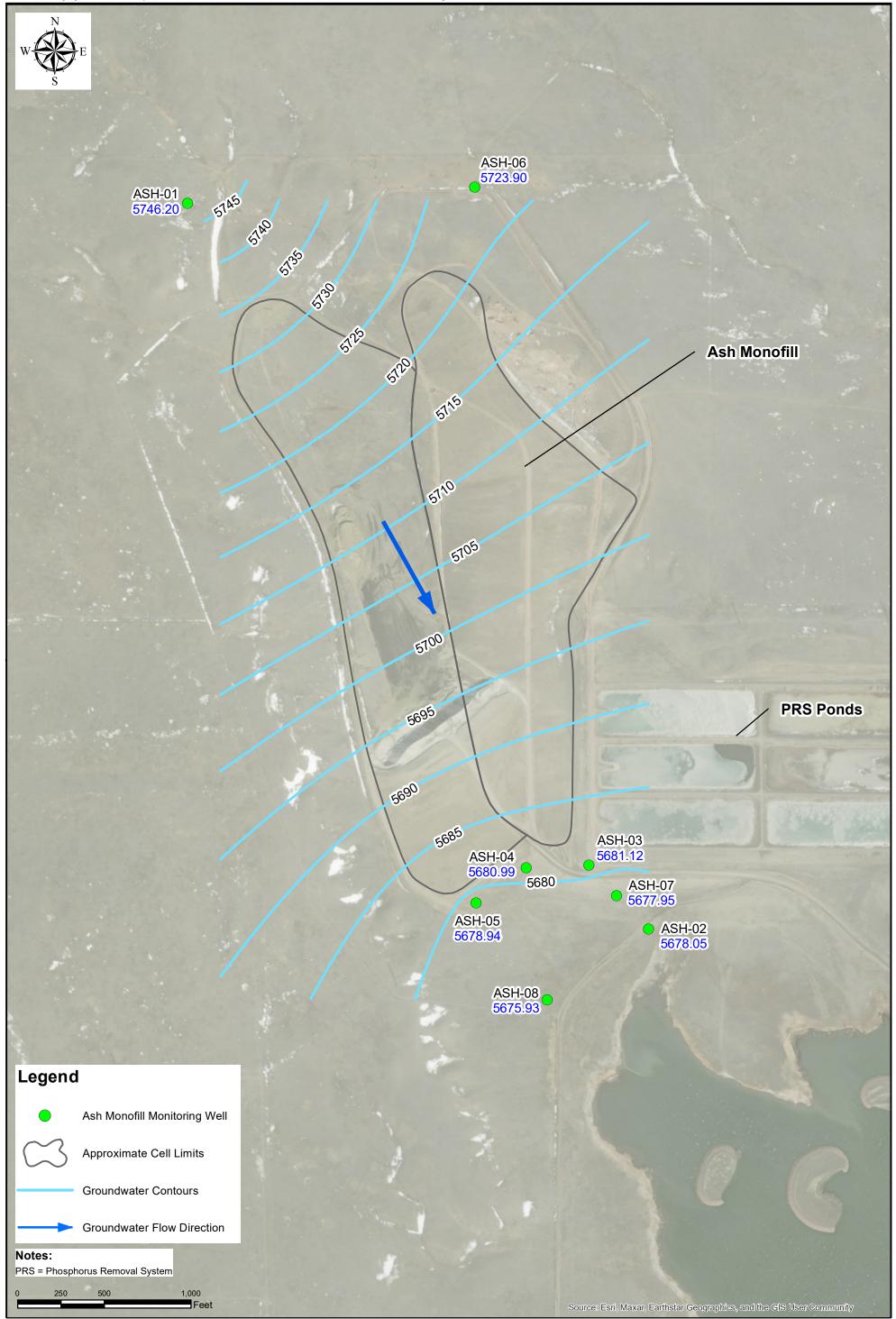
CCR 2023 Annual Groundwater Report

Platte River Power Authority Wellington, CO Project No.: 60709371 Date: 2024-01-24

Rawhide Energy Station ASH Monitoring Well Networks



Figure 1

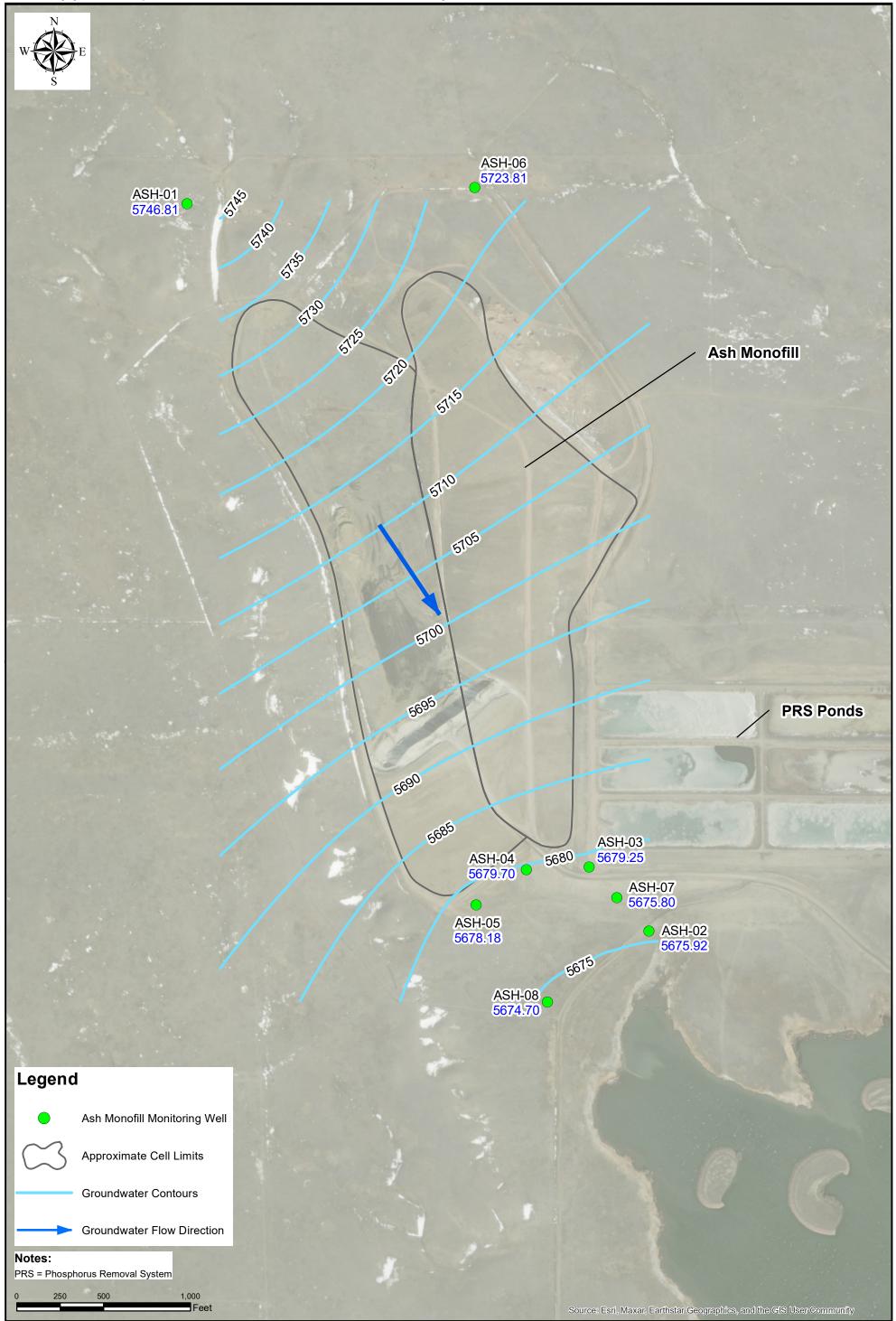


CCR 2023 Annual Groundwater Report

Platte River Power Authority Wellington, CO Project No.: 60709371 Date: 2023-12-15 Rawhide Energy Station ASH Monitoring Well Networks April 2023 Water Levels



Figure 2



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



Figure 3

Appendix A

Groundwater Sampling Forms

April 2023



Client: Project No: Site Locatior Weather Coi	רי ז: <u>ה</u>	Platte River Pow DPHE = 60630 Rawhide Genera לפטלק , (פוז)	D. Wood L	Date: <u>4/25/2</u> 3 Time: Start <u>0910</u> Finish <u>1040</u> ward & K. Hoppes					
WATER LE	/EL DATA:	(measured fro	m Top of	Casing)		Well 🛛	1	Piezomete	г 🖸
a. Total Well					TVC		- h of Water Col		
b. Water Ta	hle Denth			ising Diameter			ated Well Volu		
	-	n): <u>~200</u>	ml/min	ang Dianete	·	1. Oulou		nic (ace ba	
WELL PURC	SING DATA			-					
	b. Accepta	nce Criteria def	ined (from		well volumes)	_Low flow			
	c. Field Te	sting Equipmen	t Used:	Make YSI 556- Pro	Model Senie s		Serial Numbe 43979		
				Turbidity	HACH 2100	Q	18010[0]	64580	•
	d. Field Te	esting Equipmer	nt Calibrati	on Documenta	ation Found in Fie	d Notebo	ok #	Page #	<u> </u>
	Volume		1~	Spec. Cond/			Turbidity 🗸		DTW
Time Stabilization	Removed	(gal)	pH +/- 0.1	(µs/cm) +/- 3%	ORP +/- 10 MV	mg/L	(NTU) 5 NTU, 10%	Color	(ft) 0.3 ft
0910	0.1	10.4	7.40	3573	96.7	6.06	1,78.	dear	14.08
0915	0.3		7.38	3586	104.4	5.13	0.88	Urpr	14 29
0920	0.0		7.37	3586	[07.6	4.80	0.70	clear	14 33
0925	1.0		7.37	3585	111.1	4.53	0.71	ager	14.3
0928	1.2	- 10.1	7.37	358%	112.1	14.48	0.72	clear	14.3(
									-
	Has req Has req Have pa	nce criteria pas uired volume be uired turbidity b rameters stabili or N/A - Explai	en removi een reach ized						
		M.	8 4 - 41						
SAMPLE C				bladder pump					
Sample ASH -01 -		ontainer Type	No. of	of Containers Preservation		Analysis			Time 0930
444 M.		<u>scc coc</u> 1 L plashic		32	Ser Coc-	Dali	m-226 8 -	22%	0930
ASU -01 - (see GC		6	See CoC-	<u>penniv</u>	- uvo q	>	0930
									, , , %
omments									
onments									

Signature for the providence of the signature



Client: Project No: Site Location Weather Con	CDPH Rawh	de Generat	004, CCR ling Statio	= 60630103	J. Woodr	Date: 4/25/23 Time: Start_1235 Finish_1520 Word: 4 K. Hoppes				
WATER LE a. Total Well	/EL DATA: (me Length		•	Casing) sing Material	PVC	Well 🔽 e. Lengt	, h of Water Col	Piezometer umn		
b. Water Ta				sing Diameter _	պ ^ս	f. Calcul	ated Well Volu	me (see bac	k)	
Flow Rate (* WELL PURC	< 500 ml/min): SING DATA a. Purge Metho									
	 b. Acceptance (- Minimum Re 				vell volumes)	Low flow				
	c. Field Testing	Equipment	Used:	Make YSI-556 Pro 4 Turbidity H	Model Series Tailo 21000		Serial Numbe 43979	, <u>, 264280</u>)	
	d. Field Testing	Equipmen	t Calibratio	on Documentati	on Found in Fie	ld Notebo	ok #	Page #		
Time Stabilization	Volume Removed (gal)	T° (C) +/- 3%	√ pH +/- 0.1	Spec. Cond / (µs/cm)		mg/L	Turbidity (NTU) 5 NTU, 10%	Color	DTW) (ft)	
1236	0,1	10.3	7.79	+/-3%	+/- 10 MV 120.6	7.88	6.94 5.78	dear	0.3 ft 1.82	
12-16	0.2	9.9	7.75	3979 3981 3983	115.9 112.2 107.2-	460	5.68 820	Clear Clear Clear	2.18	
254	0.6	03 02	7.75	3975 3980	94.9 87.1	4.12 4.07	7.04 5.叫	clear clear	2.55	
300	0.75	10.2	7.74	3987	77.4	395	4.71 5.50	dean deen	3,03	
1306	0.9	10.2	7.75 <u>7.75</u> 7.74	<u>3988</u> <u>3989</u> 3988	<u>64.0</u> 61.7 61.1	4.00	5.29 5.08 3.96	dear dear dear	<u>3.22</u> <u>3.30</u> 3.55	
1315 1318	1.25	10.2 10.1	7.74	3990 3986	56.7 50.6	3.90	2.73	Clear Clear	3.76 3.91	
321 324	1,5	9.9 9.9	7.73 7.75	3988 3987	48.2 46.6	3.87 3.92	2.29 2.17	dear dear	4.01	
	e. Acceptance of Has required Has required Has parame If no or N	volume be turbidity be	en remove en reache red							

SAMPLE COLLECTION:

Sample ID

ASH -02- CCR ASH -02- CCR ASH -02- CCR

Comments

Method: bladder pump

No. of Containers

32

Ģ

Preservation

See Coc.

himcaul See CeC -

p-01-CCh 1p-01-CCR p-01-CDPIE

Signature

Container Type See CoC

IL plastic SOP. Co

4/25/23 Date

Analysis

Radium - 226 9228

Time

1327

V

327



Site Location: Rawhide Ger Weather Conds: <u>V. windy</u> t		80004, CCR = 60630 ⁻		Date: <u>4/27/23</u> Time: Start <u>1315</u> Finish <u>1450</u> ward & K-Hoppes			
NATER LEVEL D	(001 11	rom Top of Casing)		Well	Piezometer		
a. Total Well Lengt	n	c. Casing Mate	erial	e. Length of Water	Column		
o. Water Table De	pth	d. Casing Diar	neter 2"	f. Calculated Well	Volume (see back)		
Flow Rate (< 500 r	nl/min): ~150	mymin					
VELL PURGING D a. Pur		ler pump					
		efined (from workplan urge Volume (@		Low flow			
	d Testing Equipme	nt Used: Make _YSI _556	Profines	Serial Nu	mber 03059 00064580		
d. Fie	ld Testing Equipme	<u>Turbidity</u> ent Calibration Docun		ield Notebook #			
Time Remo	ved (gal) T° (C) +/- 3%	pH Spec. C pH (μs/cn +/- 0.1 +/- 3%	ו) ^V ORP	DO Turbidi mg/L (NTU) +/- 10% 5 NTU, 1	Color (ft)		
	1 13.6	6.63 634-		1.54 4.36			
1322 0.	25 3.0.	6.83 6350		1.05 4.17	dear 36		
328 0	45 12.8	6.82 634		0.89 3.05	5 Ulber 37.1		
1331 0.	8 12.8	6.83 633		0.80 3.12			
1334 0.		6.82 633		0.72 2.80	2 clear 37:		
1337 1,	0 12.8	6.83 634	5 105.9	0.68 3.00	acar 37.:		
e Acc	eptance criteria pa	ss/fail Ye	es No	N/A			
Has Has Hav	required volume b required turbidity e parameters stab If no or N/A - Expla	een removed [been reached] lized					
	TION:	Method: bladder p	ump				
Sample ID	Container Type	No. of Container		Analysi	is Time		
ASH-03-CCR	- See Col	3	See Co C .	-	134		
ASH-03-CCA	See CoC	26	See Coc.	Radium-226	2-228		

4/21

Date

23

Comments

1

Signature



Client: Project No: Site Location Weather Con	CDPH : Rawh	River Pow HE = 60630 ide Genera	004, CCR ting Static	= 60630103 m	K. Hopp	क दी	D Time: Start Finish 	1050	<u>17</u> 3
WATER LEV a. Total Well b. Water Tab			c. Ca	Casing) Ising Material Ising Diamete] th of Water Col lated Well Volu		(a-
Flow Rate (< WELL PURG	500 ml/min):	~200ml	Tmik	-					
	- Minimum Re	equired Pur	ge Volum	e (@	well volumes) _	Low flow			
,	c. Field Testing	Equipment	Used:	Make YSI- 556 Turbidity	Model no Senes fach 21000	2	Serial Numbe		
C	d. Field Testing	g Equipmen			ation Found in F	ield Notebo	ok #	Page #	
Time Stabilization	Volume Removed (gal)	T° (C) +/- 3%	v pH +/- 0.1	Spec. Cond (µs/cm) ^V +/- 3%	ORP +/- 10 MV	✓ DO ✓ mg/L	Turbidity V (NTU) 5 NTU, 10%	Color	DTW ¥ (ft) 0.3 ft
0857 0857 0902 0907 0912	0.0	1.6	7.27 7.49 7.60 9.68	6729 6769 6761 6771	(32.5 124.8 120.2 (19.1) (17.6.	2.22 7.10 7.60 8.30 7.58	28.5 51.9 40.0 42.1	clear clear clear clear	(0.84 1.02, 0.98 1.00
0917 0922 0925 0925 0925	0.95		7.73 7.78 7.79 1.80	6733 6742 6742 6738	16.8 115.8 115.4 115.0	7.57 7.63 7.57 7.62	30.1 30.1 22.2 23.2 22.1	dear dear dear dear dear	1.04
e	e. Acceptance Has required Has required Have paramo If no or N	volume be turbidity be	en remov en reach zed			N/A			
SAMPLE CO	LLECTION:		Method:	bladder pump)				
Sample I	Och P	ner Type	No. of	Containers	Preservation		Analysis		Time
ASH-04- poH-04-0	001-04	lastic CoC		26	HNO3 See Coc -	Radiu	n-226 2 -21	8	0932
			T.		1	1.1.1			
Comments	20	not the	54 DO 9 (See	numbers	; decom	ed YSI	Dopro	be aga	in altr
Signature	for	A P			/	Date	44713		¹



Ground Water Sample Collection Record

Client: Project No: Site Location: Veather Conds:	Platte River Po CDPHE = 6063 Rawhide Gene	30004, CCR rating Static	= 60630103	D. Woodu	Date: <u>4/26/23</u> Time: Start <u>1210</u> Finish <u>1355</u> Word 2 F. Hoppel			
VATER LEVEL DA		÷		the	Well de. Lengt	n of Water Col	Piezomete umn	0.000
. Water Table Dep	th	d. Ca	sing Diameter	2"	f. Calcula	ated Well Volu	me (see ba	ck)
low Rate (< 500 m	l/min): ~(00	mymin	-					
	e Methodblado					én anti-		
	ptance Criteria de mum Required P			well volumes) _	Low flow			
c. Field	Testing Equipme	nt Used:	Make YSI 556 Pro S			Serial Numbe	59	
d. Field	d Testing Equipme	ent Calibrati	Turbidity on Documentat	Hach 2100		18010Co.		
Time Remov	ume ed (gal) T° (C) - +/- 3%	✓ pH +/- 0.1	Spec. Cond (µs/cm) +/- 3%	ORP +/- 10 MV	DO 🗸 mg/L	Turbidity (NTU) 5 NTU, 10%	Color	DTW (ft) 0.3 ft
1212 Q. 217 Q. 222 Q.	1 13.9 2 13.4	6.81	5970 5942 5900	127.9 120.8 (15.4	2.62	86.3 55.9 38.3	clear clear	19.95
227 6.	3.2	6.87	5873	112.5	0.91	23.0	clear	19.93
2.37 0.9		6.88	5848	08.8	0.81	4.7	clear	19.95
245. 1.0		- 6.89	5841 5835	07.4	0.80	10.6	clear clear	19.95
Has Has Have	ptance criteria pa required volume b required turbidity parameters stab i no or N/A - Expla	been remove been reache ilized			N/A			
		Method:	bladder pump					
Sample ID	Container Type	No. of (Containers	Preservation		Analysis	>	Time
AsH-15-CCK	11 plastic		2	HND3	Radium	-226 4-2	28	1

Comments

Signature

4/2023 Date



Ground Water Sample Collection Record

Client:		River Powe					E Time: Start	Date: 42	4/23
Project No:	CDPH	E = 60630	004, CCR	= 60630103			Time: Start	1313	•
Site Location	i: <u>Rawh</u>	ide Genera	ting Statio	n			Finish	1570	
Neather Cor	nds: <u>Svhn</u> u	Hwindy,	~60°F	Collector(s)	DW & KI	4			
NATER LEV	/EL DATA: (me	asured fro	m Top of	Casing)		Well 📝	/	Piezomete	er 🗌
a. Total Well	-		-	sing Material			n of Water Co		
o. Water Tal	ble Depth		d. Ca	sing Diameter	2"	f. Calcula	ited Well Volu	ıme (see ba	ick)
Flow Rate (<	< 500 ml/min):	~200 m	Ymin						
WELL PURG	SING DATA a. Purge Metho	d <u>biadde</u>	r pump				\square		··· ····
	b. Acceptance (- Minimum Re	Criteria defi equired Pure	ned (from ge Volume	workplan) : (@	well volumes)	_leow flow			
	c. Field Testing	Equipment	Used:	Make YSI 650 Pro S	Model		Serial Numbe 43979		
				Turbidity	Hach 2	1000	18010 Co	64580	-
	d. Field Testing	ı Equipmen	t Calibratio	on Documenta	tion Found in Fie	eld Noteboo	ok #	Page #	
Time	Volume Removed (gal)	✓ T° (C)	pH 🗸	Spec. Cond (µs/cm)	ORP	DO v mg/L	Turbidity • (NTU)	Color	DTW (ft)
Stabilization		+/- 3%	+/- 0.1	+/- 3%	+/- 10 MV		5 NTU, 10%		0.3 ft
1313	0.	17.0	7.91	796	34.7	2.97	10.5	dear	62.68
1318	0.3	3.5	7.91	756	46.0	3.34	12.5	clear	63.02
323	<u></u>	13.2	7.75	741	<u> </u>	430	<u><u><u> </u></u></u>	dear	63.35
1328	0.9	15.2	7.97	724	53.8	508	10.0	clear	63.68
338	<u></u>	13.2	8.01	715	55.0	5.96	6.76	clear	63.98
1343		13.6	804	712	<u>56.7_</u>	5.91	<u> </u>	dear	64.27
1241		4.0	8.03	709	<u>59.0</u> 60.0	606	<u>5.03</u> 3.47	dear	6457
1214		1440	8.04	709	(10.5	6.1	3.55	clear	64.77
	1.025		- 0,01			- Will	2003	Ciqu	64114
							······································		
I	 Acceptance Has required 			Yes	No	N/A			
	Has required					H			
	Have parame				П	Ē			
		/A - Explain		نكفا	<u>ب</u>				

SAMPLE COLLECTION:

Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-06-CCR	11 plashic	2	HNO2	Radium-226-228	1350
Kubbecck	See CoC	3	See CoC-		350
17318-06-CDPHE	See Col	lla	See CoC -	<u> </u>	1350
		-			

Comments

Signature

4/24/23 Date _



 \bigcirc

Ground Water Sample Collection Record

Client: Project No: Site Location: Weather Conds:	Rawhide Genera	0004, CCR = 60630		Fir	Date: <u>4/27/2</u> 3 Start <u>110</u> nish <u>1235</u> 2 Hoppes
WATER LEVEL DA a. Total Well Length		_ c. Casing Mat	erial <u>PVC</u>		Piezometer 🗌 er Column (a-
b. Water Table Dep	2		meter	f. Calculated We	II Volume (see back)
Flow Rate (< 500 m WELL PURGING D/ a. Purg	50 S-				
b. Acce	ptance Criteria del	ined (from workplar			
	Testing Equipmen	YSI 556 Turbidity	-ProSeries Hach Zr	000 180	102059
Vol	ume ed (gal) T° (C)	nt Calibration Docur			dity M DTW M
Stabilization - 110 0.6 115 0.6 120 0.7	- +/- 3% 05 [2.8] 5 [(.9] 7]2.0	+/-0.1 +/-3 6.94 8100 7.03 809 7.05 808	% +/- 10 MV 1 144.8 8 128.6 9 121-5	+/- 10% 5 NTU, 1.89 86 3.81 53. 5.05 2.8.0	10% 0.3 ft 2 clear 12.71, 4 clear 12.78 0 clear 12.73
125 1.0 130 1.2 135 1.7 140 1.9	1 2.3	7.10 808 7.12 808 7.11 805 7.10 80	8 113.8	5-71 20. 6-39 12 6-47 12-9 6-24 13.	2 clear 12.26
Has Has Have	hext well	een removed een reached zed	0	N/A	deconned before
Sample ID	Container Type	No. of Containe		Analy	vsis Time
ASH-07-CCR	SeeCoC	3	See CoC-	,	1145
ASIL-07-CDPHE	IL plastic See Coc	26	HNOZ See Coc -		11145
Comments		T			
ignature	24	typ		Date42	7 23



Comments

Signature

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ne

426 23

Date

Ground Water Sample Collection Record

)	Client:		Platte Rive						D	ate: 4/24	23	
	Project No:				0004, CCR = 60630103				Time: Start 0910			
	Site Locatio		Rawhide G					- 10	Finish	11/10/10	to	
	Weather Co	nds:	smy Ce	01,51	grif bie	Collector(s)	D. Wood	ward 7	E. Hop	99		
	WATER LE	VEL DAT	20				÷.	Well	j	Piezomete	r 🗆	
	a. Total Wel	I Length				sing Material		e. Lengt	h of Water Col	umn		
	b. Water Ta	ble Depth				sing Diamete	er'	f. Calcul	ated Well Volu	me (see ba	ck)	
	Flow Rate (< 500 ml/r	min): <u>~(</u>	50 m	Humin							
	WELL PUR		FA Methodb	ladder	pump							
			tance Criteri num Require				_ well volumes)	_Low flow				
		c Field T	esting Equi	nment I	Ised.	Make	Model		Serial Numbe	r		
		0.110101	coung Equi			YSI 556 Pm			181 (0305			
						Turbidity	Hach 2100 Q		18010000			
		d. Field	Testing Equi	ipment	Calibratio	on Document	ation Found in Fi	eld Notebo	ok #	Page #		
	Time	Volur Remove		(C)	рН	Spec. Cond (µs/cm)	ORP	DO V		Kaser Control (1997)	DTW	
	Stabilization			3%	+/- 0.1	+/- 3%	+/- 10 MV	mg/L +/- 10%	(NTU) 5 NTU, 10%	Color	(ft) 0.3 ft	
	0912	D.C	and the second se		7.01	5288	120.5	7.02	9.87	clear	8.89	
	0917	0.4		5	6.79	5328	111.2	0.67	10.2	clear	10.2	
	0922	0.0	2 10	.6	6.78.	5316	104.6	0.59	9.49	clear	10.3	
	0927	0.6		_	6.78	5337	102.9	0.61	9.07	elear	10.2	
	0932	0.7		1.2	6.77	5316	101.2	0.56	8:32	dear	10.2	
	0940	0.7	12	1	6.77	5328	101.0	0.51	7.12	dear	10.2	
	0943	0.8		8	6.11	5313	101.0	0.48	6.80	dear	10.2	
		V-0					101.	0.40		U.C.	10.00	
0							X					
					fa:1	Maa						
			tance criteria quired volur			Yes	No	N/A				
		Has re	quired turbid	dity bee	en reache							
			parameters :			V						
		lf r -	no or N/A - E	xplain	below.							
	SAMPLE C		ON:	N	lethod: t	bladder pump						
		OLLEON	on.	IV			wset					
	Sample	ID	Container Ty		No. of C	Containers V	Preservation		Analysis		Time	
	ASH-0	S-CCR	See Co	-		3	See Coc -	Delli	701 1		0945	
5	ACIT-De	CALL	1 L plast			2	HN03	reanivi	n-2268-	128	1-	
	ASH-08-	LOTHE	See Co			6	See Col ~				V	

PRPA	Rewhick	Samplin
Top of Casi	ng	1

Date:	4/24/20	23	
Recorder:	D. Woodward,	K.	Hoppes

Event: MP:

Location	Group	DTW	TD	Notes
PZ-3	Piezometer	32.53	~	
PZ-4	Piezometer	23.09	-	
PZ-5	Piezometer	35.69	-	
ASH-01	ASH	13.95		Buffalo Area - Need Escort
ASH-02	ASH	1.82	-	
ASH-03	ASH	36.06		
ASH-04	ASH	11.58		
ASH-05	ASH	19.77		
ASH-06	ASH	62.51	-	
ASH-07	ASH	2.61	l	
ASH-08	ASH	8.48	1	
BAT-01	BAT	13.58	-	
BAT-02	BAT	17.20	-	
BAT-03	ВАТ	13.20	-	Needszints to sechre well lidigfilled.
BAT-04R	BAT	15.87	-	
BAT-05	BAT	19.85		Needs bolts to secure vanit 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	46.7		
PRS-04	PRS	29.26	-	
PRS-05	PRS	28.25		
PRS-06	PRS	18.74		
MW-3	Sitewide	25.18		
	Sitewide	19.31	~	100 million (1997)
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	-	

Acronyms:

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

October 2023



Well/Piezo ID: A5H-01

Ground Water Sample Collection Record

Client: Project No: Site Locatior Weather Cor	6070 n: Raw	e River Power 19371 / 60709 hide Generatir f, WU rm,	118 a Station		Kara Hoppes &	 Olivia Helinski	[1/23
a. Total Well b. Water Tal	ble Depth	13.341	_ c. C. _ d. C	asing) asing Materia asing Diamete		Well e. Length of Wa f. Calculated Wa			_ (a-b)
	 b. Field Testing c. Field Testing Volume 				Model ProSeries 2100Q Turbidim ion Found in Field	Notebook #	Serial Numbe	r	-
Time Stabilization 1030 1037 1034 1037 1040 1043	Removed (L) 0.0 2.0 3.0 4.0 5.0 6.2	T° (C) +/-0.2 or 3% 12.0 11.5 11.5 11.5 11.5 11.5	pH +/- 0.1 7.19 7.18 7.19 7.19 7.19 7.15	Spec. Cond (µs/cm) +/- 3 % 4074 407 4074 4074 4075 4075 4013	ORP (mV) +/- 10 157.9 156.2 155.1 153.6 153.6 151.9 199.7	DO (mg/L) 0.5mg, +/- 10% 4.20 2.41 1.3 0.58 0.69 0.47	Turbidity (NTU) +/-5 or 10% 5-93 3-55 3-76 3-76 3-04 4-03 3-04	Color Cléav Cléav Cléav Cléav Cléav	DTW 0.33 ft 13.44 1.3.90 14.03 14.03 14.08 14.17 14.14
e	Has required Have parame	criteria pass/fa volume been turbidity been eters stabilized /A - Explain be	removed reached	Yes	No 				

SAMPLE COLLECTION:

Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
SH-01-CCK	*	5	J.		100

Comments

malul Signature_

10/11/23 Date ____



Well/Piezo ID: ASH-07

Ground Water Sample Collection Record

Client: Platte River Pow	er Authority				. 64	10100	7
Project No: 60709371 / 6070 Site Location: Rawhide Genera	9418		_	Time: Start		LAJQ 3	
		s) Kara Hoppes 8	k Olivia Helinski	Finish	0945		
WATER LEVEL DATA: (measured from a. Total Well Length b. Water Table Depth	c. Casing Mater		Well e. Length of Wa f. Calculated W				
WELL PURGING DATA a. Purge Method	dder pump				,		
b. Field Testing Equipment	Used: Make YSI HACH	Model ProSeries 2100Q Turbidim	neter	Serial Numbe	r	_	
c. Field Testing Equipment	Calibration Documenta	ation Found in Field	l Notebook #	Page #		2	
Volume Removed (L) T° (C) Stabilization +/-0.2 or 39 Up II. 0 · Q 12 · 6	6 +/- 0.1 +/- 3 %	ORP (mV) +/- 10	DO (mg/L) 2 0.5mg, +/- 10%	Turbidity (NTU) +/-5 or 10%	Color	DTW 0.33 ft	1.1.0
0917 2.6 11.9	7.68 3687	207.3	4.80	30.4 9.63	clear clear	3.84 4.25	Villow
0970 9.7 11.9 0973 4.1 11.9 0926 50 11.9	7.67 3579	194.7	0.36	11.7	Char S''	4.57 5.04 5.29	
823 5.9 12.0 833 6.2 12.0	7.67 3981 1.67 3505 7.67 3580	186.8	0.19	9.57	~ # ~ #	5.63	K/
036 7.0 120 036 7.5 127 094 8.8 137	7.67 3581	175.1	0.13	7.47	5 11 5 11 5 11	6.07	
8944 8.43 14.5	7.69 3579 7.65 3557	169.3	0.12	7.79	5 P 5- P	6.75	V
-							
 e. Acceptance criteria pass/ Has required volume bee Has required turbidity bee 	n removed	No □ □	N/A				
Have parameters stabilize If no or N/A - Explain t	d d						
SAMPLE COLLECTION:	Method: bladder pum	р					
Sample ID Container Type	No. of Containers	Preservation	ΑΑ	nalysis		Time	
HSH-OL-CCK SEE COC	5	900 CaC +				6845	

Comments

alu 11 Signature

10/12/23 Date

S.



Well/Piezo ID: ASH-0.3

	Client: Platte River Power Authority Project No: 60709371 / 60709418 Site Location: Rawhide Generating Station Weather Conds: Clived 4 , WORM, Drelay Collector(s) Olivia Helinski a	Date: <u>10 10 2</u> 3 Time: Start <u>1350</u> & KAYA Hoppes Finish <u>1510</u>
	water Level Data: (measured from Top of Casing) a. Total Well Length	Well Piezometer e. Length of Water Column (a-b) f. Calculated Well Volume (see back)
	WELL PURGING DATA a. Purge Method <u>blackir PNMY</u>	
	b. Field Testing Equipment Used: Make Model <u>YSI</u> ProSeries <u>HACH</u> 2100Q Turbidim	Serial Number 50146 reter 24789
	c. Field Testing Equipment Calibration Documentation Found in Field Time Removed (L) T° (C) PH (µs/cm) ORP (mV) Stabilization - +/-0.2 or 3% +/-0.1 +/-3% +/-10 1.354 0.0 15.5 7.20 5444 1/6.8 1.357 1.0 12.5 7.23 5260 115.1 1.406 3.0 12.3 7.26 5229 113.5 1.403 3.0 13.2 7.26 5233 112.0 1.403 3.0 13.2 7.26 5233 112.0	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
	e. Acceptance criteria pass/fail Yes No 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	
JP-01-CDPHE VP-01-CCF	Sample ID Container Type No. of Containers Preservation H5H-03-CDPHE SPC Col Ho 7 Sec Col HSH-03-CCK SEC Col Ho 7 Sec Col Dup=45H-05H-05K SEC Col Ho 7 Sec Col Dup=45H-05K SEC Col Ho 7 - Dup=45H-05K SEC Col Ho 7 - Dup=45H-05K SEC Col Ho 7 -	Analysis Time (4(0) 1910 1910 1918
	Comments <u>PUP Collected here</u> Signature	
		Date 10/10/23



Well/Piezo ID: ASH-04

Ground Water Sample Collection Record

Client: Platte River Power Authority Date: Date: Project No: 60709371 / 60709418 Time: Start Date: Site Location: Rawhide Generating Station Time: Start 1000 Weather Conds: Image: Authority Collector(s) Kara Hoppes & Olivia Helinski	
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 12.87' d. Casing Diameter 21' f. Calculated Well Volume (see back) (a-b) WELL PURGING DATA bladdaw pype pype f. Calculated Well Volume (see back) f. Calculated Well Volume (see back)	
b. Field Testing Equipment Used: Make Model Serial Number YSI ProSeries 501-10 HACH 2100Q Turbidimeter 24745	
c. Field Testing Equipment Calibration Documentation Found in Field Notebook #Page # Time Removed (L) T° (C) PH (us/cm) ORP (mV) (mg/L) (NTU) Color DTW Stabilization +/-0.2 or 3% +/- 0.1 +/- 3% +/- 10 0.5mg, +/- 10% +/- 5 or 10% 0.33 ft 1400 0.0 13.3 7.35 6.25 6 147.7 3.46 3.47 (1/Ar) 17.9 L 1417 1.9 13.3 7.40 6.29 8 145.7 3.49 3.45 CH Ar) 17.9 L 1418 4.6 13.4 7.37 6.20 6 143.0 1.55 1.3.40 * '' 13.93 1431 5.1 13.4 7.36 6.20 6 143.0 1.55 1.3.40 * '' 13.93 1431 5.1 13.4 7.36 6.20 6 143.0 1.55 1.3.40 * '' 13.93 1431 5.1 13.4 7.36 6.20 6 143.0 1.55 1.3.40 * '' 13.93 1431 5.1 13.4 7.36 6.20 6 143.0 1.55 1.3.40 * '' 13.93 1431 5.1 13.4 7.36 6.20 6 143.0 0.48 P.4 * '' 14.03 1431 5.1 13.4 7.36 6.20 6 143.0 0.48 P.4 * '' 14.03 1432 7.37 6.22 8 147.3 0.48 P.4 * '' 14.03 1434 5.1 14.0 13.4 7.36 6.20 6 143.0 0.48 P.4 * '' 14.03 1434 5.1 14.0 1.3 6 2.28 147.3 0.48 P.4 * '' 14.03 1434 5.1 14.0 1.3 6 2.28 147.3 0.48 P.4 * '' 14.03 1434 5.1 14.0 1.3 6 2.28 147.3 0.48 P.4 * '' 14.03 1434 5.1 14.0 1.3 6 2.28 147.3 0.48 P.4 * '' 14.03 1434 5.1 14.0 1.3 6 2.28 147.3 0.48 P.4 * '' 14.09 1434 5.1 14.0 1.3 6 2.28 147.3 0.48 P.4 * '' 14.09 1434 5.1 14.0 1.4 7.38 6.20 6 143.0 0.48 P.4 * '' 14.09 1434 5.1 14.0 1.4 7.38 6.20 6 143.0 0.48 P.4 * '' 14.09 1434 5.1 14.0 1.4 7.39 6.22 8 147.3 0.48 P.4 * '' 14.09 1434 5.1 14.0 1.4 7.39 6.22 8 147.3 0.48 P.4 * '' 14.09 1434 5.1 14.0 1.4 7.39 6.22 8 147.3 0.48 P.4 * '' 14.09 1434 5.1 14.0 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	in
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 ID
 Container Type
 No. of Containers
 Preservation
 Analysis

 ASH-00-000
 500 000
 7
 500 000
 5
 500 000

 ASH-00-000
 500 000
 5
 500 000
 5

Comments

Ilustell Signature

10/11/23 Date

Time

1430

AECOM

Well/Piezo ID: ASH-05

Ground Water Sample Collection Record

Client: Project No: Site Locatio Weather Co	on: 6070	e River Power 09371 / 607094 hide Generatir St Windy	418 ng Station		Kara Hoppes &	Olivia Helinski	E 	Date: [0 1 300 350	1/23
WATER LEVEL DATA: (measured from Top of Casing) Well Piezometer a. Total Well Length									_ (a-b)
	b. Field Testing	g Equipment U	lsed:	Make YSI HACH	Model ProSeries 2100Q Turbidim		Serial Numbe 50146 24785	r	-
Time Stabilization 1310 1316 1316 1316 1323 1325 1325 1337	Volume Removed (L)	T° (C) +/-0.2 or 3% 14.4 13.4 13.3 13.2 13.2 13.1 13.1 13.1	pH +/- 0.1 7-08 7-11 7-12 7-12 7-12 7-12 7-12 7-12 7-12	Spec. Cond (µs/cm) +/- 3 % 5337 5357 5357 5357 5357 5370 5370 5370		Notebook # (mg/L) 0.5mg, +/- 10% 4.45 .3.32 2.09 1.11 0.56 0.36 0.38 0.37	Page # Turbidity (NTU) +/-5 or 10% 56.6 64.5 55.1 48.9 35.0 33.7 31.6 16.9 17.9		DTW 0.33 ft 20.67 20.61 20.83 20.83 20.83 20.83 20.93 20.94 20.94 20.94 20.94
	Has required Have parame	criteria pass/fa I volume been turbidity been eters stabilized I/A - Explain be	removed reached	Yes	No D	N/A D			

SAMPLE COLLECTION:

Method: bladder pump

Sample ID	Container Type	No. of Containers	Preservation	Analysis	Time
ASH-OB-CCR	se col		Secoc		

Comments

melle Signature

Date 10/11/2 <



Well/Piezo ID: ASH-06

Ground Water Sample Collection Record

Client: Project No: Site Location: Weather Conds:	Platte River Powe 60709371 / 60709 Rawhide Generati	9418 ing Station		Kara Hoppes &	— — Olivia Helinski	D Time: Start Finish		1/23
WATER LEVEL DA a. Total Well Length b. Water Table Dep		c. C	asing) asing Material asing Diamete		Well e. Length of Wa f. Calculated We			_ (a-b)
WELL PURGING D a. Pur	ata ge Method	- Gers	bladder	pump				
b. Field	d Testing Equipment	Used:	Make YSI HACH	Model ProSeries 2100Q Turbidim	ieter	Serial Number	5	-
c. Fiel	d Testing Equipment	Calibration	Documentati	on Found in Field	Notebook #			-
Time Remo Stabilization		pH +/- 0.1 7.98	Spec. Cond (μs/cm) +/- 3 %	ORP (mV) +/- 10	DO (mg/L) 0.5mg, +/- 10%	Turbidity V (NTU) +/-5 or 10%	Color 	DTV 0.33
131 134 137 140 2. 143 2.	- 15.6 (4.5 - 14.5 - 14.5 - 14.2	7.97 8.00 8.03 8.02 8.02 8.07	809 782 757 746 739	129.7 128.0 128.2 127.0 125.7	2.85 3.62 4.08 4.36 4.61	7.65	clear clear clear clear clear clear	62.9
1146 3:	L 14.1	8.08	730	124.8	4.76	ŭ,77	clear	63.6
Has Has Have	ptance criteria pass/fi required volume beer required turbidity beer parameters stabilize no or N/A - Explain b	n removed n reached d	Yes	No D				
SAMPLE COLLECT	ION:	Method: t	pladder pump					
Sample ID KH-06-CDPHC KH-C6-CCR	Container Type	No. of C	Containers	Preservation	A	nalysis		
omments	ERB-01-COPH	E4-00	R collect	ed here Q	1200			
gnature	1An	/				-		

AECOM

Well/Piezo ID: ASH-07

Ground Water Sample Collection Record

Client: Project No: Site Location: Weather Conds:	Platte River Power A 60709371 / 6070941 Rawhide Generating	8 Station	Date: 10112123 Time: Start Finish Olivia Helinski					
WATER LEVEL DATA a. Total Well Length b. Water Table Depth	- In the I	op of Casing) c. Casing Materia d. Casing Diamete	6.4	Well e. Length of Wa f. Calculated Wa			_ (a-b)	
	Method							
	esting Equipment Us	ed: Make <u>YSI</u> <u>HACH</u> libration Documentati	Model ProSeries 2100Q Turbidim		Serial Number	r		
e. Accepta Has rec Has rec Has rec	$\begin{array}{c c} \text{he} & & \\ \hline \text{d} (L) & & \\ \hline \text{T}^{\circ} (C) & \\ \hline \text{+/-0.2 or 3\%} & \\ \hline $	PH (µs/cm) " +/-0.1 +/-3% 7.21 6061 7.21 6060 7.27 6058 7.30 6075 	1	DO (mg/L) 0.5mg, +/- 10% 0.27 0.31 0.31 0.31 0.31 0.31	Page # Turbidity v (NTU) +/-5 or 10% 2%.3 27.8 15.0 7.13 5.35 9.09	Color 	DTW 0.33 ft 14.43 15.05 15.11 15.14 15.14 15.10 15.10	tword
SAMPLE COLLECTIO								
		ethod: <u>bladder pump</u> No. of Containers 7 5	Preservation	P	Analysis		Time 1025 1025	
omments	455 not turni	ng on for 1st re		d for <i>Selong</i> Date0/10	1/23			

AECOM

Well/Piezo ID: ASH-08-

Ground Water Sample Collection Record

Client: Project No: Site Locatio Weather Co	6070 n: Rawl	e River Power 9371 / 607094 nide Generatir L, brillty	118 In Station	_Collector(s)	<u>Olivia Helinski</u>	= & KAYA Hopp	ロークロン Time: Start Finish	0ate: [0] 10 5 1 42	10/23		
a. Total We b. Water Ta	able Depth	9.71'	_ c. Ca _ d. Ca	asing Materia asing Diamet		Well e. Length of Wa f. Calculated Wa			_ (a-b)	-	
WELL POR	a. Purge Metho b. Field Testing	l Equipment U	lsed:	Make YSI HACH	Model ProSeries 2100Q Turbidim	neter	Serial Numbe 50194 24785 Page #	2			
Time Stabilization 1020 1023 1026 1027 1032 1035 1038 1041 1047 1050	Volume Removed (L) 0.0 1.8 3.7 .7.8 4.9 5.9 7.0 7.6 8.3 8.9 9.5 9.5 4.9 7.0 7.6 8.3 8.9 9.5	T° (C) +/-0.2 or 3% / 3.2 / 3.5 / 3.4 / 2.3 / 3.5 / 3.5	pH +/- 0.1 7.15 7.14 7.15 7.15 7.15 7.15 7.15 7.15 7.15 7.14 7.14 7.14 7.14 7.14 7.14 7.14 7.14	Spec. Cong (µs/cm) +/- 3 % 4 3 6 8 4 3 6 8 4 3 6 8 4 2 9 6 4 2 7 0 4 2 9 6 4 2 7 0 4 2 9 0 4 1 9 8 5 1 5 15 1 5 15 1 5 15 1 5 15 15 15 15 15 15 15 1	1	1	/	Color 	DTW 0.33 ft 9.42 10.94 12.33 (3.29 14.09 15.78 15.78 15.98 15.98 15.98 15.98	Y.	¥flow rate
SAMPLE CC Sample ASH-08-C SH-08-C	ID Contain	er Type COC/ COC	No. of C	ontainers	PUMP Preservation SIL COC - SEE CoC -	A			Time 1055		

Signature Com Stalle

Date 10/10/23

	Event:	PRPA OCH	iber dur	npling	Date: 10/9/23
	MP:	Top of Casing	5	•)	Recorder: Olivin Helinski
	Location	Group	DTW	TD	
0826	*PZ-3	Piezometer	32.94'	TD	Notes
	*PZ-4	Piezometer	23.21'		
0817	*PZ-5	Piezometer	36.96'		
11 1019	ASH-01	ASH 13.34-			Duffele Area New I F
0945	ASH-02	ASH	3.95'		Buffalo Area - Need Escort
0917	ASH-03	ASH	37.93'		
0926	ASH-04	ASH			
0936	ASH-05	ASH	12.871 20.531		
0 833	ASH-06	ASH			
0921	ASH-07	ASH	62.60'	/	
UIQI	ASH-08	ASH	14.76' 9.71'		
	ASH-09	ASH			as helping i have a find the
1400	BAT-01	BAT	4.55' 9.541		no tubing, neary producer; watch for much
1020	BAT-02	BAT		1	
1025	BAT-02 BAT-03	BAT	15.43		Carporder and the d
1032	BAT-04R	BAT			Consider new tubing
1030000 080	BAT-04K	BAT	15.40	~)
1092	BAT-06	BAT	16.81		
1017	BAT-09	BAT			
15th	BAT-10	BAT	16.481	-	
0.000	BAT-10 BAT-11	BAT	26.77'	all and a second	
1012	BAT-11 BAT-12	BAT	30.981	-	
	BAT-12	BAT	37.04'	-	
0909	PRS-01	PRS		_	
	PRS-02	PRS	2037		
	PRS-03	PRS	17.451		
	PRS-04	PRS	47.00'		
0001	PRS-05	PRS	27.25' 28.32'		and the second
1000	PRS-06	PRS			
15010	PRS-07	PRS	20.11'	+	
	MW-3	Sitewide	23.951 24.65		
1112	MW-4	Sitewide	19.50	1	
11 0851	MW-5	Sitewide	22.02		
071	MW-6	Sitewide			Buffalo Area - Need Escort ; no lock
0/10 095		Sitewide	1.45		Cross Barbed Wire Fence and Access by Foot
1 1013	MW-8	the second s	3.40		Cross Barbed Wire Fence and Access by Foot
1120	FTP-1	Sitewide FTP	11.04		
1120	Acronyms:		28.88	~	

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 Date Completed: July 25, 2023 Peer Reviewer: Brian Rothmeyer

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

					Analyses	5
Field Identification	Sample Type	Laboratory Identification	Matrix	Total Metals	General Chemistry	Total Radium*
		kage 60427179		-		
ASH-06-CCR	Ν	60427179001	Water	Х	Х	
ERB-02-CCR	EB	60427179002	Water	Х	Х	
	Data Pac	kage 60427315				
ASH-01-CCR	Ν	60427315001	Water	Х	Х	
ASH-02-CCR	Ν	60427315002	Water	Х	Х	
DUP-01-CCR	FD	60427315003	Water	Х	Х	
	Data Pac	kage 60427323				
ASH-08-CCR	Ν	60427323001	Water	X ^m	X ^{m1}	
ASH-05-CCR	Ν	60427323002	Water	Х	Х	
	Data Pac	kage 60427378		-		
ASH-01-CCR	N	60427378001	Water			Х
ASH-02-CCR	N	60427378002	Water			Х
DUP-01-CCR	FD	60427378003	Water			Х
ERB-02-CCR	EB	60427378004	Water			Х
ASH-06-CCR	N	60427378005	Water			Х
	Data Pac	kage 60427409		-		
ASH-08-CCR	Ν	60427409001	Water			X ^m
ASH-05-CCR	Ν	60427409004	Water			Х
ASH-04-CCR	Ν	60427409005	Water			Х
ASH-07-CCR	N	60427409006	Water			Х
ASH-03-CCR	Ν	60427409007	Water			Х
	Data Pac	kage 60427514				
ASH-04-CCR_042723	N	60427514001	Water	Х	Х	
ASH-07-CCR_042723	Ν	60427514002	Water	Х	Х	
ASH-03-CCR_042723	Ν	60427514003	Water	Х	Х	
Type: Not analyzed for this parameter	r	EB – Equipment l	Blank			

Sample Type:

FD - Field Duplicate

X^m - Matrix Spike/Matrix Spike Duplicate

N – Normal Sample

Xm1 - 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.
- <u>X</u> 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	No	Matrix Spike/ Matrix Spike Duplicate (MS/MSD)
Matrix Spike/ Matrix Spike Duplicate Data Packages 60427323 ASH-08-CCR (Total metals, anions)		With the exceptions listed in Table 2, the MS/MSD recoveries and relative percent differences (RPDs) met quality control criteria.
 Data Package 60427409 ASH-08-CCR (Radium 226, Radium 228) Laboratory Duplicate Data Package 60427323 ASH-08-CCR (TDS, anions) 		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 PerformanceLaboratory 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	No	Field Blank
• Field Blank None		A field blank was not submitted with the samples associated with this sampling event.
• Equipment Blank Data Packages 60427179/ 60427378		Equipment Blank
 Field Duplicate Data Packages 60427315/ 60427378 ASH-02-CCR/ DUP-01-CCR 		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	Criteria	Comments
Parameter	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.
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$		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

|--|

Laboratory Blank/ Associated Samples	Analyte	Concentration	Qualification
]	Data Package 60427378	

Laboratory Blank/	Analyte	Concentration	Qualification
Associated Samples	J **		
MB 2843569 ASH-01-CCR ASH-02-CCR DUP-01-CCR ERB-02-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.
ASH-06-CCR	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.

Table 1: Laboratory Blank Outliers and Resultant Data Qualification

 $\pm -$ 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	RPD	Qualification				
		(Limits)	(Limit)					
		Data 1	Package 60	427323				
ASH-08-CCR	Fluoride	70/73	3	As the potential bias was considered to be low, the				
		(80-120)	(15)	associated sample result was qualified as estimated				
				(UJ m).				

Bold - indicates a value that is outside of acceptance limits

RPD - Relative Percent Difference

%R – Percent Recoveries ld - Laboratory Duplicate Imprecision

UJ - Estimated, Non-Detect

Table 3: Uncertainty Outliers and Resultant Data Qualification

Associated	Analyte	Result	2 Sigma (σ)	MDC	Qualification
Samples		(pCi/L)	Uncertainty	(pCi/L)	
		Da	ta Package 604	27378	
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
DUP-01-CCR		0.296	± 0.387	0.638	(MDC), the associated results were qualified as estimated (J v).
		Da	ta Package 604	27409	
ASH-08-CCR	Radium 226	0.398	± 0.435	0.701	As the 2σ uncertainty multiplied by 1.65 was greater than the reported
ASH-05-CCR		0.368	± 0.452	0.737	MDC, the associated result was 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

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,

Astanton 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





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



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



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



ANALYTICAL RESULTS

Project: 60709371 PRPA CCR

Pace Project No.: 60427179

Sample: ASH-06-CCR	Lab ID: 604	427179001	Collected: 04/24/2	3 13:5	0 Received: 04	4/26/23 08:45 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Met	thod: EPA 60	010 Preparation Met	nod: EF	PA 3010			
	Pace Analytic	al 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 Met	thod: EPA 60	020 Preparation Met	nod: EF	PA 3010			
	Pace Analytic	al 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 Met	thod: EPA 74	470 Preparation Met	nod: EF	PA 7470			
	Pace Analytic	al 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 Met Pace Analytic							
Total Dissolved Solids	427	mg/L	10.0	1		04/28/23 12:43		
9056 IC Anions	Analytical Met	-	156					
	Pace Analytic							
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	
		0						



ANALYTICAL RESULTS

Project: 60709371 PRPA CCR

Pace Project No.: 60427179

Sample: ERB-02-CCR	Lab ID: 60	427179002	Collected: 04/24/2	23 16:2	0 Received: 04	1/26/23 08:45 N	Aatrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Me	ethod: EPA 60	010 Preparation Met	nod: EF	PA 3010			
	Pace Analyti	cal 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 Me	ethod: EPA 60	20 Preparation Met	nod: EF	PA 3010			
	Pace Analyti	cal 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 Me	ethod: EPA 74	70 Preparation Met	nod: EF	PA 7470			
	Pace Analyti	cal 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 Me	ethod: SM 254	40C					
	Pace Analyti	cal Services -	Kansas City					
Total Dissolved Solids	ND	mg/L	5.0	1		04/28/23 12:44		
9056 IC Anions	Analytical Me	ethod: EPA 90	056					
	Pace Analyti	cal 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	



Project:	60709371 PRPA C	CR										
Pace Project No .:	60427179											
QC Batch: 847174			Anal	ysis Metho	od: I	EPA 7470						
QC Batch Method: EPA 7470		Anal	ysis Descr	iption:	7470 Mercu	iry						
			Labo	oratory:	F	Pace Analy	ical Servic	es - Kansa	s City			
Associated Lab Sam	ples: 60427179	001, 6042717900	2									
METHOD BLANK:	3356742			Matrix: V	/ater							
Associated Lab Sam	ples: 60427179	001, 6042717900	2									
			Bla	nk	Reporting							
Param	eter	Units	Res	sult	Limit	Anal	yzed	Qualifier	S			
Mercury		ug/L		ND	0.2	0 05/16/2	3 11:34					
LABORATORY CON	TROL SAMPLE:	3356743										
			Spike	LC	CS	LCS	% R	ec				
Param	eter	Units	Conc.	Re	sult	% Rec	Limi	ts	Qualifiers			
Mercury		ug/L		5	4.8	9	5 8	30-120		_		
MATRIX SPIKE & MA	ATRIX SPIKE DUP	LICATE: 3356			3356745							
		60427323001	MS Spike	MSD Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units		Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	% Rec	RPD	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.



Project: Pace Project No.:	6070937 6042717	71 PRPA CC 79	CR										
QC Batch:	84475	3		Analy	sis Metho	d: E	EPA 6010						
QC Batch Method:	EPA 30	010		Analy	sis Descri	ption: 6	6010 MET						
				Labo	ratory:	F	Pace Analyt	tical Service	es - Kansa	s City			
Associated Lab Sam	nples:	604271790	01, 6042717900	2									
METHOD BLANK:	3347662	2			Matrix: W	/ater							
Associated Lab Sam	nples:	604271790	01, 6042717900	2									
				Blar	nk	Reporting							
Param	neter		Units	Res	ult	Limit	Analy	yzed	Qualifier	s			
Boron			ug/L		ND	10	0 05/09/2	3 11:46					
Calcium			ug/L		ND	20	0 05/09/2	3 11:46					
			-		ND	10.0	05/09/2	3 11 46					
Lithium			ug/L		ND	10.		0 11.10					
Lithium LABORATORY CON Param		AMPLE:	ug/L 3347663 Units	Spike Conc.	LC Res	s	LCS % Rec	% Ri Limi		Qualifiers			
LABORATORY CON		AMPLE: :	3347663	•	LC Res	s	LCS	% Ro Limi		Qualifiers			
LABORATORY CON Param		AMPLE: :	3347663 Units	Conc.	LC 0	CS sult	LCS % Rec	% Ri 	ts (Qualifiers	_		
LABORATORY CON Param Boron		AMPLE: :	3347663 Units ug/L	Conc100	LC Res 0 0	S sult	LCS % Rec 9	% R(ts 30-120	Qualifiers	_		
LABORATORY CON Paran Boron Calcium	neter		3347663 Units ug/L ug/L ug/L	Conc. 100 1000 1000	LC Res 0 0	CS sult	LCS % Rec 94	% R(ts 0 30-120 30-120	Qualifiers	_		
LABORATORY CON Paran Boron Calcium Lithium	neter		3347663 Units ug/L ug/L ug/L	Conc. 100 1000 1000	LC Res 0 0	Ssult 964 10400 1000	LCS % Rec 94	% R(ts 0 30-120 30-120	Qualifiers	-		
LABORATORY CON Paran Boron Calcium Lithium	neter		3347663 Units ug/L ug/L ug/L	Conc. 100 1000 1000 664	LC Res 0 0 0	Ssult 964 10400 1000	LCS % Rec 94	% R(ts 0 30-120 30-120 30-120 MSD	Qualifiers % Rec	_	Мах	
LABORATORY CON Paran Boron Calcium Lithium	neter IATRIX S		3347663 Units ug/L ug/L ug/L	Conc. 100 1000 100 664 MS	LC Res 0 0 0 0 MSD	2S sult 964 10400 1000 3347665	LCS % Rec 90 100 100	% Ri Limi 6 8 4 8 0 8	ts 0 30-120 30-120 30-120		RPD	Max RPD	Qual
LABORATORY CON Paran Boron Calcium Lithium MATRIX SPIKE & M	neter IATRIX S	PIKE DUPL	3347663 Units ug/L ug/L ug/L ICATE: 3347 60427323001	Conc. 100 1000 100 664 MS Spike	LC Res 0 0 0 0 MSD Spike	2S sult 964 10400 1000 3347665 MS	LCS % Rec 9 10 10 10	- <u>Limi</u> 6 & & 4 & & 0 & &	ts 0 30-120 30-120 30-120 MSD	% Rec Limits			Qual
LABORATORY CON Param Boron Calcium Lithium MATRIX SPIKE & M Parameter	neter IATRIX S	PIKE DUPL	3347663 Units ug/L ug/L ug/L ICATE: 3347/ 60427323001 Result	Conc. 100 1000 100 664 MS Spike Conc.	LC Res 0 0 0 0 MSD Spike Conc.	S sult 964 10400 1000 3347665 MS Result	LCS % Rec 90 100 100 100 NSD Result	MS % Ri Limi 6 & 8 % Rec	ts 0 30-120 30-120 30-120 MSD % Rec	% Rec Limits 75-125 75-125		RPD 20 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.



Project: 60709371 PRPA CCR

Pace Project No.:	60427179
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QC Batch:	84475	54	Analysis Meth	nod: E	PA 6020	
QC Batch Method:	EPA 3	010	Analysis Deso	cription: 6	020 MET	
			Laboratory:	F	ace Analytical Servio	ces - Kansas City
Associated Lab Sam	ples:	60427179001, 60427179002	,			,
METHOD BLANK:	334766	6	Matrix:	Water		
Associated Lab Sam	ples:	60427179001, 60427179002				
			Blank	Reporting		
Param	eter	Units	Result	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

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
Antimony	ug/L	40	37.7	94	80-120	
rsenic	ug/L	40	40.1	100	80-120	
arium	ug/L	40	38.8	97	80-120	
eryllium	ug/L	40	42.3	106	80-120	
admium	ug/L	40	39.7	99	80-120	
iromium	ug/L	40	37.8	94	80-120	
balt	ug/L	40	39.8	100	80-120	
ıd	ug/L	40	39.4	98	80-120	
lybdenum	ug/L	40	39.1	98	80-120	
elenium	ug/L	40	41.3	103	80-120	
allium	ug/L	40	38.6	97	80-120	

MATRIX SPIKE & MATRIX S	SPIKE DUPLI	CATE: 3347	668 MS	MSD	3347669							
		60427323001	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	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	

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REPORT OF LABORATORY ANALYSIS

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Project: 60709371 PRPA CCR

Pace Project No.: 60427179

MATRIX SPIKE & MATRIX	SPIKE DUPLIC	CATE: 3347	668		3347669	1						
Parameter	6 Units	0427323001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
i alametei					Result	Result	70 IXEC	70 Kec				Quai
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.



Project:	60709371 PRPA	CCR							
Pace Project No.:	60427179								
QC Batch:	844134		Analysis M	ethod:	SM 2540C				
QC Batch Method:	SM 2540C		Analysis De	escription:	2540C Total Di	ssolved Solids			
			Laboratory	:	Pace Analytica	I Services - Ka	nsas Ci	ty	
Associated Lab Sam	ples: 60427179	9001, 60427179002							
METHOD BLANK:	3345517		Matrix	k: Water					
Associated Lab Sam	ples: 60427179	9001, 60427179002							
			Blank	Reporting					
Param	eter	Units	Result	Limit	Analyze	d Quali	ifiers		
Total Dissolved Solid	s	mg/L	ND	5	.0 04/28/23 12	2:40			
LABORATORY CON	TROL SAMPLE:	3345518							
			Spike	LCS	LCS	% Rec			
Param	eter	Units	Conc.	Result	% Rec	Limits	Qua	lifiers	
Total Dissolved Solid	S	mg/L	1000	976	98	80-120			
SAMPLE DUPLICAT	E: 3345519		00400047004	-					
Param	oto <i>*</i>	Units	60426917001 Result	Dup Result	RPD	Max RPD		Qualifiers	
								Quaimers	
Total Dissolved Solid	S	mg/L	318	3 29	97	7	10		
SAMPLE DUPLICAT	E: 3345520								
_			60426948001	Dup		Max		0 11	
Param		Units	Result	Result	RPD	RPD		Qualifiers	
Total Dissolved Solid	s	mg/L	355	5 35	56	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.



QC Batch:	844670		Anal	ysis Metho	d: E	PA 9056						
QC Batch Method:	EPA 9056		Analy	ysis Descri	ption: 90	056 IC Anic	ons					
			Labo	ratory:	Pa	ace Analyti	cal Service	es - Kansa	s City			
Associated Lab Samp	les: 604271790	001, 6042717900	2									
METHOD BLANK: 3	347451			Matrix: W	ater							
Associated Lab Samp	les: 604271790	001, 6042717900	2									
			Blai	nk	Reporting							
Parame	ter	Units	Res	ult	Limit	Analy	zed	Qualifier	S			
Chloride		mg/L		ND	1.0	05/02/23	3 13:01					
Fluoride		mg/L		ND	0.20	05/02/23	3 13:01					
Sulfate		mg/L		ND	1.0	05/02/23	3 13:01					
LABORATORY CONT		3347452										
LABORATORY CONT	RUL SAMPLE.	3347452	Spike	LC	s	LCS	% R	ec				
Parame	ter	Units	Conc.	Res		% Rec	Limi		Qualifiers			
Chloride		mg/L		5	4.8	95		30-120		_		
Fluoride		mg/L	2		2.7	107		30-120				
Sulfate		mg/L		5	5.8	117		30-120				
MATRIX SPIKE & MA	TRIX SPIKE DUP	LICATE: 3347			3347454							
			MS	MSD								
Parameter	Units	60427417003	Spike	Spike Conc.	MS Booult	MSD Booult	MS % Rec	MSD % Rec	% Rec	RPD	Max RPD	Qua
			Conc.		Result	Result			Limits			
Chloride	mg/L		50	50	324	326	73	76		0	-	M1
Fluoride	mg/L		2.5 5	2.5 5	1.1	0.99 5.4	37 93	33 74		8 16		M1
Sulfate	mg/L	1.7	5	J	6.3	5.4	93	74	60-120	10	15	M1,R′
SAMPLE DUPLICATE	: 3347455											
SAMI LE DUI LICAIL			604274	17003	Dup			Max				
	ter	Units	Res	ult	Result	RPD	·	RPD	Qualif	iers		
Parame				288	285		1	1:	5			
Parame		mg/L										
		mg/L mg/L		ND	.18J			1:	5			

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REPORT OF LABORATORY ANALYSIS

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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.



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		

Г		DC#_Title: ENV-	FRM-LENE-00	10		0#:6	5042	2717	9
	Real	(SCUR_ESI)							
	Pace	Revision: 3		00.44					
	ASC.		Effective Date:	01/1	604	27179			
	e: AElor			FOUR			V		011
	edEx V UPS			ECIE				Client	Other 🗆
			Pace Shippin	-			No 🗤		
-			o □ Seals ii e Bags □	ntact:) Foan		No 🗆 None		Other 2	1 C
Packing Mater	Tha a		Type of Ice:	-					
		As-read 0-3 Co						Date and	initials of persong contents: 54
	uld be above free			_ ((Shecu			examinin	g contents:) 2
Chain of Custor			The second						
					-				
	dy relinquished:		Hes .		JN/A				
	d within holding		V res]N/A				
Short Hold Tim	ne analyses (<)	72hr):	Yes	No [∃n/a	_		_	_
Rush Turn Aro	ound Time requ	lested:	□Yes]n/a				
Sufficient volum	ne:		↓ ∕es	⊡No E]N/A				
Correct containe	ers used:		∏ ∕res]N/A				
Pace containers	s used:		⊡ Yes		∃N/A				
Containers intac	ct:		Yes]N/A				
		1006 soils frozen in 48h							
			□Yes	_					
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Sample labels n	match COC: Dat	te / time / ID / analyses			JN/A				
Samples contai	in multiple phase	es? Matrix:	□Yes		□N/A				
		vation in compliance? Ilfide, NaOH>10 Cyanide)	□Yes	□No M		List sample date/time a		imes, lot #'s d	of preservative a
	A, Micro, O&G, K		LOT#:						
Cyanide water s		Decend call	□Yes						
Lead acetate str Potassium iodid		Record only) s blue/purple? (Preserv							
					26110				
Trip Blank prese			Yes (
Headspace in V	/OA vials (>6mi	m):	□Yes [N/A				
Samples from U	JSDA Regulated	Area: State:	□Yes [□No 🔽	ZN/A				
		35A / TX1005 vials in t			/N/A				
Client Notificat		1: Copy	COC to Client?	Y / I	N	Field Da	ata Require	r	
Person Contacte			Date/Time:			_		when unpackir	cord start and fin ng cooler, if >20 n
Comments/ Res	solution;							sample temps. Start:	Start:
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Section A		Section B	Section C					3	2	
Required		Required Project Information:	Attention another	1	0	Г	Lage		-	
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Email:	mon com	Purchase Order #:	Pace Quote:	1					Di Andi	000
Phone:	(303/740-2614 Fax	Project Name: PRPA Rawhide CCR- App III & IV (KS)	Pace Project Manager:		heather wilson@pacelabs.com.	1100	S	State / Location	cation	SUCCESST AND
Reques	uddired		Pace Profile #:	11033, 3				8		
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9	ASH-06-CCR	WT HP423 (350			× × ×					
7	ASH-07-COR	WT WT			× × ×					
~	ABHORCEN XV	WT			x x x					
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16 of		PRINT Name of SAMPLER:	MPLER: Kan	x Hoppes) ni qi	toq}	sf ubjez ()
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7 of 1			SIGNATURE of SAMPLER:							à	ATE SI	DATE Signed:					ui 9M3.	eceives 9	Apoisn (N/A	Y/N) Sooler ealed	Y/N) samples (N/Y
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e Date: Client:	Site:	DG90															DISUITAT	40mL MeOH clear vial	40mL TSP amber vial	40mL H2SO4 amber vial	40mL Na Thio amber vial	4UmL amber unpreserved	40mL HUI Clear VIal 40ml Na Thio clear vial		1 litter H2SO4 clear glass	1liter unpres glass	250mL HCL Clear glass	Unpre	16oz clear soil jar					
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Pace Analytical Services, LLC

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PG9Q Site: PRP Ramhide CCR-App III PG9M PG1U PG9M PG1U PG9M PG1U PG9M PG3S	de ci	•					Profile	7	Profile # 1100						
DG9M		R-App		& IV (KS)			Notes	sa							
	Urða Hrða	AG1U AG2U	¥G¢∩ ¥G32	ne⊦∩ ∀e≀n	Mekn	NGDN	BP2U BP1U	รษรก	NF98	NEda	3635	363C	ZEd8	VPDU	ирес БЫГС
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r vial	AG1U	1 liter unpres		con Bino	BP2U	2	JOML UNI	Dreserve	500mL unbreserved plastic		Т				
vial	AG2N	500mL HNO	500mL HNO3 amber glass		BP2Z	5(500mL NaOH. Zn Acetate	OH. Zn	Acetate						
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	AG3S	250mL H2S(250mL H2SO4 amber glass	ŝ	BP3F	5	50mL HN	IO3 plas	250mL HNO3 plastic - field filtered	filtered	2		Water	2	
	AG2U	500mL unpre	500mL unpres amber glass	s	BP3N	25	250mL HNO3 plastic	IO3 plas	stic				Solid		
ear glass	AG3U	250mL unpre	250mL unpres amber glass	s	BP3U	Ъ,	50mL un	preserve	250mL unpreserved plastic		NAL	L	-noN	Non-aqueous Liquid	: Liquid
16oz clear soil jar A	AG4U	125mL unpre	125mL unpres amber glass	s	BP3S	2	250mL H2SO4 plastic	SO4 pla	astic		OL		OIL		
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Pace Analytical Services, LLC

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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.

					Analyses	
Field Sample Identification	Sample Type	Laboratory Identification	Matrix	Total Metals	General Chemistry	Total Radium*
	Data Pac	ckage 60439539				
ASH-08-CCR	Ν	60439539001	Water			Х
ASH-09-CCR	Ν	60439539002	Water			
ASH-03-CCR	N	60439539003	Water			Х
DUP-01-CCR	FD	60439539004	Water			Х
	Data Pao	ckage 60439820				
ASH-01-CCR	Ν	60439820001	Water	Х	Х	
ASH-06-CCR	N	60439820002	Water	Х	Х	
ERB-01-CCR	EB	60439820003	Water	Х	Х	
ASH-05-CCR	Ν	60439820004	Water	Х	Х	
ASH-04-CCR	Ν	60439820005	Water	Х	Х	
	Data Pac	ckage 60439823				
ASH-08-CCR	Ν	60439823001	Water	Х	Х	
ASH-09-CCR	Ν	60439823002	Water			
ASH-03-CCR	Ν	60439823003	Water	Х	Х	
DUP-01-CCR	FD	60439823004	Water	Х	Х	
	Data Pao	ckage 60439904				
ASH-02-CCR	Ν	60439904001	Water	Х	Х	
ASH-07-CCR	Ν	60439904002	Water	Х	Х	
	Data Pao	ckage 60440184				
ASH-01-CCR	N	60440184001	Water			Х
ASH-06-CCR	N	60440184002	Water			Х
ERB-01-CCR	EB	60440184003	Water			Х
ASH-05-CCR	N	60440184004	Water			Х
ASH-04-CCR	N	60440184005	Water			Х
ASH-02-CCR	N	60440184006	Water			Х
ASH-07-CCR	N	60440184007	Water			Х
Sample Type: Not analyzed for this part	rameter	EB – Equipment Blai	nk		•	•

FD - Field Duplicate

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)

EB - Equipment Blank N-Normal Sample

Analyses:

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.
- <u>X</u> 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	NA	Matrix Spike/ Matrix Spike Duplicate (MS/MSD)
Matrix Spike/ Matrix Spike Duplicate None		A site-specific MS/MSD sample was not analyzed and reported for the associated data packages and could not be evaluated.

Review	Criteria	Comments
Parameter	Met?	
Laboratory Duplicate None		Laboratory Duplicate
		A laboratory duplicate was not reported for the associated data packages.
Laboratory PerformanceLaboratory 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	No	Field Blank
• Field Blank None		A field blank was not submitted with the samples associated with this sampling event.
• Equipment Blank Data Packages 60439820, 60440184		Equipment Blank
ERB-01-CCR • Field Duplicate Data Packages 60427315/ 60427378 ASH-03-CCR/ DUP-01-CCR		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.
ASII-05-CEN DOI-01-CER		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.
$^{\circ}$ C – Degrees Celsius $^{\circ}$ – Percent $^{\geq}$ – Greater Than or Equal To $^{\leq}$ – Less Than or Equal To $^{>}$ – Greater Than $^{<}$ – Less Than	1	$\begin{array}{l} \pm - \mbox{Plus or Minus} \\ \sigma - \mbox{Sigma} \\ \mbox{COC} - \mbox{Chain of Custody} \\ \mbox{DER} - \mbox{Duplicate Error Ratio} \\ \mbox{ID} - \mbox{Identification} \\ \mbox{LCS} - \mbox{Laboratory Control Sample} \\ \mbox{3} \end{array}$

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

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

> – Greater than

mg/L – Milligrams per Liter

RL - Reporting Limit

Table 3: Uncertainty Outliers and Resultant Data Qualification

Associated Samples	Analyte	Result	2 Sigma (σ)	MDC	Qualification
		(pCi/L)	Uncertainty	(pCi/L)	
		Da	ta Package 604	40184	
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

v - Compound Identification Issue



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,

Atarton 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.: 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



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



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



Project: 60709371 PRPA CCR

Pace Project No.: 60439539

Sample: ASH-08-CCR PWS:	Lab ID: 60439539 Site ID:	Collected: 10/10/23 10:55 Sample Type:	Received:	10/11/23 09:50	Matrix: Water	
Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Serv	rices - 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 Serv	rices - Greensburg				
Radium-228	EPA 904.0	0.520 ± 0.415 (0.833) C:87% T:86%	pCi/L	10/25/23 14:3	5 15262-20-1	
	Pace Analytical Serv	rices - Greensburg				
Total Radium	Total Radium Calculation	0.675 ± 0.808 (1.56)	pCi/L	11/06/23 16:20) 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60439539

Sample: ASH-09-CCR PWS:	Lab ID: 6043 Site ID:	9539002 Collected: 10/10/23 12:40 Sample Type:	Received:	10/11/23 09:50	Matrix: Water	
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	0 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 14:3	5 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	0 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60439539

Sample: ASH-03-CCR PWS:	Lab ID: 6043953 Site ID:	9003 Collected: 10/10/23 14:10 Sample Type:	Received:	10/11/23 09:50	Matrix: Water	
Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Ser	vices - Greensburg				
Radium-226	EPA 903.1	0.220 ± 0.413 (0.731) C:NA T:84%	pCi/L	11/06/23 14:34	4 13982-63-3	
	Pace Analytical Service	vices - Greensburg				
Radium-228	EPA 904.0	1.02 ± 0.431 (0.688) C:86% T:84%	pCi/L	10/25/23 14:3	5 15262-20-1	
	Pace Analytical Ser	vices - Greensburg				
Total Radium	Total Radium Calculation	1.24 ± 0.844 (1.42)	pCi/L	11/06/23 16:20) 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60439539

Sample: DUP-01-CCR PWS:	Lab ID: 60439539 Site ID:	Collected: 10/10/23 00:00 Sample Type:	Received:	10/11/23 09:50	Matrix: Water	
Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Serv	rices - Greensburg				
Radium-226	EPA 903.1	0.196 ± 0.452 (0.817) C:NA T:84%	pCi/L	11/06/23 14:34	4 13982-63-3	
	Pace Analytical Serv	rices - Greensburg				
Radium-228	EPA 904.0	0.980 ± 0.439 (0.723) C:83% T:84%	pCi/L	10/25/23 14:3	6 15262-20-1	
	Pace Analytical Serv	rices - Greensburg				
Total Radium	Total Radium Calculation	1.18 ± 0.891 (1.54)	pCi/L	11/06/23 16:20) 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60439539

Sample: ASH-09-CCR MS PWS:	Lab ID: 6043 Site ID:	9539005 Collected: 10/10/23 12:40 Sample Type:	Received:	10/11/23 09:50	Matrix: Water	
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	0 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 14:3	6 15262-20-1	



Project: 60709371 PRPA CCR

Pace Project No.: 60439539

Sample: ASH-09-CCR MSD PWS:	Lab ID: 60439 Site ID:	539006 Collected: 10/10/23 12:40 Sample Type:	Received:	10/11/23 09:50	Matrix: Water	
Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical S	ervices - Greensburg			_	
Radium-226	EPA 903.1	113.32 %REC 2.40RPD ± NA (NA) C:NA T:NA	pCi/L	11/06/23 14:34	4 13982-63-3	
	Pace Analytical S	ervices - Greensburg				
Radium-228	EPA 904.0	141.73 %REC 17.02RPD ± NA (NA) C:NA T:NA	pCi/L	10/25/23 14:3	6 15262-20-1	



QUALITY CONTROL - RADIOCHEMISTRY

Project:	60709371 PRPA CCR				
Pace Project No.:	60439539				
QC Batch:	622866	Analysis Method:	EPA 904.0		
QC Batch Method:	EPA 904.0	Analysis Description:	904.0 Radium 22	28	
		Laboratory:	Pace Analytical S	Services - Greensbur	g
Associated Lab Sa	mples: 6043953900	01, 60439539002, 60439539003, 60439539004	4, 60439539005, 6	0439539006	
METHOD BLANK:	3036041	Matrix: Water			
Associated Lab Sa	mples: 6043953900	01, 60439539002, 60439539003, 60439539004	4, 60439539005, 6	0439539006	
Para	meter	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.



QUALITY CONTROL - RADIOCHEMISTRY

Project:	60709371 PRPA 0	CR				
Pace Project No.:	60439539					
QC Batch:	622864		Analysis Method:	EPA 903.1		
QC Batch Method:	EPA 903.1		Analysis Description:	903.1 Radium-22	26	
			Laboratory:	Pace Analytical S	Services - Greensbur	g
Associated Lab Sa	mples: 60439539	001, 604395390	02, 60439539003, 6043953900	4, 60439539005, 6	0439539006	
METHOD BLANK:	3036039		Matrix: Water			
Associated Lab Sa	mples: 60439539	001, 604395390	02, 60439539003, 6043953900	4, 60439539005, 6	0439539006	
Para	meter	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.



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.



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		

Pace Analytical	
k J	

CHAIN-OF-CUSTODY / Analytical Request Document

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 involces not paid within 30 days.

Page 15 of 20

Samplos Intact (VIV)

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DATE Signed (MM/DD/YY):

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SAMPLER NAME AND SIGNATURE PRINT Name of SAMPLER: SIGNATURE of SAMPLER:

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CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed ac WO#: 30630903



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Address:	6200 South Quebec St	Copy To: Bria	an R	Brian Rothmeyer		-		Con	Company Name:	ame:	AECOM	MO				2	REGULATORY AGENCY	ORY A	GENC	≻				
	Greenwood Village, CO 80111							Address;	ess;	Sa	me as	Same as Section A	N A			ł	NPDES	L 0	GROL	GROUND WATER			DRINKING WATER	
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Phone:	(303) 740-2614 Fax	Project Name:	601	709371 P	60709371 PRPA CCR			Pace	Pace Project Manager		ather	Heather Wilson				100	Site Location	ion						
Requeste	Requested Due Date/TAT: Standard	Project Number:	60	60709371				Pace	Pace Profile #:		11033, 3	_		-		Τ	STATE:	μ	8					
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	Section D Valid Matrix Codes Required Client Information <u>MATRIX</u> COL	<u> </u>			COLL	COLLECTED		<u>.</u>		Pre	Preservatives	tives		Z. 1 N /A	<u>N</u> N									
	DRINKCING WATER DW WATER WT WATER WW PRODUCT P SOLUSOLID SL SOLLSOLID SL	ee valid codes	CCCB C≕CC		COMPOSITE START	COMPOSITE END/GRAB		S OfTECTION						†						(N/A) (<u> </u>		
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2	RAN-09-CCR	M		preserve a	second contracts	10/0123	1040	9		×				×	XX					2				
3	A34-03-CCR	MT	10			10/10/23	1410	2		X				X	XX.					2				
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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

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	er: 00439539	Workorder Name:		60709371 PRPA CCR	cر ا		м О	Owner Received Date:	eived	Date		10/11/2023		esults	Results Requested By:	ited By:	11/1/2023	23
			Subcontract To	<u> t То</u>							the second second	Reque	Requested Analysis	alysis				
Hec 960 Len Phc	Heather Wilson Pace Analytical Kansas 9608 Loiret Blvd. Lenexa, KS 66219 Phone 1(913)563-1407		Pace / 1638 F Suites Greens Phone	Pace Analytical Pittsburgh 1638 Roseytown Road Suites 2,3, & 4 Greensburg, PA 15601 Phone (724)850-5600	ourgh ad D1				muibeA m					Alexice a lexication are successible and examine a succession of the succession of		******		
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ltem	Sample ID	Sample Type	Collect Date/Time	Lab (D	Matrix	Other			l	****	<u>,</u>						LAB USE ONLY	NLY
~	ASH-D8-CCR	PS	10/10/2023 10:55	60439539001	Water	-			$ \times$	×	×							
2	ASH-09-CCR	РЅ	10/10/2023 12:40	60439539002	Water	-			×	×	×			<u> </u>	_			
e	ASH-03-CCR	PS	10/10/2023 14:10	60439539003	Water	~			×	×	×		-					
4	DUP-01-CCR	PS	10/10/2023 00:00	60439539004	Water	-			×	×	×		-					
വ	ASH-09-CCR MS	PS	10/10/2023 12:40	60439539005	Water	ب				×	×							
ۍ ا	ASH-D9-CCR MSD	PS	10/10/2023 12:40	60439539006	Water	-				×	×							
					and the second	an the second								Com	Comments			
Trar	Transfers Released By		Date/Time	Received By	y			Date/Time	ime	IR3()- Radi	um QC	Sheets	IR30- Radium QC Sheets Required	ed			
-										1								
2										r								
e										T								
š	Cooler Temperature on Receipt		°C Cust	Custody Seal Y	or N		Re	Received on Ice	on Ice	×	N S			San	Samples Intact	tact Y	or	
L 	***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.	dentiality, ered corr	, location/name nplete as is sinc	of the samplir e this informa	ng site, se Ition is av	ampler ailable	's name in the c	e and sig owner la	natur. boratc	e may ry.	not b	e provi	ded or.	this C	DC doci	iment.]
									1493			30	53		73			
										3	Ę	3	2			11 /06/23	테르관	

FMT-ALL-C-002rev.00 24March2009

PM: MAR Due Date: 11/06/23 CLIENT: PACE_60_LEKS

Page 1 of 1

Wednesday, October 11, 2023 3:58:13 PM bage 12 ot 50

	DC#_Title: ENV-FRM- Pittsburgh	GBU	२-००१	38 v0	6_Samp	sugar en proche		
Pace	Effective Date: 09/20/2023						:3063	방법 방법을 통하는 것이 같이 많이
ANALYTICAL SERVICES						PM: MAR		e Date: 11/06/23
Client Name:	AECOM					CLIENT:	PACE_60_LI	ΞKS
Courier: Fed	Ex [] UPS [] USPS [] Client er: <u>6432 1392 995</u>	JCom	merci	al 🗆 F	Pace □ Otł	ner		Initial / Date
Tracking Number	er: 6432 1342 495	<u> </u>					Examined E	by: VA 10-15-23
					Intact: lue (None)		o Labeled By: Temped By:	LA 10-16-23
Cooler Tempera	ture: Observed Temp	,	۰C	Corre	ection Facto	or:	∘C Final T	emp:oC
Temp should be abo	ve freezing to 6°C							
					pHpape		D.P.D. Resid	lual Chlorine Lot #
Comments:		Yes	No	NA	PILY	-6		
Chain of Custod	· · · · · · · · · · · · · · · · · · ·	X			1.			
Chain of Custody		X	<u> </u>		2.	. <u> </u>		
	corrections present on COC				Porte cu	llection O	ucreation	
Chain of Custody					3.			
	Signature on COC:	X			4.			
Sample Labels m		LX_			5.			
-Includes da		a						
Matrix:	W	T						
	within Hold Time:	X			6.			
	Analysis (<72hr		X		7.			
remaining):	·	ļ		<u> </u>			······································	
	nd Time Requested:		LX_	<u> </u>	8.			
Sufficient Volum		X			9.			
Correct Containe		X			10.			
-Pace Contai				ļ				
Containers Intac		$ - \Delta $			11.			
Orthophosphate				Ι-Ă-	12.			
	samples field filtered: checked for dechlorination			X	13.			
				L C	14:			
	received for dissolved tests:	X			15:			
	ecked for preservation: VOA, coliform, TOC, O&G,			<u>i</u>	16.	<u>ົ</u>		
Phenolics, Ra	adon, non-aqueous matrix				pHC	land		
All containers m	eet method preservation	X			Initial when	1Λ	Date/Time of	
requirement	•				completed Lot# of adde		Preservation	
					Preservative			
3260C/D: Heads	pace in VOA Vials (> 6mm)			X	17.			
524.1: Headspac	e in VOA Vials (0mm)			X	18.			
Frip Blank Presen	t:			X	Trip b	lank custod	ly seal present?	YES or NO
Rad Samples Scr	eened <.05 mrem/hr.	ノ		<u> </u>	Initial when , completed	79 De	10/11/27	Survey Meter SN: 1563
Comments:	<u></u>	<u> </u>	I		- osnipioteu		· paper J	
, , , , , , , , , , , , , , , , ,								

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.

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Ra-226_75834_35_WC.xls Ra-226_75834_35_WC.xls

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PACE Analytical Services Ra-226 Analysis

Quality Control Sample Performance Assessment

Pace Analytical		-	Analyst Must Manually Enter All Fields Highlighted in Yellow.	ellow.	
Analyst				MS/MSD 1	MS/MSD 2
Date:	10		imple Collection Date:	10/10/2023	
Batch ID: Matrix	75834 DW			60439539003	-
				60439539006	
Method Blank Assessment			pike I.D.:	21-031	
MB Sample ID	3036039		MS/MSD Decay Corrected Spike Concentration (pCi/mL):	39.867	
M/B Counting Lineartainty			Spike Volume Used in MS (mL);	0.20	
MB MDC:	0.466			0.20	
MB Numerical Performance Indicator	0.71		MS Target Conc.(pCi/L, g, F):	9.943	
MB Status vs Numerical Indicator.	N/A		MSD Aliauot (L. a. F):	0.802	
MB Status vs. MDC	Pass		MSD Target Conc. (pCi/L, g, F):	9.943	
			MS Spike Uncertainty (calculated):	0.467	
Laboratory Control Sample Assessment	LCSD (Y or N)?	z	MSD Spike Uncertainty (calculated):	0.467	
	LCS75834	LCSD75834	Sample Result	0.220	
Spike I.D.:	21-031		Sample Result Counting Uncertainty (pui/L, g, r):	11.219	
Spike Concentration (pCi/mL):			Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.404	
Volume Used (mL):			Sample Matrix Spike Duplicate Result:	11.486	
Target Conc. (pCi/L, g, F):	4.882		Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): MS Numerical Performance Indicator	1.450	
Uncertainty (Calculated):			MSD Numerical Performance Indicator:	1.644	
Result (pCi/L, g, F):			MS Percent Recovery:	110.63%	
Numerical Deformance Indicator			MSD Percent Recovery:	113.32%	
Percent Recovery:	121.15%		MSD Status vs Numerical Indicator:	NA	
Status vs Numerical Indicator:			MS Status vs Recovery:	Pass	
Status vs Recovery:			MSD Status vs Recovery:	Pass	
Upper % Recovery Limits:	133%		MS/MSD Upper % Recovery Limits:	136%	
				11/0	
Duplicate Sample Assessment			Matrix Spike/Matrix Spike Duplicate Sample Assessment		
Sample I.D.: Duplicate Sample I.D.		Enter Duplicate	Sample I.D. 60	60439539003	
Sample Result (pCi/L, g, F):		other than		60439539006	
Sample Result Counting Uncertainty (pCi/L, g, F):		LCS/LCSD in	Sample Matrix Spike Result:	11.219	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):		the space below.	Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.404	
Are sample and/or duplicate results below RL?	See Below ##		Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.450	
Duplicate Numerical Performance Indicator:			Duplicate Numerical Performance Indicator:	-0.260	
Duplicate RPD:			(Based on the Percent Recoveries) MS/ MSD Duplicate RPD:	2.40%	
Duplicate Status vs Numerical Indicator			MS/ MSD Duplicate Status vs Numerical Indicator:	N/A	
% RPD Limit			MS/ MS/ Duplicate status vs RFD; % RPD Limit:	32%	
## Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the RL	sample or duplicate	 results are below 			
Comments:					

CLM 11/6/23 F10673

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PACE Analytical Services Ra-228 Analysis

MS/MSD 2 60439539002 60439539005 60439539006 60439539005 60439539006 60439539002 2.784 119.50% 141.73% Pass Naming 12.424 2.410 14.614 2.829 -1.154 17.02% 10/10/2023 0.802 9.848 9.848 9.848 9.848 0.483 0.483 0.483 0.656 0.656 0.656 0.656 1.2424 12.424 12.424 12.424 12.424 1.515 1.515 MSD High* **MS/MSD** 23-043 135% 60% 39.487 Pass 0.20 0.20 Analyst Must Manually Enter All Fields Highlighted in Yellow. Sample I.D. Sample MSD I.D. Sample MSD I.D. 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): (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: Sample I.D. Sample MS I.D. Sample Matrix Spike Result: MS/MSD Upper % Recovery Limits: Sample MSD I.D. Duplicate Numerical Performance Indicator MS/MSD Decay Corrected Spike Concentration (pCl/mL): Spike Volume Used in MS (mL): Spike Volume Used in MSD (mL): MS Aliquot (L, g, F): MS Target Conc.(pCi/L, g, F): MSD Aliquot (L, g, F): Sample Result 2 Sigma CSU (pCi/L, g, F): 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): MSD Numerical Performance Indicator MS Percent Recovery MSD Percent Recovery MS Status vs Numerical Indicator: MSD Status vs Numerical Indicator: MS Status vs Recovery MSD Status vs Recovery: MS/MSD Lower % Recovery Limits MSD Target Conc. (pCi/L, g, F) MS Spike Uncertainty (calculated) MSD Spike Uncertainty (calculated) Sample Result MS Numerical Performance Indicator Sample Collection Date Spike I.D. Matrix Spike/Matrix Spike Duplicate Sample Assessment Quality Control Sample Performance Assessment Sample Matrix Spike Control Assessment Enter Duplicate sample IDs if other than LCS/LCSD in the space below LCSD75835 See Below # ZPC 10/19/2023 LCS75835 1.45 118.77% 0.328 0.652 2.34 Warning Pass (V or N) Ra-228 23-043 39.291 75835 WT 0.10 0.817 4.811 0.236 5.715 1.201 Pass 135% 60% 3036041 0.391 ٩N Sample Result (pCi/L, g, F): Sample Result 2 Sigma CSU (pCi/L, g, F): Sample Dupicate Result (pCi/L, g, F): Sample Dupicate Result 2 Sigma CSU (pCi/L, g, F): Are sample and/or duplicate results below RL? Analyst Aliquot Volume (L, g, F): Target Conc. (pCi/L, g, F): LCS/LCSD 2 Sigma CSU (pCi/L, g, F): Status vs Recovery: Upper % Recovery Limits: Lower % Recovery Limits: Sample I.D.: Duplicate Sample I.D. Duplicate RPD: Test: Date: Worklist: Matrix: MB Numerical Performance Indicator: Uncertainty (Calculated): Numerical Performance Indicator: Percent Recovery: Duplicate Numerical Performance Indicator: MB Sample ID M/B 2 Sigma CSU: MB MDC: MB Status vs Numerical Indicator: MB Status vs. MDC: Decay Corrected Spike Concentration (pCi/mL): Volume Used (mL): Status vs Numerical Indicator: MB concentration: Count Date: Spike I.D.: Laboratory Control Sample Assessmen **Duplicate Sample Assessment** Pace Analytical" Method Blank Assessment

RPD accel

Pass Pass 36%

MS/ MSD Duplicate Status vs Numerical Indicator.

MS/ MSD Duplicate Status vs RPD:

% RPD Limit:

10/26/23

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

Comments:

Duplicate Status vs Numerical Indicator:

Duplicate Status vs RPD: % RPD Limit:

Ra-228 NELAC DW2 Printed: 10/26/2023 9:54 AM

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1 of 1



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,

Atarton 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





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



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



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



ANALYTICAL RESULTS

Project: 60709371 PRPA CCR

Pace Project No.: 60439820

Sample: ASH-01-CCR	Lab ID: 6043	9820001	Collected: 10/11/2	3 10:45	6 Received: 10	0/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP	Analytical Meth	od: EPA 60	010 Preparation Meth	nod: EP	A 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 Meth	od: EPA 60	20 Preparation Meth	nod: EP	A 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 Meth	od: EPA 74	70 Preparation Meth	nod: EP	A 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 Meth	od: SM 254	40C					
	Pace Analytical	Services -	Kansas City					
Total Dissolved Solids	3400	mg/L	66.7	1		10/18/23 15:53		
9056 IC Anions	Analytical Meth Pace Analytical							
	2		•					
Chloride	18.7	mg/L	1.0	1		10/18/23 16:18		
Fluoride	ND	mg/L	0.20	1		10/18/23 16:18		
Sulfate	1880	mg/L	400	400		10/18/23 16:31	14808-79-8	



ANALYTICAL RESULTS

Project: 60709371 PRPA CCR

Pace Project No.: 60439820

Sample: ASH-06-CCR	Lab ID: 6043	39820002	Collected: 10/11/2	3 11:50	Received: 10	0/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Meth	od: EPA 60	10 Preparation Meth	nod: EP	A 3010			
	Pace Analytica	I 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	
_ithium	53.5	ug/L	10.0	1	10/19/23 14:04	10/25/23 13:14	7439-93-2	
6020 MET ICPMS	Analytical Meth	od: EPA 60	20 Preparation Meth	nod: EP	A 3010			
	Pace Analytica	I 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	
ead	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	
Fhallium	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:19	7440-28-0	
470 Mercury	Analytical Meth	od: EPA 74	70 Preparation Meth	nod: EP	A 7470			
-	Pace Analytica	I 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 Meth	od: SM 254	40C					
	Pace Analytica	I Services -	Kansas City					
Total Dissolved Solids	417	mg/L	10.0	1		10/18/23 15:53		
0056 IC Anions	Analytical Meth	od: EPA 90	56					
	Pace Analytica	I 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	



Project: 60709371 PRPA CCR

Pace Project No.: 60439820

Sample: ERB-01-CCR	Lab ID: 6043	9820003	Collected: 10/11/2	3 12:00	Received: 10	/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP			010 Preparation Meth	od: EP	A 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 Meth	od: EPA 60	20 Preparation Meth	nod: EP	A 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	
_ead	ND	ug/L	1.0	1	10/19/23 14:04	11/01/23 10:30	7439-92-1	
Volybdenum	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 Meth	od: EPA 74	70 Preparation Meth	nod: EP	A 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 Meth	od: SM 254	40C					
	Pace Analytical	Services -	Kansas City					
Total Dissolved Solids	7.0	mg/L	5.0	1		10/18/23 15:53		
9056 IC Anions	Analytical Meth	od: EPA 90	056					
	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				
Sulfate	ND	mg/L	1.0	1		10/18/23 17:11	14808-79-8	



Project: 60709371 PRPA CCR

Pace Project No.: 60439820

Sample: ASH-05-CCR	Lab ID: 6043	9820004	Collected: 10/11/2	3 13:35	6 Received: 10	0/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Meth	od: EPA 60	010 Preparation Meth	nod: EP	A 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 Meth	od: EPA 60	20 Preparation Meth	nod: EP	A 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	
_ead	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 Meth	od: EPA 74	70 Preparation Meth	nod: EP	A 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 Meth	od: SM 254	40C					
	Pace Analytical							
Total Dissolved Solids	4760	mg/L	100	1		10/18/23 15:53		
9056 IC Anions	Analytical Meth Pace Analytical							
	2		•					
Chloride	226	mg/L	100	100		10/18/23 17:38		
Fluoride	0.36	mg/L	0.20	1		10/18/23 17:25		
Sulfate	2390	mg/L	400	400		10/18/23 17:51	14808-79-8	



Project: 60709371 PRPA CCR

Pace Project No.: 60439820

Sample: ASH-04-CCR	Lab ID: 6043	39820005	Collected: 10/11/2	3 14:30) Received: 10)/12/23 08:40 N	Aatrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Meth	od: EPA 60	010 Preparation Met	nod: EP	A 3010			
	Pace Analytica	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 Meth	od: EPA 60	20 Preparation Met	nod: EP	A 3010			
	Pace Analytica	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	
_ead	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 Meth	od: EPA 74	70 Preparation Met	nod: EP	PA 7470			
-	Pace Analytica	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 Meth	od: SM 254	40C					
	Pace Analytica	Services -	Kansas City					
Total Dissolved Solids	6060	mg/L	125	1		10/18/23 15:53		
9056 IC Anions	Analytical Meth	od: EPA 90	056					
	Pace Analytica	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		



Project:	60709371 PRPA	CCR										
Pace Project No .:	60439820											
QC Batch:	870263		Analy	sis Metho	d:	EPA 7470						
QC Batch Method:	EPA 7470		Analy	sis Descri	ption:	7470 Mercu	ry					
			Labo	ratory:		Pace Analyt	ical Servic	es - Kansa	s City			
Associated Lab Sam	nples: 60439820	0001, 6043982000	02, 6043982	0003, 604	39820004,	6043982000)5					
METHOD BLANK:	3446202			Matrix: W	ater							
Associated Lab Sam	nples: 60439820	0001, 6043982000	2, 6043982	0003, 604	39820004,	6043982000	05					
			Blar	nk	Reporting							
Param	neter	Units	Res	ult	Limit	Analy	zed	Qualifier	S			
Mercury		ug/L		ND	0.2	0 10/25/23	3 12:38					
LABORATORY CON	ITROL SAMPLE:	3446203										
			Spike	LC	S	LCS	% R	ec				
Param	neter	Units	Conc.	Res	sult	% Rec	Limi	ts	Qualifiers			
Mercury		ug/L		5	4.9	98	3 8	30-120				
MATRIX SPIKE & M		PLICATE: 3446	204		3446205							
		LICATE. 5440	MS	MSD	3440200)						
		60439823002	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units		Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	Qual
			5					88			20	

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	60709371 PRPA	CCR										
Pace Project No.:	60439820											
QC Batch:	869917		Analy	sis Method	d: E	PA 6010						
QC Batch Method:	EPA 3010		Analy	sis Descri	otion: 6	010 MET						
			Labo	ratory:	Р	ace Analyt	ical Service	es - Kansas	s City			
Associated Lab Sa	mples: 60439820	001, 6043982000	2, 6043982	0003, 6043	39820004, 6	04398200)5		-			
METHOD BLANK:	3444755			Matrix: W	ater							
Associated Lab Sa		001, 6043982000	2. 6043982	0003.604	39820004.6	04398200)5					
			Blar		Reporting							
Para	meter	Units	Res		Limit	Analy	zed	Qualifiers	5			
Boron		ug/L		ND	100	10/25/23	3 12:48					
Calcium		ug/L		ND	200	10/25/23	3 12:48					
Lithium		ug/L		ND	10.0	10/25/23	3 12:48					
LABORATORY CO	NTROL SAMPLE:	3444756										
			Spike	LC	S	LCS	% Re	ec				
Para	meter	Units	Conc.	Res	ult	% Rec	Limit	is (Qualifiers			
Boron		ug/L			4040	10		0-120				
		g,	100	0	1010	10	8 8	0-120				
Calcium		ug/L	1000	-	1010 10800	10		0-120 0-120				
Calcium Lithium		0		0		-	8 8					
Lithium		ug/L ug/L	1000 100	0	10800 990	108	8 8	0-120				
	MATRIX SPIKE DUI	ug/L ug/L	1000 100 757	0 0	10800	108	8 8	0-120				
Lithium	MATRIX SPIKE DUI	ug/L ug/L PLICATE: 3444	1000 100 757 MS	0 0 MSD	10800 990 3444758	108	3 8	0-120 0-120	% Poc		Mor	
Lithium		ug/L ug/L PLICATE: 3444 60439767002	1000 100 757	0 0	10800 990	108	8 8	0-120	% Rec Limits	RPD	Max RPD	Qual
Lithium MATRIX SPIKE & M Paramete	er Units	ug/L ug/L PLICATE: 3444 60439767002 5 Result	1000 100 757 MS Spike Conc.	0 0 MSD Spike Conc.	10800 990 3444758 MS Result	108 99 MSD Result	3 8 9 8 MS % Rec	0-120 0-120 MSD % Rec	Limits		RPD	Qual
Lithium MATRIX SPIKE & M		ug/L ug/L PLICATE: 3444 60439767002 60439767002 659	1000 100 757 MS Spike	0 0 MSD Spike	10800 990 3444758 MS	108 99	3 8 9 8 MS	0-120 0-120 MSD		RPD 0 0	RPD 20	Qual

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Project:	60709371 PRPA C	CR						
Pace Project No.:	60439820							
QC Batch:	869915		Analysis Meth	iod: EF	PA 6020			
QC Batch Method:	EPA 3010		Analysis Desc	cription: 60	20 MET			
			Laboratory:	Pa	ce Analytical Servi	ces - Kansas City		
Associated Lab Samples: 60439820001, 60439820002, 60439820003, 60439820004, 60439820005								
METHOD BLANK:	3444741		Matrix:	Water				
Associated Lab Sar	mples: 604398200	001, 604398200	02, 60439820003, 60	439820004, 60	439820005			
			Blank	Reporting				
Para	meter	Units	Result	Limit	Analyzed	Qualifiers		
Antimony		ug/L		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

		Spike	LCS	LCS	% Rec	0 11
Parameter	Units	Conc.	Result	% 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 S	MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3444743											
			MS	MSD								
	6	0439767002	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	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	

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Project: 60709371 PRPA CCR

Pace Project No.: 60439820

MATRIX SPIKE & MATRIX	SPIKE DUPLIC	ATE: 3444	743		3444744							
	6	0439767002	MS Spike	MSD Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	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	

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Project:	60709371 PRPA (CCR						
Pace Project No.:	60439820							
QC Batch:	869526		Analysis Me	ethod:	SM 2540C			
QC Batch Method:	SM 2540C		Analysis De	escription:	2540C Total Di	ssolved Solids		
			Laboratory:		Pace Analytica	I Services - Ka	nsas C	ity
Associated Lab Sar	mples: 60439820	0001, 6043982000	2, 60439820003,	60439820004	1, 60439820005			
METHOD BLANK:	3443296		Matrix	: Water				
Associated Lab Sar	mples: 60439820	0001, 6043982000	2, 60439820003,	60439820004	4, 60439820005			
			Blank	Reporting	I			
Parar	neter	Units	Result	Limit	Analyze	d Quali	ifiers	_
Total Dissolved Soli	ds	mg/L	ND) :	5.0 10/18/23 1	5:51		
LABORATORY CO	NTROL SAMPLE:	3443297						
_			Spike	LCS	LCS	% Rec	-	
Parar		Units	Conc	Result	% Rec	Limits	Qua	alifiers
Total Dissolved Soli	ds	mg/L	1000	990	99	80-120		
SAMPLE DUPLICA	TE: 3443298							
Demo		11.5%	60439528002	Dup		Max		O sell'fin an
Parar		Units	Result	Result	RPD	RPD		Qualifiers
Total Dissolved Soli	ds	mg/L	2010	19	960	3	10	
SAMPLE DUPLICA	TE: 3443299							
5		11-26	60439847001	Dup	000	Max		Qualifiant
Parar		Units	Result	Result	RPD	RPD		Qualifiers
Total Dissolved Soli	ds	mg/L	1930	19	900	1	10	

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00 D / J			. .			DA 0070						
QC Batch: 86955				/sis Method		EPA 9056						
QC Batch Method: EPA 9	9056			/sis Descrip		056 IC Anio			0.1			
Accepted Lab Samplas	604208200	01, 6043982000		ratory:		Pace Analyti		es - Kansa	as City			
Associated Lab Samples:	004396200	01,0043962000	2,0043962	.0003, 004	59620004, 0	0043962000	5					
METHOD BLANK: 344340)2			Matrix: Wa	ater							
Associated Lab Samples:	604398200	01, 6043982000	-		39820004, 6	6043982000)5					
D (Blar		Reporting			0 ""				
Parameter		Units	Res		Limit	Analy		Qualifie	rs			
Chloride		mg/L		ND	1.0							
Fluoride		mg/L		ND	0.20							
Sulfate		mg/L		ND	1.() 10/18/23	3 11:09					
METHOD BLANK: 344475	53			Matrix: Wa	ater							
Associated Lab Samples:	604398200	01, 6043982000	2, 6043982	20003, 6043	39820004, 6	6043982000)5					
			Blar		Reporting							
Parameter		Units	Res	ult	Limit	Analy	zed	Qualifie	rs			
Chloride		mg/L		ND	1.0							
Fluoride		mg/L		ND	0.20							
Sulfate		mg/L		ND	1.() 10/19/23	8 09:15					
LABORATORY CONTROL S	SAMPLE:	3443403										
			Calles		~	LCS						
			Spike	LC	S		% Re	ec				
Parameter		Units	Conc.	LC Res		% Rec	% Re Limit		Qualifiers	_		
		Units mg/L	Conc.				Limit		Qualifiers	_		
			Conc.		ult	% Rec	Limit B 8	ts	Qualifiers	_		
Chloride Fluoride		mg/L	Conc.		ult 4.9	% Rec 98	Limit 8 8 8 8	ts 30-120	Qualifiers	_		
Chloride Fluoride Sulfate	SAMPLE:	mg/L mg/L	Conc.	Res 5 .5	ult 4.9 2.5	% Rec 98 98	Limit 8 8 8 8	ts 30-120 80-120	Qualifiers	_		
Chloride Fluoride Sulfate	SAMPLE:	mg/L mg/L mg/L	Conc.	Res 5 .5	4.9 2.5 5.0	% Rec 98 98	Limit 8 8 8 8	ts 30-120 30-120 30-120	Qualifiers	_		
Chloride Fluoride Sulfate	SAMPLE:	mg/L mg/L mg/L	2.	Res 5 5 5	ult 4.9 2.5 5.0 S	% Rec 98 98 100	Limii 8 8 8 8 9 8	ts	Qualifiers	_		
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter	SAMPLE:	mg/L mg/L mg/L 3444754 Units	Conc. 2. Spike Conc.		ult 4.9 2.5 5.0 S	% Rec 98 98 100	Limit E 8 E 8 E 8 E 8 E 8 E 8 E 8 E 8 E 8 E 8	ts		_		
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride	SAMPLE:	mg/L mg/L mg/L 3444754	Conc. 2. Spike Conc.		ult	% Rec 98 98 100 LCS % Rec	Limit Limit 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	ts 30-120 30-120 30-120 30-120 ec ts		_		
Chloride Fluoride Sulfate LABORATORY CONTROL S	SAMPLE:	mg/L mg/L mg/L 3444754 Units mg/L	Spike Conc.		ult 4.9 2.5 5.0 S ult 4.9	% Rec 98 98 100 LCS % Rec 97	Limit E	ts		_		
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride Sulfate		mg/L mg/L 3444754 Units mg/L mg/L mg/L	Spike Conc.	Res 5 5 5 5 5 LC Res 5 5 5	ult 4.9 2.5 5.0 S ult 4.9 2.5 5.1	% Rec 98 98 100 LCS % Rec 97 102	Limit E	ts		_		
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride		mg/L mg/L 3444754 Units mg/L mg/L mg/L	Spike Conc.	Res 5 5 5 5 5 LC Res 5 5 5	ult 4.9 2.5 5.0 S ult 4.9 2.5	% Rec 98 98 100 LCS % Rec 97 102	Limit E	ts		_		
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride Sulfate		mg/L mg/L 3444754 Units mg/L mg/L mg/L	Conc. 2. Spike Conc. 2. 404	Res 5 5 5 5 5 5 5 5 5	ult 4.9 2.5 5.0 S ult 4.9 2.5 5.1	% Rec 98 98 100 LCS % Rec 97 102	Limit E	ts		_	Мах	
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride Sulfate		mg/L mg/L 3444754 Units mg/L mg/L mg/L mg/L	Conc. 2. Spike Conc. 2. 404 MS	Res 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ult 4.9 2.5 5.0 S ult 4.9 2.5 5.1 3443405	% Rec 98 98 100 LCS % Rec 97 102 102	Limit Limit 8 8 8 8 8 8 9 8 9 8 2 8 2 8 2 8 2 8	ts	Qualifiers	RPD	Max RPD	Qual
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride Sulfate MATRIX SPIKE & MATRIX S Parameter	SPIKE DUPI	mg/L mg/L 3444754 Units mg/L mg/L mg/L LICATE: 34434 60439823002	Conc. 2. Spike Conc. 2. 404 MS Spike	Res 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ult 4.9 2.5 5.0 S ult 4.9 2.5 5.1 3443405 MS	% Rec 96 96 100 LCS % Rec 97 102 102 102	Limit Limit 8 8 8 8 9 8 9 8 2 8 2 8 2 8 2 8 2 8 2 8 2 8 2 8 3 3 4 5 4 5 5 8 5 8 8 5 8 8 8 8 8 8 8 8 8 8	ts	Qualifiers % Rec Limits		RPD	
Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride Sulfate MATRIX SPIKE & MATRIX S	SPIKE DUPI	mg/L mg/L mg/L 3444754 Units mg/L mg/L mg/L LICATE: 34434 60439823002 Result	Conc. 2. Spike Conc. 2. 404 MS Spike Conc.	Res 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ult 4.9 2.5 5.0 S ult 4.9 2.5 5.1 3443405 MS Result	% Rec 98 98 100 LCS % Rec 97 102 102 102 MSD Result	Limit B 8 B 8 B 8 B 8 B 8 C 8 C 10 C 10 C 10 C 10 C 10 C 10 C 10 C 10	ts 30-120 30-120 30-120 30-120 30-120 30-120 30-120 30-120 MSD % Rec	Qualifiers % Rec Limits 5 80-120		RPD 15	

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Project: 60709371 PRPA CCR

Pace Project No.: 60439820

SAMPLE DUPLICATE: 3443406						
		60439823002	Dup		Max	
Parameter	Units	Result	Result	RPD	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.



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.



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		

				WO#:6	60439820
	Pace	DC#_Title: ENV- (SCUR_ESI) Revision: 3	FRM-LENE-0010_Samp		
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Courier:	FedEx V UPS				Client C Other
	6432 130		Pace Shipping Label Used		
Packing Mate			lo □ Seals intact: Yes ⊾ e Bags □ Foam □		Other DCC
Thermomete	6-0		Type of Ice: (Ve) Blue		
Cooler Temp		As-read 1.4 Co	orr. Factor - 0-3 Correct		Date and initials of person 10/14/23 examining contents:
	nould be above free	and the second		<u> </u>	examining contents.
Chain of Cust			₩Yes □No □N/A		
	ody relinquished:	_	ÉrYes ⊡No □N/A		
Samples arriv	ed within holding	time:	I⊈Yes □No □N/A		
	ime analyses (<		□Yes 🖬 ON/A		
1	round Time requ		⊡Yes ≌Ko □N/A		
Sufficient volu	ime:		ØYes □No □N/A		
Correct conta	iners used:	1. S	K⊄Yes □No □N/A		
Pace containe	ers used:		⊠rYes ⊡No ⊡N/A		
Containers int	act:				
Unpreserved	5035A / TX1005/	1006 soils frozen in 48	hrs? 🛛 Yes 🖾 No 🖾 🕅 A		
Filtered volum	ne received for dis	ssolved tests?			
Sample labels	match COC: Da	te / time / ID / analyses	Yes No N/A		
Samples cont	ain multiple phase	es? Matrix: VT	□Yes 🖬 N/A		
		vation in compliance?		List sample IDs, volu date/time added.	umes, lot #'s of preservative and the
	HCl<2; NaOH>9 SL OA, Micro, O&G, KS	ulfide, NaOH>10 Cyanide S TPH, OK-DRO)	LOT#: 67187		
Cyanide wate	r sample checks:				
	strip turns dark? (Yes No		
Potassium iod	lide test strip turn	s blue/purple? (Presen	ve) 🛛 Yes 🗆 No		
Trip Blank pre	sent:	N	□Yes □No 🖼 (A		
Headspace in	VOA vials (>6m	m):	□Yes □No ₩N/A		
Samples from	USDA Regulated	d Area: State:			
Additional lab	els attached to 50	35A / TX1005 vials in	the field? □Yes □No		
Client Notific	ation/ Resolution	n: Cop	y COC to Client? Y / N	Field Data Requir	
Person Conta			Date/Time:	_	Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck
Comments/ R	esolution:				sample temps.
					Start: Start:
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CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

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Clien	Required Project Information:	Jeculo C Invoice Information:	Page:
	Report To: Vasanta Kalluri	Attention: Accounts Payable	
Address: 6200 South Quebec St	Copy To: Brian Rothmeyer	Company Name: AECOM RE	REGULATORY AGENCY
Greenwood Village, CO 80111		Same as Section A	NPDES [GROUND WATER] DRINKING WATER
Email To: brian.rothmeyer@aecom.com	Purchase Order No.: 1599462	Pace Quote 42700	UST F RCRA CTHER
Phone: (303) 740-2614 Fax:	Project Name: 60709371 PRPA CCR	Heather Wilson	
Requested Due Date/TAT: Shandurd	Project Number: 60709371	Pace Profile #: 11033, 3	STATE: CO
		Requested Ana	Requested Analysis Filtered (Y/N)
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Client: AECOM

Site GOTO9371 PRPA CCR

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40mL MeOH clear vial WG2U 2oz clear soli jar BP1S 1L H2SO4 plastic 40mL TSP amber vial JGFU 40z unpreserved amber vide BP1U 1L unpreserved plastic 40mL TSO4 amber vial AG0U 106NL unpreserved amber vide BP1Z 500mL NAOH plastic 40mL Na Thio amber vial AG1F 1L H2SO4 amber glass BP2C 500mL NAOH plastic 40mL KI clear vial AG1 1L H2SO4 amber glass BP2C 500mL NAOH plastic 40mL Mamber unpreserved AG1 1L H2SO4 amber glass BP2C 500mL NAOH plastic 40mL Martino: clear vial AG1 1L H2SO4 amber glass BP2C 500mL NAOH plastic 40mL Unpreserved AG1 11ter unpres BP2C 500mL NAOH plastic 40mL Unpreserved clear vial AG2N 500mL H2SO4 amber glass BP2U 500mL NAOH plastic 11ter H2SO4 amber glass BP2U 500mL NAOH plastic E30mL NAOH plastic E30mL NAOH plastic 11ter H2SO4 amber glass BP3U 250mL NAOH plastic E30mL NAOH plastic E30mL NAOH plastic 11ter Unpreserved clear vial AG2U 250mL unpreserved plastic E30mL NAOH plastic E30mL NAOH plastic 11ter H2SO4 amber glass BP3N 250mL NAOH plastic E30mL NAOH plastic E30mL NAOH plastic	DG9H	40mL HCI amber voa vial	WGFU	4oz clear soil jar	BP1N	11L HNO3 plastic	SP51	120mL Coliform Na Thiosulfate
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40mL amber unpreserved AG1S 1L H2SO4 amber glass BP2N 500mL HNO3 plastic 40mL HCl clear vial AG1T 1L Na Thiosulfate clear/amber glass BP2U 500mL H2SO4 plastic 40mL Na Thio. clear vial AG1U 1liter unpres amber glass BP2U 500mL unpreserved plastic 40mL unpreserved clear vial AG2N 500mL HNO3 amber glass BP2U 500mL unpreserved plastic 10fter H2SO4 clear vial AG2N 500mL HNO3 amber glass BP2U 500mL NaOH, Zh Acetate 10fter H2SO4 clear vial AG2N 500mL HNO3 amber glass BP3C 250mL NaOH, Zh Acetate 10fter Unpreserved clear vial AG2S 500mL HNO3 amber glass BP3C 250mL NaOH, Zh Acetate 10fter Unpreserved clear vial AG3S 250mL unpreserved plastic 250mL UnoC HNO3 plastic 250mL Unpres Clear glass BP3K 250mL Unpreserved plastic BP3K 250mL NAO3 plastic 10fter unpres glass AG3U 105mL unprese amber glass BP3K 250mL NAO3 plastic 250mL Unpres Clear glass BP3K 250mL NAO3 plastic 250mL NAO3 plastic 10fter unpres clear soli jar AG3U 125mL unpreserved plastic 250mL unpreserved p	0G9T	40mL Na Thio amber vial	AG1H	1L HCI amber glass	BP2C	500mL NAOH plastic	R	Terracore Kit
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250mL Unpres Clear glass AG3U 250mL unpres amber glass BP3U 250mL unpreserved plastic J 16oz clear soil jar AG4U 125mL unpres amber glass BP3S 250mL H2SO4 plastic AG5U 100mL unpres amber glass BP3Z 250mL unpreserved plastic BP4U 125mL unpreserved plastic BP4U 125mL HNO3 plastic BP4N 125mL HNO3 plastic BP4S 125mL HNO3 plastic BP4S 125mL HNO3 plastic BP4S 125mL HNO3 plastic BP4S 125mL HNO3 plastic	G3H	250mL HCL Clear glass	AG2U		BP3N	250mL HNO3 plastic	SL	Solid
J 16oz clear soil jar AG4U 125mL unpres amber glass BP3S 250mL H2SO4 plastic AG5U 100mL unpres amber glass BP3Z 250mL NaOH, Zh Acetate BP4U 125mL unpreserved plastic BP4N 125mL HNO3 plastic BP4S 125mL HNO3 plastic	iG3U	250mL Unpres Clear glass	AG3U		BP3U	250mL unpreserved plastic	NAL	Non-aqueous Liquid
100mL unpres amber glass BP3Z 250mL NaOH, Zn Acetate BP4U 125mL unpreserved plastic BP4N 125mL HNO3 plastic BP4S 125mL HNO3 plastic BP4S 125mL HNO3 plastic WPDU 16oz unpresserved plastic	VGDU	16oz clear soil jar	AG4U	125mL unpres amber glass	BP3S	250mL H2SO4 plastic	OL	OIL
125mL unpreserved plastic 125mL HNO3 plastic 125mL H2SO4 plastic 16oz unbresserved plastic			AG5U		BP3Z	250mL NaOH, Zn Acetate	WP	Wipe
					BP4U	125mL unpreserved plastic	DW	Drinking Water
					BP4N	125mL HNO3 plastic		
_					BP4S	125mL H2SO4 plastic		
				1	WPDU	16oz unpresserved plstic		

Carts also

Work Order Number:



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,

Atarton 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





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



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



SAMPLE ANALYTE COUNT

Project: 60709371 PRPA CCR

Pace Project No.:	60439823
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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



Project: 60709371 PRPA CCR

Pace Project No.: 60439823

Sample: ASH-08-CCR	Lab ID: 6043	9823001	Collected: 10/10/2	3 10:55	Received: 10	/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP	Analytical Metho	od: EPA 60	010 Preparation Meth	nod: EP	A 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 Metho	od: EPA 60	20 Preparation Meth	nod: EP	A 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	
_ead	ND	ug/L	2.0	2	10/19/23 14:04	10/26/23 13:22	7439-92-1	D3
Nolybdenum	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
470 Mercury	Analytical Metho	od: EPA 74	70 Preparation Meth	nod: EP	A 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 Metho	od: SM 254	40C					
	Pace Analytical	Services -	Kansas City					
Total Dissolved Solids	4400	mg/L	100	1		10/17/23 15:09		BH
9056 IC Anions	Analytical Metho	od: EPA 90	056					
	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		
Sulfate	2080	mg/L	400	400		10/18/23 19:38		



Project: 60709371 PRPA CCR

Pace Project No.: 60439823

Sample: ASH-09-CCR	Lab ID: 6043	39823002	Collected: 10/10/2	23 12:40	Received: 10	/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Meth	od: EPA 60	10 Preparation Met	hod: EP	A 3010			
	Pace Analytica	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 Meth	od: EPA 60	20 Preparation Met	hod: EP	A 3010			
	Pace Analytica	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 Meth	od: EPA 74	70 Preparation Met	hod: EP	A 7470			
	Pace Analytica	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 Meth	od: SM 254	40C					
	Pace Analytica	Services -	Kansas City					
Total Dissolved Solids	5440	mg/L	125	1		10/17/23 15:09		BH
9056 IC Anions	Analytical Meth	od: EPA 90	56					
	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		D6,M1 R1



Project: 60709371 PRPA CCR

Pace Project No.: 60439823

Sample: ASH-03-CCR	Lab ID: 6043	9823003	Collected: 10/10/2	23 14:10	Received: 10	0/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP	Analytical Meth	od: EPA 60	010 Preparation Meth	nod: EP	A 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 Meth	od: EPA 60	20 Preparation Meth	nod: EP	A 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 Meth	od: EPA 74	70 Preparation Meth	nod: EP	A 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 Meth	od: SM 254	40C					
	Pace Analytical							
Total Dissolved Solids	5320	mg/L	125	1		10/17/23 15:10		BH
9056 IC Anions	Analytical Meth	od: EPA 90)56					
	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		
Sulfate	3000	mg/L	400	400		10/18/23 22:32		



Project: 60709371 PRPA CCR

Pace Project No.: 60439823

Sample: DUP-01-CCR	Lab ID: 6043	9823004	Collected: 10/10/2	23 00:00	Received: 10)/12/23 08:40 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP	Analytical Meth	od: EPA 60	010 Preparation Metl	nod: EP	A 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 Meth	od: EPA 60	20 Preparation Met	nod: EP	A 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	
_ead	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	
Fhallium	ND	ug/L	2.0	2	10/19/23 14:04	10/27/23 12:07	7440-28-0	D3
470 Mercury	Analytical Meth	od: EPA 74	70 Preparation Met	nod: EP	A 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 Meth	od: SM 254	40C					
	Pace Analytical							
Total Dissolved Solids	5510	mg/L	100	1		10/17/23 15:10		BH
9056 IC Anions	Analytical Meth	od: EPA 90	056					
	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		
Sulfate	3690	mg/L	400	400		10/18/23 23:12		



Project:	60709371 PRPA	CCR										
Pace Project No.:	60439823											
QC Batch:	870263		Analy	/sis Metho	d: E	EPA 7470						
QC Batch Method:	EPA 7470		Analy	sis Descri	iption: 7	7470 Mercur	у					
			Labo	ratory:	F	Pace Analyti	cal Service	s - Kansa	s City			
Associated Lab Sar	mples: 60439823	3001, 6043982300	02, 6043982	3003, 604	39823004							
METHOD BLANK:	3446202			Matrix: W	/ater							
Associated Lab Sar	nples: 60439823	3001, 6043982300	02, 6043982	3003, 604	39823004							
			Blar	nk	Reporting							
Parar	neter	Units	Res	ult	Limit	Analy	zed	Qualifier	S			
Mercury		ug/L		ND	0.20	0 10/25/23	12:38					
LABORATORY CO	NTROL SAMPLE:	3446203										
			Spike	LC	S	LCS	% Re	ec				
Parar	neter	Units	Conc.	Re	sult	% Rec	Limit	s (Qualifiers			
Mercury		ug/L		5	4.9	98	8	0-120				
MATRIX SPIKE & N	ATRIX SPIKE DU	PLICATE: 3446	6204		3446205							
			MS	MSD								
		60439823002	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Paramete	r Unit	s Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	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.



Project:	60709371 PRPA C	CR										
Pace Project No.:	60439823											
QC Batch:	869918		Analy	sis Method	d:	EPA 6010						
QC Batch Method:	EPA 3010		Analy	sis Descrip	otion:	6010 MET						
			Laboi	atory:		Pace Analyt	ical Service	es - Kansa	s City			
Associated Lab Sat	mples: 604398230	001, 6043982300	2, 6043982	3003, 6043	39823004				-			
METHOD BLANK:	3444762			Matrix: Wa	ater							
Associated Lab Sar	mples: 604398230	01, 6043982300	2, 6043982	3003, 6043	39823004							
			Blan	k I	Reporting							
Para	meter	Units	Resu	ılt	Limit	Analy	/zed	Qualifier	S			
Boron		ug/L		ND	10	0 10/25/2	3 14:18					
Calcium		ug/L		ND	20	0 10/25/2	3 14:18					
Lithium		ug/L		ND	10.	0 10/25/23	3 14:18					
LABORATORY CO Para	NTROL SAMPLE:	3444763 Units	Spike Conc.	LC Res	-	LCS % Rec	% Re		Qualifiers			
Boron												
		ua/l	100	0	985	9	3 8	30-120				
Calcium		ug/L ug/L	100 1000		985 10700	98 10		80-120 80-120		_		
		0		0		-	7 8			_		
Calcium Lithium	MATRIX SPIKE DUPI	ug/L ug/L	1000 100	0 0	10700	10 9	7 8	80-120				
Calcium Lithium	MATRIX SPIKE DUPI	ug/L ug/L LICATE: 3444	1000 100 764 MS	MSD	10700 966 3444765	10 ⁻ 9 ⁻	7 E 7 E	30-120 30-120				
Calcium Lithium		ug/L ug/L	1000 100	0 0	10700 966	10 9	7 8	80-120	% Rec Limits	RPD	Max RPD	Qual
Calcium Lithium MATRIX SPIKE & M Paramete	er Units	ug/L ug/L LICATE: 3444 60439823002 Result	1000 100 764 MS Spike Conc.	0 0 MSD Spike Conc.	10700 966 3444765 MS Result	10 9 MSD Result	7 8 7 8 MS % Rec	MSD % Rec	Limits		RPD	Qual
Calcium Lithium MATRIX SPIKE & M		ug/L ug/L LICATE: 3444 [*] 60439823002	1000 100 764 MS Spike	0 0 MSD Spike	10700 966 3444765 MS	10 9 5 MSD	7 8 7 8 MS	80-120 80-120 MSD		RPD 1		

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.



Project:	60709371 PRPA 0	CR				
Pace Project No.:	60439823					
QC Batch:	869916		Analysis Meth	od: E	PA 6020	
QC Batch Method:	EPA 3010		Analysis Desc	ription: 60	020 MET	
			Laboratory:	Pa	ace Analytical Servi	ces - Kansas City
Associated Lab Sam	nples: 60439823	001, 6043982300	02, 60439823003, 60	439823004		
METHOD BLANK:	3444747		Matrix:	Water		
Associated Lab Sam	nples: 60439823	001, 6043982300	02, 60439823003, 60	439823004		
			Blank	Reporting		
Param	neter	Units	Result	Limit	Analyzed	Qualifiers
Antimony		ug/L		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

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% 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	
ead	ug/L	40	40.5	101	80-120	
lolybdenum	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 MSD MS 60439823002 Spike Spike MS MSD MS MSD % Rec Max Parameter Units Result Conc. Conc. Result Result % Rec % Rec Limits RPD RPD Qual ND 20 Antimony ug/L 40 40 36.0 35.8 90 89 75-125 1 ND 40 40 99 100 Arsenic ug/L 40.7 41.2 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

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REPORT OF LABORATORY ANALYSIS

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Project: 60709371 PRPA CCR

Pace Project No.: 60439823

MATRIX SPIKE & MATRIX	SPIKE DUPLIC	CATE: 3444	749		3444750							
Parameter	6 Units	0439823002 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.



Project: 60709371 PRPA C	CCR					
Pace Project No.: 60439823		Analysis Me	ethod:	SM 2540C		
QC Batch Method: SM 2540C		Analysis De			issolved Solids	
		Laboratory:			al Services - Ka	nsas Citv
Associated Lab Samples: 60439823	001, 60439823002	•				
METHOD BLANK: 3442741		Matrix	: Water			
Associated Lab Samples: 60439823	001, 60439823002	2, 60439823003,	60439823004			
		Blank	Reporting			
Parameter	Units	Result	Limit	Analyz	ed Qual	fiers
Total Dissolved Solids	mg/L	7.0	5.	0 10/17/23	15:03 1e,BH	
ABORATORY CONTROL SAMPLE:	3442742					
5		Spike	LCS	LCS	% Rec	0 ""
Parameter	Units	Conc	Result	% Rec	Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1000	100	80-120	1e,BH
SAMPLE DUPLICATE: 3442743						
		60439767002	Dup		Max	
Parameter	Units	Result	Result	RPD	RPD	Qualifiers
Total Dissolved Solids	mg/L	5640	548	0	3	10 1e,BH
SAMPLE DUPLICATE: 3442744						
		60439769004	Dup		Max	
Parameter	Units	Result	Result	RPD	RPD	Qualifiers
Total Dissolved Solids	mg/L	202	17	3	16	10 BH,D6
SAMPLE DUPLICATE: 3442745						
		60439823002	Dup		Max	
			Deevilt	RPD	RPD	Qualifiers
Parameter	Units	Result	Result	RPD	RPD	Quaimers

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REPORT OF LABORATORY ANALYSIS

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Project: Pace Project No.:	60709 60439	371 PRPA C 823	CR										
QC Batch:	8695			Analy	sis Methoo	1: E	EPA 9056						
QC Batch Method:	EPA				/sis Descrip		056 IC Anic	ons					
				-	ratory:		Pace Analyti	cal Service	es - Kansa	as City			
Associated Lab Sar	mples:	604398230	001, 6043982300		-		,,,,,,,, .			,			
METHOD BLANK:	34434	02			Matrix: Wa	ater							
Associated Lab Sa	mples:	604398230	01, 6043982300	2, 6043982	3003, 6043	39823004							
				Blar	nk F	Reporting							
Para	meter		Units	Res	ult	Limit	Analy	zed	Qualifie	rs			
Chloride			mg/L		ND	1.(0 10/18/23	3 11:09					
Fluoride			mg/L		ND	0.20	0 10/18/23	3 11:09					
Sulfate			mg/L		ND	1.(0 10/18/23	8 11:09					
METHOD BLANK:	34447	53			Matrix: Wa	ater							
Associated Lab Sa	mples:	604398230	01, 6043982300	2. 6043982	3003. 6043	39823004							
	•		,	Blar		Reporting							
Para	meter		Units	Res		Limit	Analy	zed	Qualifie	rs			
Chloride			mg/L		ND	1.(0 10/19/23	00.15					
Fluoride			mg/L		ND	0.20							
Sulfate			mg/L		ND	1.0							
			g										
LABORATORY CO	NTROL	SAMPLE:	3443403	0.11									
Para	meter		Units	Spike Conc.	LC Res		LCS % Rec	% Re Limi		Qualifiers			
	meter							- <u> </u>		Quaimers	_		
Chlorido			mg/L		5	4.9	98		30-120				
Chloride			- "				09						
Fluoride			mg/L	2.		2.5	98		30-120				
			mg/L mg/L		5	2.5 5.0	100		30-120 30-120				
Fluoride Sulfate	NTROL	SAMPLE:	-		5	5.0	100						
Fluoride Sulfate LABORATORY CO		SAMPLE:	mg/L 3444754	Spike	5 LC	5.0 S	100 LCS	9 E	80-120 ec				
Fluoride Sulfate LABORATORY CO	NTROL	SAMPLE:	mg/L		5	5.0 S	100	3 (1	80-120 ec	Qualifiers			
Fluoride Sulfate LABORATORY CO Para		SAMPLE:	mg/L 3444754	Spike Conc.	5 LC	5.0 S	100 LCS	% Re Limi	80-120 ec	Qualifiers			
Fluoride Sulfate LABORATORY CO Para		SAMPLE:	mg/L 3444754 Units	Spike Conc.	5 LC 	5.0 S ult	100 LCS % Rec	۵ کې ۲۰۰۰ ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰ ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ -	80-120 ec ts	Qualifiers			
Fluoride Sulfate LABORATORY CO Para Chloride Fluoride		SAMPLE:	mg/L 3444754 Units mg/L	Spike Conc.	5 LC 	5.0 S ult 4.9	100 LCS % Rec 97	9 8 % R(Limi 8	80-120 ec ts	Qualifiers	_		
Fluoride Sulfate LABORATORY CO Para Chloride Fluoride Sulfate	meter		mg/L 3444754 Units mg/L mg/L mg/L	Spike Conc. 2.	5 5 5 5	5.0 S ult 4.9 2.5	100 LCS % Rec 97 102 102	9 8 % R(Limi 8	80-120 ec ts	Qualifiers	_		
Fluoride Sulfate LABORATORY CO Para Chloride	meter		mg/L 3444754 Units mg/L mg/L mg/L	Spike Conc. 2.	5 5 5 5	5.0 S ult 4.9 2.5 5.1	100 LCS % Rec 97 102 102	9 8 % R(Limi 8	ec ts 30-120 30-120 30-120 30-120		_		
Fluoride Sulfate LABORATORY CO Para Chloride Fluoride Sulfate	meter		mg/L 3444754 Units mg/L mg/L mg/L	Spike Conc. 2. 404	5 LC Res 5 5 5	5.0 S ult 4.9 2.5 5.1	100 LCS % Rec 97 102 102	9 8 % R(Limi 8	80-120 ec ts	Qualifiers % Rec	_	Мах	
Fluoride Sulfate LABORATORY CO Para Chloride Fluoride Sulfate	MATRIX		mg/L 3444754 Units mg/L mg/L mg/L	Spike Conc. 2. 404 MS	5 LC 8es 5 5 5 5 5	5.0 S ult 2.5 5.1 3443405	100 LCS % Rec 97 102 102) % R(Limi - 2 2 5 5 6 5 6 6 7 7 8 7 8 8 8 8 8 8 8 8 8 8	ec ts 30-120 30-120 30-120 30-120			Max RPD	Qua
Fluoride Sulfate LABORATORY CO Para Chloride Fluoride Sulfate MATRIX SPIKE & M Paramete	MATRIX	SPIKE DUP	mg/L 3444754 Units mg/L mg/L mg/L LICATE: 3443 60439823002	Spike Conc. 2. 404 MS Spike Conc.	5 LC Res 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	5.0 S ult 4.9 2.5 5.1 3443405 MS	LCS % Rec 97 102 102 MSD Result	% Re Limi E E E E S MS	80-120 ec ts 30-120 30-120 30-120 MSD	% Rec Limits			
Fluoride Sulfate LABORATORY CO Para Chloride Fluoride Sulfate MATRIX SPIKE & M	MATRIX	SPIKE DUPI	mg/L 3444754 Units mg/L mg/L LICATE: 3443 60439823002 Result	Spike Conc. 2. 404 MS Spike	5 LC Res 5 5 5 5 5 5	5.0 S ult 4.9 2.5 5.1 3443405 MS Result	100 LCS % Rec 97 102 102	MS % Rec	80-120 ec ts 30-120 30-120 30-120 30-120 MSD % Rec	% Rec Limits 5 80-120		RPD	M1

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REPORT OF LABORATORY ANALYSIS

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Project: 60709371 PRPA CCR

Pace Project No.: 60439823

SAMPLE DUPLICATE: 3443406						
		60439823002	Dup		Max	
Parameter	Units	Result	Result	RPD	RPD	Qualifiers
Chloride	mg/L	278	236	17		15 D6
Fluoride	mg/L	ND	ND			15
Sulfate	mg/L	3640	4550	22		15 D6

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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.



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		

		WO# : 60	0439823
Pace DC#_Title: ENV-FRM-L (SCUR_ESI)	ENE-0010_San	60439823	
	ive Date: 01/12/202	22	
Client Name: AEcon			
,			Client Other
	e Shipping Label Used		r
Custody Seal on Cooler/Box Present: Yes V No			Other PCC
Packing Material: Bubble Wrap □ Bubble Bags □ Thermometer Used: 𝔅𝔅 𝔅𝔅	Be of Ice: We → Blue		Other Dr 21 CC
Cooler Temperature (°C): As-read [] Corr. Factor			Date and initials of person lo/14/23
Temperature should be above freezing to 6°C			examining contents: TA
Chain of Custody present:	ØYes □No □N/A		
Chain of Custody relinquished:			
Samples arrived within holding time:			
Short Hold Time analyses (<72hr): Rush Turn Around Time requested:			
Sufficient volume:		1	
Correct containers used:	I⊉Yes ⊡No □N/A		
Pace containers used:			
Containers intact:	ĔYes □No □N/A		
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?			
Filtered volume received for dissolved tests?			
Sample labels match COC: Date / time / ID / analyses			
Samples contain multiple phases? Matrix: V	□Yes ĦNo □N/A		- P
Containers requiring pH preservation in compliance?	Wes □No □N/A	List sample IDs, vol date/time added.	umes, lot #'s of preservative and the
(HNO ₃ , H ₂ SO ₄ , HCI<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	1816		
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	□Yes □No		
Potassium iodide test strip turns blue/purple? (Preserve)			
Trip Blank present:			
Headspace in VOA vials (>6mm):	Yes No M/A		
	,		
Additional labels attached to 5035A / TX1005 vials in the field? Client Notification/ Resolution: Copy COC to		Field Data Requir	red? Y / N
Person Contacted: Date/Ti	me:		Temp Log: Record start and finish times
Comments/ Resolution:			when unpacking cooler, if >20 min, recheck sample temps.
			Start: Start:
Draight Managan Daview			End: End:
Project Manager Review:	Date		Temp: Temp:

Qualtrax Document ID: 30473

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CHAIN-OF-CUSTODY / Analytical Request Document

CcR tS

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

Company: AFCOM	Req	Section B Required Project Information:				Section C Invoice Information:	nation:							Page:		of	
	Rep	Report To: Vasanta Kalluri				Attention:	Accounts Payable	Payable			Г		=0			-	
Address: 6200 South Quebec St	Cop	Copy To: Brian Rothmeyer	/er			Company Na	Company Name: AECOM	W			REG	ULATOR	REGULATORY AGENCY				
Greenwood Village, CO 80111						Address;	Same as	Same as Section A			L	NPDES	L GROUN	GROUND WATER	L	DRINKING WATER	TER
Email To: brian.rothmeyer@aecom.com		Purchase Order No : 1599462	462			Pace Quote	42700				L.,	UST	RCRA		1	OTHER	CCR
Phone: (303) 740-2614 Fax	Proj	Project Name: 60709371	60709371 PRPA CCR			Pace Project Manager	Heather Wilson	Vilson			Site	Site Location		1936			the sh
Requested Due Date/TAT: Shaund word		Project Number: 60709371				Pace Profile #	: 11033, 3				1	STATE:	8	1989			
										Request	ed Analy	Requested Analysis Filtered (Y/N)	ed (Y/N)			10000	CI III
Section D Required Client Information	Valid Matrix Codes MATRIX CODE	(Jhai o) .	COLLECTED	CTED			Preservatives	ives	2 1 N /A	NNNNN	NN	•					
	DRINKING WATER DW WATER WT WASTE WATER WY PRODUCT P SOILSOLID SL OIL	Seboo bilay ees	COMPOSITE START	COMPOSITE END/GRAB	оггестіои	S				*S				(N/X) (
SAMPLE ID WI (A-Z, 0-9 / ,-) AR Sample IDS MUST BE UNIQUE TIS	WIPE WP AIR AR OTHER OT TISSUE TS	CODE (1			TA 9M91	итеки гуед			test zia F, SO4	tal Meta tal Meta	DS נאן Merc			Chlorine	6043723	2423	
# W311		MATRIX • TAMAR • TAMAR	TIME	DATE	L ∃J9MA2	Duprese	NªOH HCI HNO ³ H ⁵ 20 ⁴	Other Methanc Other	Analy	oT 0208	01 0747			lsubizəЯ	Pace Pr	Pace Project No / Lah LD	0 T de
ASH-08-CCR		WT G	1	31					_	×	XX			2			
2 ASH 29-CCR		WTG -	1	icticks 12	240	7 4	ŝ			XX	X			2			
		1017	1		410	3			\mathbf{X}	XX	XX			Z			
+ DUP-OI-CCK		514		10/10/23 -	1	-			<u>×</u>	×	×			Z			
0 0																	
7									1			-					
80																	
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12														-			
ADDITIONAL COMMENTS		RELINQUISHED BY / AFFILIATION	BY / AFFILIATIO	z	DATE	TIME		ACCEPTED BY / AFFILIATION	D BY / AF	FILIATION		DATE	TIME		SAMPLE	SAMPLE CONDITIONS	
'Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Ti		Met.	-/ AECON		to lio [23	ILSS									-	-	
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MS/MS) collected for MSH og- CCI	y														-		
Pa																0	r
age 1			SAMPLE	SAMPLER NAME AND SIGNATURE	SIGNATUR	-2		-		- AVUIOT	5.			⊃° ni	(N/)	61692 (N\Y)	s Intac (N
9 of				SIGNATIBE of SAMPLER	SAMPLER.	Terret		האמ	-	DATE Sinned	ed .	-		dwə	.) eo	oler	əlqm \Y)

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

"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.

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		съгс										F				ن ا		m Na							.	×			Liquid			٩٢			
		WPDU														Misc.	wab	Colifor	дag	5	selles				Materia				Ineous	Non-aqueous Liquid OIL Wipe Drinking Water	g Wate				
		BP3Z															Wipe/Swab	120mL	ZIPIOC Bag	Air Filter	All Casselles	Summa Can					Water	Solid	Non-aq	OIL	Wipe	Drinkin			
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		BP3S															_	SP51		AF AF	ء م د	-					۲	SL	NAL	Ы	МР	DW			
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		BP3U	4	m	4	2										stic	Istic	stic	astic	ed pla		3 plast	A plas	served	H, Zn A	H plasti	3 plasti	3 plasti	served	04 plas	H, Zn A	served	3 plasti)4 plas	201
Profile #	Notes	BP2U														Plastic	L NAOH plastic	1L HNO3 plastic	1L HZSU4 plastic	1L unpreserved plastic	IL NAUN, ZII ACEIAIE	500ml HNO3 plastic	500mL H2SO4 plastic	500mL unpreserved plastic	500mL NaOH, Zn Acetate	250mL NaOH plastic	250mL HNO3 plastic	250mL HNO3 plastic	250mL unpreserved plastic	250mL H2SO4 plastic	250mL NaOH, Zn Acetate	125mL unpreserved plastic	125mL HNO3 plastic	125mL H2SO4 plastic	3
п.		BP1U	А	4	1	4)										1L NA	UL TN					500ml	500mL	500ml	250mL	250mL	250mL	250mL	250mL	250mL	125mL	125ml	125mL	1000
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		Mekn															BP1C	BP1N			BP1Z	BP2N	BP2S	BP2U	BP2Z	BP3C	BP3F	BP3N	BP3U	BP3S	BP3Z	BP4U	BP4N	BP4S	2 2
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		N¢9∀																		amber wide			lear/ar	r glass	500mL HNO3 amber glass	500mL H2SO4 amber glass	oer gla:	500mL unpres amber glass	250mL unpres amber glass	125mL unpres amber glass	100mL unpres amber glass				
		SEÐA,															ljar	ar			10 HCI amber dass	mbero	1L Na Thiosulfate clear/amber glass	amber	3 amb	04 amt	04 amt	es amb	es amb	es amb	es amb				
		NG2U														8oz clear soil jar	4oz clear soil jar	202 CIERT SOIL JAL	4oz unpreserved	- unor	SO4 al	Thiost	1 liter unpres amber glass	ONH	- H2SC	250mL H2SO4 amber glass	- unpre	- unpre	- unpre	- unpre					
		ບເອ∀														8oz cle	40Z C	202 CI	402 UC		1L H2SO4 amber glass	1L Na		500ml	500ml	250ml	500ml	250ml	125ml	100mL				-	
	CCR	нгэа																																	
	PRPA CCR	ບເວຍ														Glass	WGKU	WGFU	NV62U			AG1S	AG1T	AG1U	AG2N	AG2S	AG3S	AG2U	AG3U	AG4U	AG5U				
	PRI	DC9B														Glá																			
		Meða																							ial				s						
Lon Con	093	DG9U															r vial	Da vial		lal strial		Served		r vial	clear v	glass		glass	ar glas.						
Client: AECOM	site: 60707371	∩ 69∧															te clea		Clear.				ear vial	o. clea	served	clear	glass	Clear o	es Cle	oil jar					(10)
Client:	Site:	DG90															40mL bisulfate clear via	40mL HCI amber voa via		40mL ISP amber vial	Annt Na This amber via	40mL amber unpreserved	40mL HCI clear vial	40mL Na Thio. clear vial	40mL unpreserved clear vial	1liter H2SO4 clear glass	1liter unpres glass	250mL HCL Clear glass	250mL Unpres Clear glass	16oz clear soil jar					
		н6Эа															40mL	40mL				40ml	40mL	40mL	40mL	1liter H	1liter u	250mL	250mL	16oz c					mber:
		Н6ЭЛ																																	Work Order Number:
		xintsM	5		_	~									Codes		DG9B	HASO	MADO C	2690		DG9U	VG9H	VG9T	VG9U	BG1S	BG1U	BG3H	BG3U	WGDU					Work O
		COC Line Item	-	2	en	4	5	9	7	00	6	10	11	12	Container Codes																				

DC#_Title: ENV-FRM-LENE-0001_Sample Container Count Revision: 3 | Effective Date: | issued by: Lenexa

client AECOM

Qualtrax Document ID: 30422

6439823



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,

Atarton 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





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



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



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



ANALYTICAL RESULTS

Project: 60709371 PRPA CCR

Pace Project No.: 60439904

Sample: ASH-02-CCR	Lab ID: 6043	39904001	Collected: 10/12/2	23 08:45	5 Received: 10	0/13/23 08:30 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Meth	od: EPA 60	010 Preparation Met	nod: EP	A 3010			
	Pace Analytica	I 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	
020 MET ICPMS	Analytical Meth	od: EPA 60	20 Preparation Met	nod: EP	A 3010			
	Pace Analytica	I 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
admium	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
ead	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7439-92-1	D3
lolybdenum	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
hallium	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:28	7440-28-0	D3
470 Mercury	Analytical Meth	od: EPA 74	70 Preparation Met	nod: EP	A 7470			
	Pace Analytica	I Services -	Kansas City					
Mercury	ND	ug/L	0.20	1	10/24/23 12:45	10/25/23 13:12	7439-97-6	
540C Total Dissolved Solids	Analytical Meth Pace Analytica							
Total Dissolved Solids	3330	mg/L	100	1		10/19/23 12:25		
056 IC Anions	Analytical Meth Pace Analytica							
Chloride	22.8	mg/L	5.0	5		10/18/23 23:38	16887-00-6	
luoride	ND	mg/L	0.20	1		10/18/23 23:25		
Sulfate	2330	mg/L	200	200		10/19/23 00:18		



ANALYTICAL RESULTS

Project: 60709371 PRPA CCR

Pace Project No.: 60439904

Sample: ASH-07-CCR	Lab ID: 6043	9904002	Collected: 10/12/2	23 10:25	6 Received: 10	0/13/23 08:30 N	latrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Meth	od: EPA 60	010 Preparation Met	hod: EP	A 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	
020 MET ICPMS	Analytical Meth	od: EPA 60	20 Preparation Met	hod: EP	A 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
ead	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7439-92-1	D3
lolybdenum	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	
hallium	ND	ug/L	3.0	3	10/19/23 14:04	11/05/23 15:32	7440-28-0	D3
470 Mercury	Analytical Meth	od: EPA 74	70 Preparation Met	hod: EP	A 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 Meth	od: SM 254	40C					
	Pace Analytical							
Total Dissolved Solids	7110	mg/L	143	1		10/19/23 12:25		
0056 IC Anions	Analytical Meth Pace Analytical							
Chloride	214	mg/L	200	200		10/19/23 00:45	16887-00-6	
luoride	ND	mg/L	0.20	1		10/19/23 00:32		
Sulfate	3440	mg/L	1000	1000		10/19/23 00:59		



Project: 60709371	PRPA CCR									
Pace Project No.: 60439904										
QC Batch: 870263		Analysis	Method:	EPA 7470						
QC Batch Method: EPA 747	0	Analysis	Description:	7470 Mercu	ry					
		Laborato	ry:	Pace Analyt	cal Services	s - Kansa	s City			
Associated Lab Samples: 60	439904001, 6043990400	02								
METHOD BLANK: 3446202		Ма	trix: Water							
Associated Lab Samples: 60	439904001, 6043990400	02								
		Blank	Reportin	g						
Parameter	Units	Result	Limit	Analy	zed	Qualifier	S			
Mercury	ug/L		ND O	0.20 10/25/23	3 12:38					
LABORATORY CONTROL SAM	APLE: 3446203									
		Spike	LCS	LCS	% Red	c				
Parameter	Units	Conc.	Result	% Rec	Limits	; (Qualifiers			
Mercury	ug/L	5	4.9	98	8 80)-120		_		
MATRIX SPIKE & MATRIX SPI	KE DUPLICATE: 3446	3204	34462	205						
		-	SD	-00						
	60439823002	-	oike MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units Result	Conc. Co	onc. Result	Result	% Rec	% Rec	Limits	RPD	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.



Project:	60709	371 PRPA CO	CR										
Pace Project No .:	60439	904											
QC Batch:	8699	18		Analy	ysis Metho	d:	EPA 6010						
QC Batch Method:	EPA	3010		Anal	ysis Descri	ption:	6010 MET						
				Labo	ratory:		Pace Analy	tical Servic	es - Kansas	s City			
Associated Lab San	nples:	604399040	01, 6043990400	2									
METHOD BLANK:	34447	62			Matrix: W	/ater							
Associated Lab San	nples:	604399040	01,6043990400	2									
				Blai	nk	Reporting							
Paran	neter		Units	Res		Limit	Anal	yzed	Qualifiers	5			
Boron			ug/L		ND	10	0 10/25/2	3 14:18					
Calcium			ug/L		ND	20	0 10/25/2	3 14:18					
Lithium			ug/L		ND	10.	0 10/25/2	3 14:18					
LABORATORY CON	NTROL	SAMPLE:	3444763										
				Spike	LC	S	LCS	% R	ec				
Paran	neter		Units	Conc.	Res	sult	% Rec	Limi	its (Qualifiers			
Boron			ug/L	100	00	985	9	8 8	80-120		_		
Calcium			ug/L	1000	00	10700	10	7 8	80-120				
Lithium			ug/L	100	00	966	9	7 8	80-120				
MATRIX SPIKE & M			_ICATE: 3444	764		3444765							
		0. 112 001 0		MS	MSD	0111100	•						
			60439823002	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter		Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	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.



Project:		371 PRPA CCR				
Pace Project No.:	60439	904				
QC Batch:	8699	16	Analysis Meth	nod: EF	PA 6020	
QC Batch Method:	EPA	3010	Analysis Des	cription: 60	20 MET	
			Laboratory:	Pa	ace Analytical Servi	ces - Kansas City
Associated Lab Sar	nples:	60439904001, 60439904002	-		-	-
METHOD BLANK:	34447	47	Matrix:	Water		
Associated Lab Sar	nples:	60439904001, 60439904002				
			Blank	Reporting		
Parar	neter	Units	Result	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

		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% 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	
hromium	ug/L	40	40.6	101	80-120	
obalt	ug/L	40	40.9	102	80-120	
ad	ug/L	40	40.5	101	80-120	
blybdenum	ug/L	40	41.5	104	80-120	
elenium	ug/L	40	41.1	103	80-120	
hallium	ug/L	40	39.5	99	80-120	

MATRIX SPIKE & MATRIX S	SPIKE DUPLI	CATE: 3444	749		3444750							
			MS	MSD								
	6	0439823002	Spike	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	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

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Project: 60709371 PRPA CCR

Pace Project No.: 60439904

MATRIX SPIKE & MATRIX	SPIKE DUPLIC	ATE: 3444	749		3444750							
	-	0439823002	MS Spike	MSD Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	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.



Project: Pace Project No.:	60709371 PRPA 0 60439904	CCR						
QC Batch:	869801		Analysis M	ethod:	SM 2540C			
QC Batch Method:	SM 2540C		Analysis De	escription:	2540C Total Di	ssolved Solids		
			Laboratory	:	Pace Analytica	Services - Ka	nsas (City
Associated Lab Sam	ples: 60439904	001, 60439904002						
METHOD BLANK:	3444342		Matrix	: Water				
Associated Lab Sam	ples: 60439904	001, 60439904002						
			Blank	Reporting				
Param	neter	Units	Result	Limit	Analyze	d Quali	fiers	
Total Dissolved Solid	ds	mg/L	NE) 5	.0 10/19/23 12	2:23		
LABORATORY CON	ITROL SAMPLE:	3444343						
			Spike	LCS	LCS	% Rec		
Param	neter	Units	Conc.	Result	% Rec	Limits	Qu	alifiers
Total Dissolved Solid	ds	mg/L	1000	998	100	80-120		
SAMPLE DUPLICAT	E: 3444344							
5		11-2-	60439695001	Dup	000	Max		
Param		Units	Result	Result	RPD	RPD		Qualifiers
Total Dissolved Solid	ds	mg/L	854	89	94	5	10	
SAMPLE DUPLICAT	E: 3444345							
			60439956004			Max		
Param	neter	Units	Result	Result	RPD	RPD		Qualifiers
Total Dissolved Solid	ds	mg/L	6040) 590	00	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.



QC Batch: 86955	8	Analys	sis Metho	d: E	EPA 9056						
QC Batch Method: EPA 90	056	-	sis Descri		9056 IC Anie	ons					
		Labora			Pace Analyt	ical Servic	es - Kansa	as City			
Associated Lab Samples:	60439904001, 604399040	02	·								
METHOD BLANK: 3443402	2	٢	Matrix: W	/ater							
Associated Lab Samples:	60439904001, 604399040										
Doromotor	Linita	Blank		Reporting Limit	Analy	ad	Qualifie	r 0			
Parameter	Units	Resu			Analy		Quaime				
Chloride	mg/L		ND	1.0							
Fluoride Sulfate	mg/L mg/L		ND ND	0.20 1.0							
Sunate	ing/∟		ND	1.0	0 10/10/20	5 11.09					
METHOD BLANK: 3444753	3	1	Matrix: W	/ater							
Associated Lab Samples:	60439904001, 604399040	02									
		Blank	k	Reporting							
Parameter	Units	Resu	lt	Limit	Analy	/zed	Qualifie	rs			
Chloride	mg/L		ND	1.(0 10/19/23	3 09:15					
Fluoride	mg/L		ND	0.20	0 10/19/23	3 09:15					
Sulfate	mg/L		ND	1.0	0 10/19/23	3 09:15					
LABORATORY CONTROL S	AMPLE: 3443403										
		Spike	LC		LCS	% R					
LABORATORY CONTROL S Parameter	AMPLE: 3443403 Units	Spike Conc.	LC Re:		LCS % Rec	% R Lim		Qualifiers			
Parameter	Units mg/L		Re			Lim		Qualifiers	_		
Parameter Chloride Fluoride	Units mg/L mg/L	Conc. 5	Res 5	4.9 2.5	% Rec 98 98	Lim 	its 80-120 80-120	Qualifiers	_		
Parameter	Units mg/L	Conc.	Res 5	sult 4.9	% Rec 98	Lim 	its 80-120	Qualifiers	_		
Parameter Chloride Fluoride Sulfate	Units mg/L mg/L mg/L	Conc. 5	Res 5	4.9 2.5	% Rec 98 98	Lim 	its 80-120 80-120	Qualifiers	_		
Parameter Chloride Fluoride Sulfate	Units mg/L mg/L mg/L	Conc. 5	Res 5	4.9 4.5 5.0	% Rec 98 98	Lim 	its 80-120 80-120 80-120	Qualifiers	_		
Parameter Chloride Fluoride Sulfate	Units mg/L mg/L mg/L	Conc. 5 2.5 5	Re:	sult 4.9 2.5 5.0	% Rec 98 98 100	Lim 3 3)	its	Qualifiers	_		
Parameter Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter	Units mg/L mg/L mg/L MPLE: 3444754	Conc. 5 2.5 5 Spike	Rea 5 5 5 LC Rea	sult 4.9 2.5 5.0	% Rec 98 90 100	Lim	its		_		
Parameter Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride	AMPLE: 3444754 Units mg/L MUNITS Mg/L mg/L mg/L mg/L	Conc. 5 2.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		sult 4.9 2.5 5.0 CS sult 4.9 2.5 	% Rec 98 98 100 LCS % Rec 97 102	Lim	its		_		
Parameter Chloride Fluoride Sulfate LABORATORY CONTROL S	AMPLE: 3444754	Conc. 5 2.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		sult 4.9 2.5 5.0 CS sult 4.9	% Rec 98 98 100 LCS % Rec 97	Lim	its		_		
Parameter Chloride Fluoride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride Sulfate	Units mg/L mg/L mg/L mg/L MPLE: 3444754 Units mg/L mg/L mg/L mg/L	Conc. 5 2.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		sult 4.9 2.5 5.0 CS sult 4.9 2.5 	% Rec 98 98 100 LCS % Rec 97 102 102	Lim	its		_		
Parameter Chloride Sulfate LABORATORY CONTROL S Parameter Chloride Fluoride Sulfate	Units mg/L mg/L mg/L mg/L MPLE: 3444754 Units mg/L mg/L mg/L mg/L mg/L	Conc. 5 2.5 5 5 5 5 5 5 3404 MS	Rei LC Rei MSD	sult 4.9 2.5 5.0 2S sult 4.9 2.5 5.1 3443405	% Rec 98 98 100 LCS % Rec 97 102 102	Lim	its	Qualifiers	_		
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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

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Project: 60709371 PRPA CCR

Pace Project No.: 60439904

SAMPLE DUPLICATE: 3443406						
		60439823002	Dup		Max	
Parameter	Units	Result	Result	RPD	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.



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.



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		

DC#_Title: ENV-FRM-LENE-0009_Sample Co Participant Revision: 2 Effective Date: 01/12/2021 Issued By: Lenexa Client Name: Revision: 2 Effective Date: 01/12/2021 Issued By: Lenexa Client Name: Packing Affective Pace Vial Clay Packing Affective Pace Pace Antidue Pace Pace Antidue Pace Pace Antidue Pace Pace Affective Pace <								W0#:6043990	4
DC#_Title: ENV-FRM-LENE-0009_Sample Co EG33904 Pace Revision: 2 Effective Date: 01/12/2022 Issued By: Lenexa Client Name: Pace No Client Name: Client Name: Courier: FedEx UPS VA Clay PEX ECI Pace Xroads Client Other Courier: FedEx UPS VA Clay PEX ECI Pace Xroads Client Other Packing Material: Bubble Wrap Bubble Bags Foam Nope Other Pace and initials of parson Thermometer Used: T-2 Ascend -7 Corrected Inc Pace and initials of parson Color Temperature (10): Ascend Fraction Pace No Pace No Pace No Pace No Pace No Pace									
Procession Revision: 2 Effective Date: 01/12/2022 Issued By: Lenexa Client Name: Default Clay PEX ECI Pace Xroads Client Other Cracking #: Default Clay PEX ECI Pace Shipping Labil Used? Yes No Packing Matchina: Bubble Bags Form Nog Other Transmeter Used: T2-18 Type of Ics: Blue None Date and initials of parson Color forapperature (C): Asread J-2 Corr. Factor -0.3 Corrected Image: Date and initials of parson Color forapperature (C): Asread J-2 Corr. Factor -0.3 Corrected Image: Date and initials of parson Colar Ocasdody present: Yes No Na Na Samples arrived within holding time: Image: Date Image:									
Revision: 2 Effective Date: 01/12/202 Issued By: Lonexa Client Name: Action Action Packing #: Other Other Construct: Fore No Seals intact: No Other Other Tracking #: Lig 1: 33:0:1:4:1 Pack Basis intact: Yes No No Other Tracking #: Lig 1: 33:0:1:4:1:7:1:7:1:7:1:7:1:7:1:7:1:7:1:7:1:7	Pa	ce	DC#_Title: EN	IV-FRN	1-LENE-000	9_Samı	ple C	0 00438804	
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Tracking #: 6422 1393 0444 Pace Shipping Label Used? Yes Vicinity Should be above freezing to Stress intact: Vicinity Should be above freezing to	Client Name:	AE	com						
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Packing Material: Bubble Wrap Bubble Bags Bubble Bags Foam Nove Other Color Thermometer Used: Type of Ice: Wa Bubble None Color Temperature ('C): As-read 1-7 Corr. Factor -0.3 Corrected / Packanging contents: Temperature should be above freezing to 5'C W1H 11'2'3 Chain of Custody present: Vers No ENA Samples arrived within holding time: Vers No ENA Sufficient volume: Vers No ENA Samples containers used: Vers No ENA Samples containers used: Vers No ENA Samples container requiring Pri preservation in compliance? Vers No ENA Samples contain multiple phases? Matrix: Vers No ENA Samples contain multiple phases? Matrix: Vers No ENA Samples contain multiple phases? Matrix: Vers No ENA Samples contain for the / ID / analyses Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test strip turns dark? (Record only) Vers No Patasium indide test	Tracking #: 60	BI	13930447	F	ace Shipping	Label Use	d? Y	es 🗆 No 🗆	
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Chain of Custody relinquished: Ves No NvA Samples arrived within holding time: Ves No NvA Samples arrived within holding time: Ves No NvA Short Hold Time analyses (<72hr): Ves No NvA Sufficient volume: Ves No NvA Correct containers used: Ves No NvA Containers used: Ves No NvA Containers intact: Ves No NvA Containers intact: Ves No NvA Samples dot dot dots forcen in 48hrs? Ves No NvA Samples contain multiple phases? Matrix: Ves No NvA Containers requiring pH preservation in compliance? Ves No NvA Containers requiring pH preservation in compliance? Ves No NvA Containers requiring pH preservation in compliance? Ves No NvA Containers requiring pH preservation in compliance? Ves No NvA Containers requiring pH preservation in compliance? Ves No NvA Containers requiring pH preservation in compliance? Ves No NvA Containers requiring pH preservation in compliance? Ves No NvA Containers requiring pH preservation in compliance? Ves No Containers requiring pH preservative and the diate/time added. Containers requiring pH preservative and the diate/time added. Containers ample checks: Lead acetate strip turns dark? (Record only) Containers Contactet Containers Containers Conta	Temperature should be al	oove freez	ing to 6°C 11/11	123			r	~ (0/17	n3
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Short Hold Time analyses (<72hr):	Chain of Custody reline	quished:				No □N/A			
Rush Turn Around Time requested:	Samples arrived within	holding f	ime:			No □N/A			
Sufficient volume: Yes INo INVA Correct containers used: Yes INo INVA Pace containers used: Yes INo INVA Containers intact: Yes INo INVA Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? Yes INo INVA Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? Yes INo INVA Sample labels match COC: Date / time / ID / analyses Yes INo INVA Samples contain multiple phases? Matrix: Yes INo INVA Containers requiring pt preservation in compliance? Ives INo INVA Containers requiring pt preservation in compliance? Ives INo INVA Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) LOT#: 62/182 Cyanide water sample checks: Ives INo Ives Ino Ead actate strip turns durk? (Record only) Ives INo Ives Ino Potassium iodide test strip turns durk? (Record only) Ives Ino IviA Hadspace in VOA vials (>6mm): Ives INo IviA	Short Hold Time anal	yses (<7	2hr):			No 🗆 N/A		/	
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Samples contain multiple phases? Matrix: Image: Matrix Imatrix Image: Matrix Image:	Filtered volume receive	d for dise	solved tests?		□Yes □N				
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HNO3, H2SO1, HCI<2; NaOH>9 Sulfide, NaOH>10 Cyanide) date/time added. (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) LOT#: 67/187 Cyanide water sample checks:	Samples contain multip	le phase	s? Matrix:	WT		lo □n/A			
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CHAIN-OF-CUSTODY / Analytical Request Document

CCP KS

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

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Section D Required Client Information	Valid Matrix Codes MATRIX COL	odes CODE	OMP)		COLLECTED	Ē		1	Ľ.	Preservatives	ves		Ļ		1					
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"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

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Pace Analytical Services, LLC

Qualtrax Document ID: 30422

Page 18 of 18

Page 1 of 1



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,

Atarton 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.: 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



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



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



Project: 60709371 PRPA CCR

Pace Project No.: 60440184

Sample: ASH-01-CCR PWS:	Lab ID: 60440 Site ID:	184001 Collected: 10/11/23 10:45 Sample Type:	Received:	10/13/23 09:10	Matrix: Water	
Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical S	Gervices - Greensburg				
Radium-226	EPA 903.1	0.121 ± 0.443 (0.851) C:NA T:89%	pCi/L	10/31/23 15:19	9 13982-63-3	
	Pace Analytical S	Services - Greensburg				
Radium-228	EPA 904.0	1.08 ± 0.513 (0.902) C:82% T:80%	pCi/L	10/26/23 12:4	7 15262-20-1	
	Pace Analytical S	Services - Greensburg				
Total Radium	Total Radium Calculation	1.20 ± 0.956 (1.75)	pCi/L	11/01/23 10:57	7 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60440184

Sample: ASH-06-CCR PWS:	Lab ID: 6044 Site ID:	0184002 Collected: 10/11/23 11:50 Sample Type:	Received:	10/13/23 09:10	Matrix: Water	
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	2 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	7 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	



Project: 60709371 PRPA CCR

Pace Project No.: 60440184

Sample: ERB-01-CCR PWS:	Lab ID: 6044 Site ID:	0184003 Collected: 10/11/23 12:00 Sample Type:	Received:	10/13/23 09:10	Matrix: Water	
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	2 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	8 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	7 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60440184

Sample: ASH-05-CCR PWS:	Lab ID: 6044 Site ID:	0184004 Collected: 10/11/23 13:35 Sample Type:	Received:	10/13/23 09:10	Matrix: Water	
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	2 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	3 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	7 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60440184

Sample: ASH-04-CCR PWS:	Lab ID: 6044 Site ID:	0184005 Collected: 10/11/23 14:30 Sample Type:	Received:	10/13/23 09:10	Matrix: Water	
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	6 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	9 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	



Project: 60709371 PRPA CCR

Pace Project No.: 60440184

Sample: ASH-02-CCR PWS:	Lab ID: 60440 Site ID:	184006 Collected: 10/12/23 08:45 Sample Type:	Received:	10/13/23 09:10	Matrix: Water	
Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical S	Services - Greensburg				
Radium-226	EPA 903.1	-0.143 ± 0.444 (1.01) C:NA T:88%	pCi/L	10/31/23 14:10	6 13982-63-3	
	Pace Analytical S	Services - Greensburg				
Radium-228	EPA 904.0	0.188 ± 0.306 (0.664) C:82% T:83%	pCi/L	10/26/23 12:49	9 15262-20-1	
	Pace Analytical S	Services - Greensburg				
Total Radium	Total Radium Calculation	0.188 ± 0.750 (1.67)	pCi/L	11/01/23 10:57	7 7440-14-4	



Project: 60709371 PRPA CCR

Pace Project No.: 60440184

Sample: ASH-07-CCR PWS:	Lab ID: 6044 Site ID:	0184007 Collected: 10/12/23 10:25 Sample Type:	Received:	10/13/23 09:10	Matrix: Water	
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 14:10	6 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	9 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	7 7440-14-4	



QUALITY CONTROL - RADIOCHEMISTRY

Project:	60709371 PRPA	CCR			
Pace Project No .:	60440184				
QC Batch:	623938	Analysis Method:	EPA 903.1		
QC Batch Method:	EPA 903.1	Analysis Description	: 903.1 Radium-2	26	
		Laboratory:	Pace Analytical	Services - Greensbu	rg
Associated Lab Sa	mples: 60440184	4001, 60440184002, 60440184003, 6044018	4004, 60440184005, 6	60440184006, 60440	184007
METHOD BLANK:	3041606	Matrix: Water			
Associated Lab Sa	mples: 60440184	4001, 60440184002, 60440184003, 6044018	4004, 60440184005, 6	60440184006, 60440	184007
Para	meter	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.



QUALITY CONTROL - RADIOCHEMISTRY

Project:	60709371 PRPA C	CR				
Pace Project No.:	60440184					
QC Batch:	623941		Analysis Method:	EPA 904.0		
QC Batch Method:	EPA 904.0		Analysis Description:	904.0 Radium 2	228	
			Laboratory:	Pace Analytical	Services - Greensbu	rg
Associated Lab Sa	mples: 604401840	001, 60440184002,	60440184003, 604401840	04, 60440184005,	60440184006, 60440	184007
METHOD BLANK:	3041608		Matrix: Water			
Associated Lab Sa	mples: 604401840	001, 60440184002,	60440184003, 604401840	04, 60440184005,	60440184006, 60440	184007
Para	meter	Act ± Un	c (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.



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.



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		

Heather Wilson Pace Analytical Kansas 9608 Loiret Blvd. Lenexa, KS 66219 Phone 1(913)563-1407		Pace Analy 1638 Rose Suites 2,3, Greensbur Phone (72	Pace Analytical Pittsburgh 1638 Roseytown Road Suites 2,3, & 4 Greensburg, PA 15601 Phone (724)850-5600	Irgh		៣ulbsអំពារ					
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Sample ID	Sample Type	Collect Date/Time	labib	Matrix	Other						LAB USE ONLY
ASH-01-CCR	PS	10/11/2023 10:45	60440184001	Water	1	×	×			00	6
ASH-06-CCR	PS		60440184002	Water	-	X	X			\$¢	کوک
	PS	10/11/2023 12:00 6	60440184003	Water	-	 ×	×		 	\$ 	୯ ୯୬
ASH-05-CCR	PS	10/11/2023 13:35 6	60440184004	Water	1	 ×	×		 	100	۲.
ASH-04-CCR	PS	10/11/2023 14:30	60440184005	Water	،	 ×	×			5	Soo
ASH-02-CCR	PS	10/12/2023 08:45 (60440184006	Water		×	×			Ō	006
ASH-07-CCR	PS	10/12/2023 10:25 6	60440184007	Water	ب	×	×			607	٢
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CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

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Pace Project No./ Lab I.D. OTHER ъ 00 GROUND WATER enung L Page: (N' '') eninointO leubiseR REGULATORY AGENCY 8 RCRA Requested Analysis Filtered (Y/N) L Site Location STATE NPDES UST L muibeA leto] Law 2 822-mulbe? 3adium-226 tseT sisvisnA N /A Same as Section A Jetho Accounts Payable Methanol Heather Wilson 602S26N Preservatives Company Name: AECOM HORN 11033.3 42700 ICH Invoice Information; [€]ONH ²OS²H Manager: Pace Profile #: Pace Quote Reference: Pace Project Section C Unpreserved Address; Attention: # OF CONTAINERS SAMPLE TEMP AT COLLECTION TIME 50 COMPOSITE END/GRAB CIN N DATE COLLECTED 60709371 PRPA CCR TIME COMPOSITE START 1599462 DATE Brian Rothmeyer Report To: Vasanta Kailuri 60709371 Required Project Information: ene. **BAYT BJAMAS** ourchase Order No.: (G=GRAB C=COMP) Project Number: (nel of seboo bilev ees) WATRIX CODE roject Name: Copy To: Valid Matrix Codes MATRIX CODE MA NA 『 꼭 익 못 못 안 ≿ DRINKING WATER U WATER WATER WATER PRODUCT F OIL WIPE AIR OTHER TISSUE Greenwood Village, CO 80111 brian.rothmeyer@aecom.com Requested Due Date/TAT: Standard CLIENT: PACE_60_LEKS (A-Z, D-9 / ,-) Sample IDs MUST BE UNIQUE 6200 South Quebec St SAMPLE ID Fax Section D Required Client Information (303) 740-2614 Required Client Information AECOM PM: MAR Company: Email To: ddress: Phone: # WƏLI

(N/A) Samples Intact SAMPLE CONDITION3 F-ALL-C-020rev.08, 12-Oct-2007 (N/Y) 19(00) oleaS ybolau 50 500 006 200 N 203 204 (N/X) 901 C Received on 7 Ž O° ni qmeT TIME 200 0/12/23 10-19-CS DATË DINA Helmstri DATE Signed (MM/DD/YY): ACCEPTED BY / AFFILIATION × × 6020 (11/1000/INV T Cara Horses Shung-(\times 8 ~ N \sim 2 e l SAMPLER NAME AND SIGNATURE Accountio 1/2/23 PRINT Name of SAMPLER: SIGNATURE of SAMPLER: DATE 0845 1200 ş 1025 00 6 H 123 (335 10/12/23 10 IU 72 0112 1.6 6 6 2 01123 RELINQUISHED BY / AFFILIATION CONCEPTION OF (REPROP. All beach ------5 Ð 60 O ĘM N 3 ADDITIONAL COMMENTS 20-1 -C3-V いても 511-45-ar RB-01-CC 54-0 とうして T. S Ĵ. 10 ÷ 5 Page 17 of 20 2 ŝ 4 ŝ ç ~ 00 ¢0

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

Effective Date: 09/20/2023

Due Date: 11/03/23 PM: MAR CLIENT: PACE_60_LEKS

ARACYT	ICAL SERVICES	
Client	Name:	

Pace

Courier: 🖄 Fed Ex 🗆 UPS 💭 USPS 🗌 Client I	🗌 Com	merci	al 🗆 P	ace 🗌 Other		Initial / Date
Tracking Number: 6432139290	780)			Examined By	- TUD19123
-	es 🗆 N		Seals	Intact: 🖄 Yes [DA 1011923
				ue (None	Temped By:	
Cooler Temperature: Observed Temp	and the second se	۰C	Corre	ction Factor:	 •C Final Te	mp: •C
Temp should be above freezing to 6°C		•				1
				pH paper Lot#		ual Chlorine Lot #
Comments:	Yes	No	NA	2023-08		
Chain of Custody Present	2			1. Received	10/20123	LOL.
Chain of Custody Filled Out:	7			2.		
-Were client corrections present on COC		17				
Chain of Custody Relinquished		7		3.		
Sampler Name & Signature on COC:		7	ļ	4.		
Sample Labels match COC:	7			5.		
-Includes date/time/ID						
Matrix:	N.F	2				
Samples Arrived within Hold Time:	3			6.		
Short Hold Time Analysis (<72hr		J		7.		
remaining):		_	<u> </u>			
Rush Turn Around Time Requested:		1		8.		
Sufficient Volume:	L		ļ	9.		
Correct Containers Used:	J			10.		
-Pace Containers Used	1	<u> </u>				
Containers Intact:	J	İ	ļ	11.		
Orthophosphate field filtered:			1	12.		
Hex Cr Aqueous samples field filtered:			1	13.		
Organic Samples checked for dechlorination			3	14:		•
Filtered volume received for dissolved tests:		<u> </u>	J	15;		
All containers checked for preservation:	7			16.		
exceptions: VOA, coliform, TOC, O&G,				01.0		
Phenolics, Radon, non-aqueous matrix				FACE		
All containers meet method preservation	J			Initial when	Date/Time of	
requirements:				completed	Preservation	
				Preservative		
8260C/D: Headspace in VOA Vials (> 6mm))	17.		
624.1: Headspace in VOA Vials (0mm)			1	18.		
Trip Blank Present:			J	Trip blank cus	tody seal present?	YES or NO
Rad Samples Screened < 05 mrem/hr.	Х			Initial when LA	Date: 1043-23	Survey Meter SN: 563
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.

PACE Analytical Services Ra-226 Analysis

Quality Control Sample Performance Assessment

Quality Control Sample Performance Assessment					
Pace Analytical"			Analyst Must Manually Enter All Fields Highlighted in	n Yellow.	
www.pacelabs.com Test:	Ra-226		Analyst must manually Enter An Tields Tighinghted in	1 renow	
	CLM		a la Martin Calles Canter L Annonent	MS/MSD 1	MS/MSD 2
Analyst:			Sample Matrix Spike Control Assessment Sample Collection Date:	10/12/2023	1013/10130 2
Date:	10/23/2023				
Batch ID:	75904		Sample I.D.	30632314001	
Matrix:	DW		Sample MS I.D.	30632314001MS	
			Sample MSD I.D.		State Conclusion in the
Method Blank Assessment			Spike I.D.:	23-013	
MB Sample ID	3041606		MS/MSD Decay Corrected Spike Concentration (pCi/mL):	32.281	NAMES OF TRANSPORT
MB concentration:	0.267		Spike Volume Used in MS (mL):	0.20	Constant and
M/B Counting Uncertainty:			Spike Volume Used in MSD (mL):		
MB MDC:	0.641		MS Aliquot (L, g, F):	0.658	
MB Numerical Performance Indicator:	1.39		MS Target Conc.(pCi/L, g, F):	9.819	
MB Status vs Numerical Indicator:			MSD Aliquot (L, g, F):		
MB Status vs. MDC:	Pass		MSD Target Conc. (pCi/L, g, F):		
			MS Spike Uncertainty (calculated):	0.461	
Laboratory Control Sample Assessment	LCSD (Y or N)?	N	MSD Spike Uncertainty (calculated):	1	
	LCS75904	LCSD75904	Sample Result:	-0.106	
Count Date:	10/31/2023		Sample Result Counting Uncertainty (pCi/L, g, F):	0.254	
Spike I.D.:	23-013		Sample Matrix Spike Result:	9.440	
Spike Concentration (pCi/mL):	32.281		Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.410	
Volume Used (mL):	0.10	이는 그 그는 것은 것을 했다.	Sample Matrix Spike Duplicate Result:		
Aliquot Volume (L, g, F):	0.652		Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):		
Target Conc. (pCi/L, g, F):	4.948		MS Numerical Performance Indicator:	-0.355	
Uncertainty (Calculated):	0.233		MSD Numerical Performance Indicator:		
Result (pCi/L, q, F):	4.078		MS Percent Recovery:	97.22%	
LCS/LCSD Counting Uncertainty (pCi/L, g, F)	0.939		MSD Percent Recovery:		
Numerical Performance Indicator	-1.76		MS Status vs Numerical Indicator:	N/A	
Percent Recovery	82.41%		MSD Status vs Numerical Indicator:		
Status vs Numerical Indicator	N/A		MS Status vs Recovery:		
Status vs Recovery	Pass		MSD Status vs Recovery:		
Upper % Recovery Limits			MS/MSD Upper % Recovery Limits:		
Lower % Recovery Limits	73%		MS/MSD Lower % Recovery Limits:	71%	
Duplicate Sample Assessment			Matrix Spike/Matrix Spike Duplicate Sample Assessment		
Sample I.D.	35834054001	Enter Duplicate	Sample I.D.		
Duplicate Sample I.D.			Sample MS I.D.		
Sample Result (pCi/L, q, F)		other than	Sample MSD I.D.		
Sample Result Counting Uncertainty (pCi/L, g, F)		LCS/LCSD in	Sample Matrix Spike Result	:	
Sample Result Counting Oricertainty (pCi/L, g, F)		the space below.	Matrix Spike Result Counting Uncertainty (pCi/L, g, F)		
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F)			Sample Matrix Spike Duplicate Result		
Are sample and/or duplicate results below RL2			Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F)		
Duplicate Numerical Performance Indicator	and an and a second second	35834054001	Duplicate Numerical Performance Indicator		
Duplicate Numerical Performance indicator		35834054001DUP	(Based on the Percent Recoveries) MS/ MSD Duplicate RPD		
		00004004001D0F	MS/ MSD Duplicate Status vs Numerical Indicator		
Duplicate Status vs Numerical Indicator Duplicate Status vs RPD			MS/ MSD Duplicate Status vs RPD		
% RPD Limit			% RPD Limit		
% RPD LIIIII	. 32.70	1	North D Ennie		

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

Comments:

LL 10.31.23

CLM 11/1123

PACE Analytical Services Ra-228 Analysis

Quality Control Sample Performance Assessment

Analyst Must Manually Enter All Fields Highlighted in Yellow.

www.pacelabs.com	-		Analyst Must Manually Enter An Tields Highlighted in		
lest.	Ra-228			MS/MSD 1	MS/MSD 2
Analyst:	VAL		Sample Matrix Spike Control Assessment		1013/10130 2
Date:	10/24/2023		Sample Collection Date:	10/12/2023	
Worklist:	75905		Sample I.D.	30632314001	
Matrix:	WT		Sample MS I.D.	30632314001MS	
			Sample MSD I.D.		
			Spike I.D.:	23-043	
Method Blank Assessment MB Sample ID	3041608		MS/MSD Decay Corrected Spike Concentration (pCi/mL):	39.462	
	and the second s		Spike Volume Used in MS (mL):	0.20	
MB concentration:	0.784		Spike Volume Used in MSD (mL):		
M/B 2 Sigma CSU:	0.404		MS Aliquot (L, g, F):	0.803	
MB MDC:	0.703		MS Target Conc.(pCi/L, g, F):	9.832	
MB Numerical Performance Indicator:	3.80		MSD Aliquot (L, g, F):	Contrast Contrast Contrast	
MB Status vs Numerical Indicator:	Fail*		MSD Anddot (L, g, F). MSD Target Conc. (pCi/L, g, F):		
MB Status vs. MDC:	See Comment*		MSD Parget Cont. (pc/r., g, r). MS Spike Uncertainty (calculated):	0.482	
				0.402	
Laboratory Control Sample Assessment	LCSD (Y or N)?	N	MSD Spike Uncertainty (calculated):	0.000	
managementeringen et teoremonist ist stillings	LCS75905	LCSD75905	Sample Result:		
Count Date:	10/26/2023		Sample Result 2 Sigma CSU (pCi/L, g, F):	0.345	
Spike I.D.:	23-043		Sample Matrix Spike Result:		
Decay Corrected Spike Concentration (pCi/mL):	39.279		Matrix Spike Result 2 Sigma CSU (pCi/L, g, F):	1.846	
Volume Used (mL):	0.10	the set of the set of the	Sample Matrix Spike Duplicate Result:		
Aliquot Volume (L, g, F):	0.815		Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F):		
Target Conc. (pCi/L, g, F):	4.817		MS Numerical Performance Indicator:	-1.056	
Uncertainty (Calculated):	0.236		MSD Numerical Performance Indicator:		
Result (pCi/L, g, F):	3.677		MS Percent Recovery:	89.37%	
	0.871		MSD Percent Recovery:		
LCS/LCSD 2 Sigma CSU (pCi/L, g, F):	-2.48		MS Status vs Numerical Indicator:	Pass	
Numerical Performance Indicator:	76.33%		MSD Status vs Numerical Indicator:		
Percent Recovery:	N/A		MS Status vs Recovery:		
Status vs Numerical Indicator:	Pass		MSD Status vs Recovery:		
Status vs Recovery:			MS/MSD Upper % Recovery Limits:		
Upper % Recovery Limits:	135%		MS/MSD Lower % Recovery Limits:		
Lower % Recovery Limits:	60%				
			Matrix Spike/Matrix Spike Duplicate Sample Assessment		
Duplicate Sample Assessment					
Sample I.D.:	30632555001	Enter Duplicate	Sample I.D.		
Duplicate Sample I.D.	30632555001DUP	sample IDs if	Sample MS I.D.		
Sample Result (pCi/L, g, F):	0.806	other than	Sample MSD I.D.		
Sample Result 2 Sigma CSU (pCi/L, g, F):	0.420	LCS/LCSD in	Sample Matrix Spike Result:		
Sample Result 2 Signa CSO (pCi/L, g, F). Sample Duplicate Result (pCi/L, g, F):	0.718	the space below.	Matrix Spike Result 2 Sigma CSU (pCi/L, g, F):		
		are space below.	Sample Matrix Spike Duplicate Result:		
Sample Duplicate Result 2 Sigma CSU (pCi/L, g, F):	See Below ##		Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F):		
Are sample and/or duplicate results below RL?		30632555001	Duplicate Numerical Performance Indicator		
Duplicate Numerical Performance Indicator:	0.313	30632555001 B0632555001DUP	(Based on the Percent Recoveries) MS/ MSD Duplicate RPD:		
Duplicate RPD:		D003200000000	MS/ MSD Duplicate Status vs Numerical Indicator		
Duplicate Status vs Numerical Indicator:			MS/ MSD Duplicate Status vs Numerical indicator		
Duplicate Status vs RPD:			MS/ MSD Duplicate Status vs KPD. % RPD Limit		
% RPD Limit:	36%	1	70 KFD Littit.	•	

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

Comments:

ce Analvtical

*The method blank result is below the reporting limit for this analysis and is acceptable.

VAL ZC 10/27/23 101 10-27-23

Ra-228_75905_DW_W Ra-228 (ENV-FRM-GBUR-0295 02) xls Page 20 of 20

Ra-228 NELAC DW2 Printed: 10/27/2023 8:49 AM

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	
К =	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

Gradient	ASH-01 to ASH-02
April 2023	0.014051546
October 2023	0.014616495
Average	0.014334021

Average

Notes:

ASH wells gradient between ASH-01 and ASH-02 for dH and dL

8.935E-02

Low Hydraulic Conductivity

Low nyaraane cona.			
April ASH		October ASH	
K =	0.085	К =	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	
К =	1.44	К =	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	рН	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 ASH-01	Date 9/13/16	Antimony	D_Antimor	iy Arsenic	D_Arse	IC Barium	D_Bariun	n seryiium	D_Beryllur	n Cadmium L 0 1	J_Cadmiur	nunromiumi		m Cobat	D_Coba	0.12	D_Fluoride	Lead	D_Lead	1 Litnium	D_Lithur	1 Mercury I 0 1	J_Mercury	/ MolybdenumL		um kadium L	_kadium	Radium-226L)_Radium-2	26Radium-228D	Radium-22	28 Selenium L)_Selenium	n inalium	D_Inalium
ASH-01	11/3/16	1	0	1	0	11			0	0.1	0	1	0		0	0.12	0	1	0	410	1	0.1	0		0	0.91	1					2	1	-	0
ASH-01	12/20/16	1	0	1	0	0	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	ó	1	1	0	0.1	0	1	0	1	0	0.30	1	1	0	440	1	0.1	0		0	1.9	1					1	1	1	0
ASH-01	4/5/17	1	ő	1	0	8	i	1	0	0.1	0	1	0	1	ő	0.2	1	2	1	399	1	0.1	0	i	0	0.48	0					2	1	i	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	U	13.7	1	0.584	1	-0.0582	1	0.584	1	24.9	1	1	U
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	U

1	A B C	D E Background Statistic	F s for Data Set	G s with Non-De	H etects	I J K	L
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 App	endix III Total	2016-2021.xl	S	
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							
	Boron						
12							
13	General Statistics						
14	Total	Number of Observation	ns 28			Number of Distinct Observations	26
15						Number of Missing Observations	3
16		Minim	um 283			First Quartile	321
17		Second Larg	est 580			Median	461
18		Maxim	um 630			Third Quartile	490.3
10		Me	an 424.4			SD	100.9
		Coefficient of Variat				Skewness	-0.00677
20		Mean of logged D				SD of logged Data	0.247
21							
22		Critical Value	s for Backgro	und Threshol	d Values (BT	Vs)	
23	Tole	rance Factor K (For U	-			d2max (for USL)	2.714
24			2.210				2.711
25			Normal	GOF Test			
26	S	hapiro Wilk Test Statis				Shapiro Wilk GOF Test	
27		hapiro Wilk Critical Va				Normal at 5% Significance Level	
28		Lilliefors Test Statis			Data Not	Lilliefors GOF Test	
29	5	% Lilliefors Critical Va			Data Not	Normal at 5% Significance Level	
30			Not Normal at	5% Significa		Normal at 576 Significance Level	
31		Dulu		o to orginited			
32		Backgrour	d Statistics As	suming Norm	nal Distributio	n	
33	95%	JTL with 95% Covera				90% Percentile (z)	553.7
34	/3/00	95% UPL	-			95% Percentile (z)	590.3
35		95% U				99% Percentile (z)	659.1
36		/3/00	070.2			7776 T Creentine (2)	037.1
37			Camma	GOF Test			
38		A-D Test Statis			Anders	on-Darling Gamma GOF Test	
39		5% A-D Critical Va				na Distributed at 5% Significance Leve	
40		K-S Test Stati				rov-Smirnov Gamma GOF Test	
41		5% K-S Critical Va			-	na Distributed at 5% Significance Leve	
42			amma Distribu				
43		Data NULG		ieu al 070 Oly			
44			Comme	Statistics			
45				I SIGUISUCS		k star (bias corrected MLE)	15.77
46		k hat (MI Theta hat (MI				Theta star (bias corrected MLE)	26.91
47							883.2
48	КЛІ	nu hat (Ml LE Mean (bias correct				nu star (bias corrected)	
49	M	LE IVIEAN (DIAS CORRECT	ed) 424.4			MLE Sd (bias corrected)	106.9
50		D	Chatterine +			-	
51		-	d Statistics As	suming Gami	ma Distributio		F/F 0
52	95% Wilson Hilferty (W					90% Percentile	565.8
53	95% Hawkins Wixley (H					95% Percentile	614.1
54	95% WH Approx. Gamma l	JIL with 95% Covera	ge 689.1			99% Percentile	711.7

	A B C D E 95% HW Approx. Gamma UTL with 95% Coverage	F 695.5	G	Н	I	J K	L
55	95% WH USL	758				95% HW USL	768.4
56	7570 WITUSL	750				737011W U3L	700.4
57		Lognorma	I GOF Test				
58	Shapiro Wilk Test Statistic	0.87	I GOF TESI	Shan	iro Wilk L	ognormal GOF Test	
59	5% Shapiro Wilk Critical Value	0.87		-		at 5% Significance Level	
60	Lilliefors Test Statistic	0.924			0	normal GOF Test	
61	5% Lilliefors Critical Value	0.243			-	at 5% Significance Level	
62			t 5% Significa		ognormar		
63		.ognormar a	t 570 Signino				
64	Background Sta	atistics assu	mina Loanor	mal Distribut	ion		
65	95% UTL with 95% Coverage					90% Percentile (z)	565.8
66	95% UPL (t)					95% Percentile (z)	618.9
67	95% USL	805.9				99% Percentile (z)	732.3
68		00017				, , , e i e e e e e e e e e e e e e e e	70210
69	Nonparametric	Distribution	Free Backo	round Statist	ics		
70	Data do not fi		•				
71					,		
72	Nonparametric Upp	per Limits fo	r Background	d Threshold	Values		
73	Order of Statistic, r	28	Duongroum			UTL with 95% Coverage	630
74	Approx, f used to compute achieved CC	1.474	Approxima	te Actual Cor		oefficient achieved by UTL	0.762
75	· · · · · · · · · · · · · · · · · · ·					ed to achieve specified CC	59
76	95% Percentile Bootstrap UTL with 95% Coverage	630		•		UTL with 95% Coverage	
77	95% UPL	607.5				90% Percentile	
78 79	90% Chebyshev UPL	732.4				95% Percentile	
	95% Chebyshev UPL	871.9				99% Percentile	616.5
80 81	95% USL	630					
82							
83	Note: The use of USL tends to yield a conservati	ve estimate	of BTV, espe	cially when t	he sample	size starts exceeding 20.	
84	Therefore, one may use USL to estimate a BTV			-	-		
85	and consists of observa	ations collect	ted from clear	n unimpacted	l locations		
86	The use of USL tends to provide a balar	nce between	false positive	es and false r	negatives	provided the data	
87	represents a background data set and w	hen many or	nsite observa	tions need to	be compa	ared with the BTV.	
88							
	Calcium						
90							
	General Statistics						
92	Total Number of Observations	28			Numb	er of Distinct Observations	26
93					Numb	er of Missing Observations	3
94	Minimum	23200				First Quartile	26925
95	Second Largest	380000				Median	329500
96	Maximum	381000				Third Quartile	360750
97		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 f	or Backgrou	Ind Threshol	d Values (BT	'Vs)		
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			•	Vilk GOF Test	
106	5% Shapiro Wilk Critical Value	0.924		Data Not		t 5% Significance Level	
107	Lilliefors Test Statistic	0.327				s GOF Test	
108	5% Lilliefors Critical Value	0.164		Data Not	Normal a	t 5% Significance Level	

100	A B C D E Data Not	F t Normal at 5	G 5% Significar	H nce Level	I	J	K	L
109			one origination					
110	Background S	Statistics Ass	sumina Norm	al Distributio	n			
111	95% UTL with 95% Coverage					90%	% Percentile (z	433822
112	95% UPL (t)						% Percentile (z	
113	95% USL						% Percentile (z	
114 115								
115 116		Gamma	GOF Test					
117	A-D Test Statistic	4.48		Anders	son-Darli	ng Gamma (GOF Test	
118	5% A-D Critical Value	0.773	Da			-	Significance Le	evel
119	K-S Test Statistic	0.366		Kolmogo	orov-Smi	rnov Gamma	GOF Test	
120	5% K-S Critical Value	0.17	Da	ata Not Gamr	ma Distril	outed at 5% S	Significance Le	evel
121	Data Not Gam	ma Distribut	ed at 5% Sig	nificance Lev	vel			
122								
123		Gamma	Statistics					
124	k hat (MLE)	1.02				k star (bias o	corrected MLE	0.935
125	Theta hat (MLE)	220477			The	ta star (bias o	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		1						
129	Background S	tatistics Ass	uming Gamn	na Distributio	on			
130	95% Wilson Hilferty (WH) Approx. Gamma UPL					1	90% Percentile	9 526675
131	95% Hawkins Wixley (HW) Approx. Gamma UPL					1	95% Percentile	e 690250
132	95% WH Approx. Gamma UTL with 95% Coverage						99% Percentile	e 1071952
133	95% HW Approx. Gamma UTL with 95% Coverage							
134	95% WH USL	1322586					95% HW USL	1585803
135		-						
136		-	I GOF Test					
137	Shapiro Wilk Test Statistic			-		ognormal G	ificance Level	
138	5% Shapiro Wilk Critical Value Lilliefors Test Statistic				-	gnormal GOI		
139	5% Lilliefors Critical Value					-	ficance Level	
140			t 5% Significa		ognorma			
141		-ognormar a	t o /o olgillilot					
142 143	Background Sta	atistics assu	ming Lognor	mal Distribut	ion			
143	95% UTL with 95% Coverage					90%	% Percentile (z) 665363
145	95% UPL (t)	1189958				95%	% Percentile (z)) 1061791
146	95% USL	4203759				99%	% Percentile (z)) 2551505
147		1	1					1
148	Nonparametric	Distribution	Free Backgr	round Statist	ics			
149	Data do not f	follow a Disc	ernible Distri	ibution (0.05))			
150								
151	Nonparametric Up	-	r Background	d Threshold				
152	Order of Statistic, r						95% Coverage	
153	Approx, f used to compute achieved CC	1.474					chieved by UTL	
154			Approxim				ve specified CC	
155	95% Percentile Bootstrap UTL with 95% Coverage			95% BCA	Bootstra	-	95% Coverage	
156	95% UPL						90% Percentile	
157	90% Chebyshev UPL						95% Percentile	
158	95% Chebyshev UPL						99% Percentile	380730
159	95% USL	381000						
160	Note: The use of USL tends to yield a conservat	ivo octimata	of BTV/ conc		hosomel	o sizo storto	ovcooding 20	
161	Therefore, one may use USL to estimate a BTV		•	5	•		0	
162	mererore, one may use USE to estimate a BTV	only when t	ie uata set fe	presents a D	aunyiuuli	iu uala sel II	ee of outilets	

	A	E	3	С		D		E	F	G	Н			J	J		К	L
163			-	bo uso of !						ted from clear false positiv				ovided	tho de	ata		
164										nsite observa		0	•					
165			Te	presents a	раску								трак		ine b	Ι ν.		
166	Chloride																	
167	ernende																	
168 169	General S	tatistics																
170				Tot	tal Num	nber of	Observ	ations	26			N	umber	r of Dist	tinct C	bserv	/ations	20
170												Nu	umber	r of Miss	sing C	bserv	/ations	5
172							Mir	nimum	6.9						F	First Q	uartile	7.825
172						Se	econd L	argest	25.4							Ν	<i>l</i> edian	19.8
174							Max	ximum	29						T	hird Q	uartile	23.48
175								Mean	16.96								SD	7.812
176					Сс	pefficier	nt of Va	riation	0.461							Ske	wness	-0.263
177					1	Mean o	f logge	d Data	2.701					ç	SD of	logge	d Data	0.55
178																		
179									or Backgrou	Ind Thresho	ld Values ((BTVs)						
180				То	olerance	e Facto	or K (Fo	r UTL)	2.275						d2m	ax (fo	r USL)	2.681
181																		
182										GOF Test								
183					-		Test S		0.825			•		ilk GOF				
184				5%	Shapir				0.92		Data I	Not Norm		-		ice Le	evel	
185							Test S		0.223					GOF T				
186					5% Li	lliefors	Critical		0.17			Not Norm	hal at 5	5% Sigr	nifican	nce Le	evel	
187							Da	ata Not	Normal at 8	5% Significa	Ince Level							
188							Deelenn				nal Distrib							
189				050	% UTL ν		-		34.73	suming Norr	nai Distrib	ution				oroon	ntile (z)	26.97
190				93%	% UIL \	WILLI 93		JPL (t)	30.56								ntile (z)	28.97
191								6 USL	37.91								ntile (z)	35.14
192							757	0 0 0 0 D	57.71						///01	creen		
193									Gamma	GOF Test								
194						A-D	Test S	tatistic	2.429		And	derson-Da	arling	Gamm	na GO	F Tes	st	
195					5		Critical		0.748	C	Data Not Ga		-					el
196 197					-		Test S		0.27			ogorov-S			0			
197					5	% K-S	Critical	Value	0.172	C	Data Not Ga	-						el
198										ed at 5% Sig					5			
200																		
200									Gamma	Statistics								
202							k hat	(MLE)	4				k s	star (bia	as cor	rectec	MLE)	3.564
202						The	eta hat	(MLE)	4.24			Т	Theta s	star (bia	as cor	rected	d MLE)	4.759
204							nu hat	(MLE)	208					nu sta	ar (bia	is corr	rected)	185.3
205					MLE M	lean (bi	ias corr	ected)	16.96					MLE S	6d (bia	is corr	rected)	8.984
206								I										
207							-			uming Gam	ma Distrib	ution						
208				on Hilferty (• •			34.68								centile	29.01
209				ins Wixley (35.51								centile	33.92
210				ox. Gamma				-	42.69						999	% Per	centile	44.46
211	9	5% HW	Appr	ox. Gamma	a UTL v			-	44.45									
212						Q	95% W	H USL	49.54						95	5% H\	<i>N</i> USL	52.3
213									<u> </u>									
214					0.			· · · · · ·		I GOF Test						. <u>.</u>		
215				=			Test S		0.78			napiro Wi	-	-				
216				5%	Shapir	o vvilk	Critical	value	0.92		Data No	ot Lognor	mal a	1 5% Si	gnifica	ance L	_evel	

	A B C D E Lilliefors Test Statistic	F 0.286	G	H		J normal GOF	K	L
217	5% Lilliefors Critical Value	0.286			-	at 5% Signific		
218			t 5% Significa		Lognormai	at 576 Signino	ance Lever	
219		ognornal at	signine					
220	Background Sta	tistics assu	mina Loanor	mal Distribu	ition			
221	95% UTL with 95% Coverage	52.08				90%	Percentile (z)	30.15
222 223	95% UPL (t)	38.81					Percentile (z)	36.82
223 224	95% USL	65.11					Percentile (z)	53.57
224							. ,	
226	Nonparametric	Distribution	Free Backgr	round Statis	tics			
227	Data do not fo	ollow a Disc	ernible Distri	ibution (0.05	5)			
228								
229	Nonparametric Upp	er Limits for	r Background	d Threshold	Values			
230	Order of Statistic, r	26			95%	UTL with 95	5% Coverage	29
231	Approx, f used to compute achieved CC	1.368	Approximat	te Actual Co	nfidence C	oefficient achi	eved by UTL	0.736
232			Approxim	nate Sample	Size need	ed to achieve	specified CC	59
233	95% Percentile Bootstrap UTL with 95% Coverage	29		95% BCA	A Bootstrap	UTL with 95	5% Coverage	28.1
234	95% UPL	27.74					% Percentile	25
235	90% Chebyshev UPL	40.84					% 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 conservation		-	-	-		-	
240	Therefore, one may use USL to estimate a BTV	-		-	-		of outliers	
241	and consists of observa							
242	The use of USL tends to provide a balan	ice hetween	falso nositiva	es and false	negatives i	h art habivor	ata	
			•					
243	represents a background data set and wh		•					
244	represents a background data set and wh		•					
244 245			•					
244 245 246	represents a background data set and wh	nen many on	nsite observa					
244 245 246 247	represents a background data set and wt	nen many or General	•		o be compa	red with the B	TV.	3
244 245 246 247 248	represents a background data set and wh Fluoride Total Number of Observations	General	nsite observa		o be compa		TV.	3
244 245 246 247 248 249	represents a background data set and wh Fluoride Total Number of Observations Number of Distinct Observations	General 28 17	nsite observa		o be compa	red with the B	TV. Dbservations	
244 245 246 247 248 249 250	represents a background data set and wh Fluoride Total Number of Observations	General	nsite observa		D be compa	red with the B	TV. Dbservations Non-Detects	3
244 245 246 247 248 249 250 251	Fluoride Total Number of Observations Number of Distinct Observations Number of Distinct Detects Number of Distinct Detects	General 28 17 21 17	nsite observa		D be compa	er of Missing (Number of Der of Distinct	Dbservations Non-Detects	7
244 245 246 247 248 249 250 251 252	Fluoride Total Number of Observations Number of Distinct Observations Number of Detects	General 28 17 21	nsite observa		D be compa	er of Missing (Number of Der of Distinct Minimun	TV. Dbservations Non-Detects	7
244 245 246 247 248 249 250 251 252 253	Fluoride Total Number of Observations Number of Distinct Observations Number of Distinct Detects Number of Distinct Detects Minimum Detect	General 28 17 21 17 0.12	nsite observa		D be compa	er of Missing (Number of Der of Distinct Minimun Maximun	Dbservations Non-Detects Non-Detects	7 1 0.2
244 245 247 248 249 250 251 252 253 254	represents a background data set and where the s	General 28 17 21 17 0.12 1.65	nsite observa		D be compa	er of Missing (Number of Der of Distinct Minimun Maximun Percent	Dbservations Non-Detects Non-Detects n Non-Detect n Non-Detect	7 1 0.2 0.2
244 245 246 247 248 249 250 251 252 253 254 255	represents a background data set and where the s	General 28 17 21 17 0.12 1.65 0.129	nsite observa		Numb	er of Missing (Number of Der of Distinct Minimun Maximun Percent	Dbservations Non-Detects Non-Detects n Non-Detect n Non-Detect Non-Detects SD Detected	7 1 0.2 0.2 25%
244 245 246 247 248 250 251 252 253 255 255	Fluoride Fluoride Total Number of Observations Number of Distinct Observations Number of Distinct Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected	General 28 17 21 17 0.12 1.65 0.129 0.58	nsite observa		Numb	er of Missing (Number of Der of Distinct Minimun Maximun Percent	Dbservations Non-Detects Non-Detects n Non-Detect n Non-Detect Non-Detects SD Detected	7 1 0.2 0.2 25% 0.359
244 245 246 247 248 250 251 252 253 254 255 256 255	Fluoride Fluoride Total Number of Observations Number of Distinct Observations Number of Distinct Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected	General 28 17 21 17 0.12 1.65 0.129 0.58 -0.744	Statistics	tions need to	Numb	er of Missing (Number of Der of Distinct Minimun Maximun Percent	Dbservations Non-Detects Non-Detects n Non-Detect n Non-Detect Non-Detects SD Detected	7 1 0.2 0.2 25% 0.359
244 245 246 247 248 250 251 252 253 254 255 256 257 258	represents a background data set and where the set and the set and where the set and	General 28 17 21 17 0.12 1.65 0.129 0.58 -0.744	Statistics	tions need to	Numb	er of Missing (Number of Der of Distinct Minimun Percent D of Detected	Dbservations Non-Detects Non-Detects n Non-Detect n Non-Detect Non-Detects SD Detected	7 1 0.2 0.2 25% 0.359
244 245 246 247 248 250 251 252 253 254 255 255 255 255 255 255 255	represents a background data set and where the set and the set and where the set and	General 28 17 21 17 0.12 1.65 0.129 0.58 -0.744 or Backgrou	Statistics	tions need to	Numb	er of Missing (Number of Der of Distinct Minimun Percent D of Detected	Dbservations Non-Detects Non-Detects Non-Detect Non-Detect SD Detected Logged Data	7 1 0.2 0.2 25% 0.359 0.68
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298 299 300 301 302 303 304 305 306 307 308 307 308 309 310 311 312 313 314 315 316 317	95% Appr		95%	distribu M 6 Percer The f L	LE Me htile of followi 5% Cov	Thete Thete Thete Chisqu Chisqu Chisqu Stati Limits of Verage na USL Es Va	his is espec data, BTVs Minimun Maximun SE k hat (MLE a hat (MLE a hat (MLE u hat (MLE u hat (MLE s corrected are (2kstar 6 Percentile stics are co using Wilso WH 1.972 2.58 timates of (Mean (KM riance (KM k hat (KM	ially true wh and UCLs m 0.01 1.65 0.384 1.026 0.44 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.455 0.132 0.465 0.132 0.132	en the samp ay be compu- ay be	ROS Statis	small. gamr stics ey (H 959	na distrib	k star a star nu ML ted Da	(bias cc (bias cc i star (b E Sd (b 99 ata	estin orrec orrec ilas (0% 2% F	Me Med Cted MI correcto Correcto Percent Percent WH 1.426 SD (K Mean (K star (K	ean constant of the second sec	0.31 0.851 0.94 0.481 52.62 0.466 1.056 2.147 HW 1.559
298 299 300 301 302 303 304 305 306 307 308 307 308 309 310 311 312 313 314 315 316 317 318	95% Appr		95%	distribu M 6 Percer The f L	LE Me htile of followi 5% Cov	Thete Thete an (bia Chisqu 959 Ing stati Limits of verage na USL Es Va	his is espec data, BTVs Minimun Maximun SE k hat (MLE a hat (MLE) a hat (MLE) a hat (MLE) s corrected are (2kstar 6 Percentile stics are co using Wilsc WH 1.972 2.58 timates of (Mean (KM riance (KM k hat (KM nu hat (KM	ially true wh and UCLs m 0.01 1.65 0.384 1.026 0.44 0.452 0.452 0.452 0.452 0.452 0.455 0.455 0.1383 0 mputed usi n Hilferty (V HW 2.264 3.096 3 amma Para 0.465 0.132 0.1638 0.175	en the samp ay be compu- ay be	ROS Statis	small. gamr stics ey (H 959	na distrib	k star a star nu ML ted Da	(bias cc (bias cc i star (b E Sd (b 99 ata	estin orrec orrec ilas (0% 	Me Med Cted MI correcte Correcte Percent Percent WH 1.426 SD (K Mean (K star (K star (K	ean ian CV E) ed) ed) ile ile ile M) M) M) M)	0.31 0.851 0.94 0.481 52.62 0.466 1.056 2.147 HW 1.559 0.363 0.0703 1.487 83.26
298 299 300 301 302 303 304 305 306 307 308 307 308 309 310 311 312 313 314 315 316 317 318 319	95% Appr		95%	distribu M 6 Percer The f U . with 95 95% (LE Me ntile of followi 5% Cov Gamm	Thete Thete Thete Thete Pan (bia Chisqu 959 Ing stati Limits of Verage na USL Es Va Va	his is espec data, BTVs Minimun Maximun SE k hat (MLE a hat (MLE a hat (MLE s corrected are (2kstar 6 Percentile stics are ci using Wilsc WH 1.972 2.58 timates of (Mean (KM riance (KM k hat (KM nu hat (KM	ially true wh and UCLs m 0.01 1.65 0.384 1.026 0.44 57.44 0.452 0.5755 1.383 00000000000000000000000000000000000	en the samp ay be compu- ay be	ROS Statis	small. gamr stics ey (H 959	na distrib	k star a star nu ML ted Da	(bias cc (bias cc i star (b E Sd (b 90 99 ata	estir orrec orrec orrec 0% I 2% F 2% F 2% F 4 2% F 4 5% F 5% F 5% F 5% F 5% F 5% F 5% F 5% F	Me Med Cted MI correcto Percen Percent WH 1.420 SD (K Mean (K star (K star (K star (K	ean ian CV E) ed) ed) tile ile ile M) M) M) M)	0.31 0.851 0.94 0.481 52.62 0.466 1.056 2.147 HW 1.559
298 299 300 301 302 303 304 305 306 307 308 307 308 307 308 307 310 311 312 313 314 315 314 315 316 317 318 319 320	95% Appr		95%	distribu M 6 Percer The f U . with 95 95% (809	LE Mentile of followi Jpper 5% Cov Gamm	Thete Thete Thete Thete Chisqu 95% Ing stati Limits of verage ha USL Es Va USL	his is espec data, BTVs Minimun Maximun SE k hat (MLE a hat (MLE u hat (MLE u hat (MLE u hat (MLE corrected are (2kstar 6 Percentile stics are co using Wilsc WH 1.972 2.58 timates of 0 Mean (KM riance (KM k hat (KM nu hat (KM eta hat (KM	ially true wh and UCLs m 0.01 1.65 0.384 1.026 0.44 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.455 0.133 0 mputed usi n Hilferty (V HW 2.264 3.096 0 Gamma Para 0.465 0.132 0.132 0.1638 0.175 0.284 0.72	en the samp ay be compu- ay be	ROS Statis	small. gamr stics ey (H 959	na distrib	k star a star nu ted Da nods	(bias cc (bias cc i star (b E Sd (b 99 ata ama UP SE SE	estin orrec orrec iias c iias c 0% l 2% F 2% F	Me Med Cted MI correcto Percent Percent WH 1.426 SD (K Aean (K star (K star (K star (K star (K	ean constructions of the second secon	0.31 0.851 0.94 0.481 52.62 0.466 1.056 2.147 HW 1.559
298 299 300 301 302 303 304 305 306 307 308 307 308 309 310 311 312 313 314 315 314 315 316 317 318 319 320 321	95% Appr		95%	distribu M 6 Percer The f U . with 95 95% (809	LE Mentile of followi Jpper 5% Cov Gamm	Thete Thete Thete Thete Chisqu 95% Ing stati Limits of verage ha USL Es Va USL	his is espec data, BTVs Minimun Maximun SE k hat (MLE a hat (MLE a hat (MLE s corrected are (2kstar 6 Percentile stics are ci using Wilsc WH 1.972 2.58 timates of (Mean (KM riance (KM k hat (KM nu hat (KM	ially true wh and UCLs m 0.01 1.65 0.384 1.026 0.44 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.452 0.455 0.133 0 0.465 0.132 0.465 0.132 0.284 0.72	en the samp ay be compu- ay be	ROS Statis	small. gamr stics ey (H 959	na distrib	k star a star nu ted Da nods	(bias cc (bias cc i star (b E Sd (b 90 99 ata	estin orrec orrec iias c iias c 0% l 2% F 2% F	Me Med Cted MI correcto Percent Percent WH 1.426 SD (K Aean (K star (K star (K star (K star (K	ean constraints of the second	0.31 0.851 0.94 0.481 52.62 0.466 1.056 2.147 HW 1.559

	A B C D E The following statistics are c	F	G ing gamma d	H listribution a	 Ind KM es	J	K	L
325	Upper Limits using Wilson	•						
326		HW				nous	WH	HW
327	95% Approx. Gamma UTL with 95% Coverage 1.593	1.684		Q	5% Annro	x. Gamma UPL	1.212	1.247
328	95% KM Gamma Percentile 1.153	1.182		7.		% Gamma USL	2.004	2.175
329		1.102			75		2.004	2.175
330	Lognormal GC)F Test on D	etected Obs	ervations O	nlv			
331	Shapiro Wilk Test Statistic				•	Wilk GOF Test		
332	5% Shapiro Wilk Critical Value		Dete	ected Data a	•	normal at 5% S		evel
333	Lilliefors Test Statistic	0.232	Dott			ors GOF Test		
334	5% Lilliefors Critical Value			Data Not		I at 5% Significa	ance Level	
335	Detected Data appear A		Lognormal a		-	-		
336		-PP:						
337	Background Lognormal ROS Statistics	s Assumina	Lognormal D	istribution L	Jsing Impi	uted Non-Detec	ts	
338 339	Mean in Original Scale	0.467	J		5 1		in Log Scale	-1.086
340	SD in Original Scale	0.369					in Log Scale	0.857
341	95% UTL95% Coverage	2.313			95	5% BCA UTL95	-	1.367
341	95% Bootstrap (%) UTL95% Coverage	1.65				1	95% UPL (t)	1.491
342	90% Percentile (z)	1.012					Percentile (z)	1.382
344	99% Percentile (z)	2.478					95% USL	3.456
345								
345	Statistics using KM estimates	on Logged	Data and Ass	suming Logr	normal Dis	stribution		
347	KM Mean of Logged Data	-1.088		95%	6 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 As	suming Logr	normal Distr	ibution			
352	Mean in Original Scale	0.46				Mean i	in Log Scale	-1.134
353	SD in Original Scale	0.375				SD i	in Log Scale	0.902
354	95% UTL95% Coverage	2.442					95% UPL (t)	1.538
355	90% Percentile (z)	1.023				95% P	ercentile (z)	1.42
356	99% Percentile (z)	2.626					95% USL	3.727
357	DL/2 is not a Recommended Meth	nod. DL/2 pr	ovided for co	mparisons a	and histor	ical reasons.		
358								
359	Nonparametric		-					
360	Data appear to follow a	Discernible	Distribution a	at 5% Signif	icance Le	vel		
361								
362	Nonparametric Upper Limits for B		inction made	between de				
363	Order of Statistic, r	28				5% UTL with959	0	1.65
364	Approx, f used to compute achieved CC		Approxima	te Actual Co	ntidence (Coefficient achie	,	0.762
365	Approximate Sample Size needed to achieve specified CC	59					95% UPL	1.286
366	95% USL	1.65				95% KM Che	bysnev UPL	2.077
367	Note: The use of UCL to detail the second	huo cotine i	of DT\/	alalluur	the err '		ooding 22	
368	Note: The use of USL tends to yield a conservat							
369	Therefore, one may use USL to estimate a BTV	-		-	-		oroutilers	
370	and consists of observa The use of USL tends to provide a balar						ata	
371	represents a background data set and w							
372	represents a background data set and w	nen many Of	ISITE ODZELAG		o ne comp	area with the B	I V.	
373	pH							
374	<u>۲</u> ۰۰							
375	General Statistics							
370	Total Number of Observations	26			Num	ber of Distinct C)hservations	23
377		20				ber of Missing C		5
378					TACILL			5

	А		В		С		D		E		F	G		Н		I		J	\Box		К	L	
379								6	Minimu		6.55										uartile	7.15	
380								Sec	cond Large		9.25										/ledian	7.31	
381									Maximu		9.63									nird Q	artile	7.94	
382							0	1 - 1	Me		7.588									Cha	SD	0.71	
383									t of Variati		0.094							C [) of l		wness	1.30	
384							IVIea	an or	logged Da	ata	2.023							SL		oggeo	d Data	0.08	99
385								Crit	ical Value	o foi	r Packarou	nd Thresho		aluos (I		c)							
386						Tolor	anco Er		K (For UT		2.275			alues (i	DIV	5)			d2m	av (fo	r USL)	2.68	21
387						IUICI		actor		· L)	2.275							,			03L)	2.00) I
388											Normal (GOF Test											
389 390						Sł	napiro V	Nilk 1	Fest Statis	stic	0.892				S	hapiro	Wilk	GOF T	Test				
390 391					5		•		Critical Val		0.92			Data N		-		5 Signif		ce Le	vel		
391							-		Test Statis		0.19							OF Tes					
392						59	% Lillief	ors C	Critical Val	ue	0.17			Data N	lot N	Iormal	at 5%	5 Signif	ican	ce Le	vel		
394									Data I	Not N	Normal at 5	% Significa	ance	Level									
395																							
396								В	ackgroun	d Sta	atistics Ass	uming Nori	mal C	Distribu	ition								
397					9	5% U	TL with	ר 1	% Covera	ge	9.212							90	1% P	ercen	ntile (z)	8.50)3
398									95% UPL	(t)	8.83							95	% P	ercen	ntile (z)	8.76	52
399									95% US	SL	9.501							99	% P	ercen	ntile (z)	9.24	18
400																							
401												GOF Test											
402									Fest Statis		0.749						-	amma					
403									Critical Val		0.742	[Data I						Ŭ		nce Lev	el	
404									Fest Statis		0.189				-			Gamm					
405							5% K		Critical Val		0.171						ibuted	1 at 5%	Sigr	nificar	nce Lev	el	
406								Da	ata Not Ga	amm	a Distribute	ed at 5% Si	Ignific	cance L	_eve								
407											Gamma	Statistics											
408									k hat (ML	E)	125.2	Statistics					k sta	ar (bias	corr	ecter	IMLE)	110.8	
409								The	ta hat (ML		0.0606					The		ar (bias				0.06	
410									nu hat (ML	-	6512							-			rected)	5762	
411 412						ML	E Mear		as correcte		7.588							ILE Sd				0.72	21
412								•															
414								В	ackground	d Sta	atistics Ass	uming Gam	nma [Distribu	ution								
415		9	5% Wil	lson l	Hilfer	ty (W	H) Appr	rox. (Gamma Ul	PL	8.834	-							90%	6 Per	centile	8.52	26
416		95	% Haw	/kins	Wixle	ey (H∖	N) Appi	rox. (Gamma U	PL	8.835								9 5%	6 Per	centile	8.81	12
417	(95% V	NH Ap	prox.	Gam	ma U	TL with	ר 195	% Covera	ge	9.249								99 %	6 Per	centile	9.36	55
418	(95% F	HW Ap	prox.	Gam	ima U	TL with	ו 95	% Covera	ge	9.255												
419								9	5% WH U	SL	9.573				_				95	5% HV	N USL	9.58	34
420																<u> </u>							
421												GOF Test											
422							•		Fest Statis		0.922						-	ormal C					
423					5	% Sh	•		Critical Val		0.92		Da	ta appe		0			•		Level		
424									Fest Statis		0.183						-	mal GC					
425						59			Critical Val		0.17			Data No		-	aı at 5	% Sigr	ntica	ince L	evel		
426							Da	ata a	ippear Ap	prox	imate Logr	iormal at 59	% Sig	gnifican	ice l	_evel							
427								De	ckaround	Ctot	letice essi-	mingless	orm o'	Dictric	+ ¹ ~	n							
428					0	E0/ 1	TI		скground % Covera			ming Logno	Jimal		JULIO	11		00	<u>10/ n</u>	orcor	tilo (¬)	8.48	21
429					9	J % U			% Covera 95% UPL	•	9.273 8.838										ntile (z) ntile (z)	8.48	
430									95% UPL 95% U		9.618										ntile (z)	9.31	
431									7 0%U	JL	7.010							99	70 P	ercen	uie (Z)	7.31	0
432																							

	А	В		С	[D Nor	E	F C Distrib		G Free Back	aroi	H Ind Stat	tistics			J			К		L
433					r		•			ormal at 59	•										
434					L	Dala aj	phear yhb	UNIMALE	LUgi	ionnai at 57	/0 3	ignincai		.evei							
435						Nonnar	ametric II	ner l im	its for	r Backgrour	nd T	Thresho	ld Va	alues							
436						-	of Statistic,	•		Duckgrou					5% UT	TI with	959	% Cr	overage	2	9.63
437			Approx	cfused			chieved C		68	Approxim	ate	Actual (Confi								0.736
438										Approxi									5		59
439		95% Percer	ntile Bo	otstrap L	JTL wit	th 95%	% Coverag	e 9.6	3	1.1.								•	overage		9.63
440 441							95% UP												ercentile		8.235
441					909	% Chet	oyshev UP	9.7	7								95%	% Pe	ercentile	э	9.008
443					959	% Chet	yshev UP	L 10.7	76								99%	% Pe	ercentile	э	9.535
444							95% US	9.6	3												
445																					
446		Note: Th	he use	of USL te	ends to	o yield	a conserva	itive estir	nate	of BTV, esp	pecia	ally whe	en the	samp	le siz	e start	s exc	ceedi	ing 20.		
447		Therefo	ore, one	e may us	e USL	to esti	mate a BT	V only wi	nen th	ne data set r	repr	esents a	a bac	kgrour	nd da	ita set	free	of ou	utliers		
448					and	consist	ts of obser	ations c	ollect	ed from clea	an u	unimpac	cted lo	ocatior	1 S.						
449			The us	se of US	L tends	s to pro	ovide a bal	ance betv	ween	false positiv	ves	and fals	se ne	gatives	s prov	vided t	he da	ata			
450			represe	ents a ba	ackgrou	und dai	ta set and	when ma	ny on	site observ	atio	ns need	d to b	e com	parec	l with t	he B1	TV.			
451	represents a background data set and when many onsite observations need to be compared with the BTV.																				
452	Sulfate																				
453																					
454									neral	Statistics											
455							bservation							Num	nber c	of Miss	ing O)bser	rvations	5	5
456				Number			bservation														
457							r of Detect												Detects		1
458				Nu	umber		inct Detect							Nur	mber				Detects		1
459							mum Deteo		5								-	-	n-Detec	-	1
460							mum Deteo												n-Detec		1
461							ce Detecte		3							Perc			Detects		3.846%
462							an Detecte		/1						<u> </u>	Datas			etectec		990.3
463				wean	of Dete	ected L	ogged Dat	a 6.3	01						20.01	Delec	lea L	Logge	ed Data	1	1.594
464						Criti	cal Values	for Back	arou	nd Thresho		/aluos (c)							
465				Toler	ance F		K (For UTL		•			values (5)			d2m	av (f	or USL)	1	2.681
466				TUIEI	ancei			.) 2.2	75								uzm			/	2.001
467							Nor	mal GOI	- Tes	t on Detect	s O	nlv									
468				S	hapiro	Wilk T	est Statisti					,	S	haniro	Wilk	GOF	Test				
469					-		ritical Valu					Data				% Sign			evel		
470					-		est Statisti									OF Te					
471 472				59	% Lillie	efors C	ritical Valu					Data I				6 Sign		ice L	evel		
472 473				-	_					% Significa	ance					5					
473										-											
475					Kapla	an Meie	er (KM) Ba	ckgroun	d Stat	tistics Assu	ımin	ng Norm	nal Di	stribut	tion						
475							KM Mea	-				-							KM SD) ç	982.3
477					95% L	JTL95%	% Coverag	e 3455									95%	KM	UPL (t)) 2	931
478					90%	6 KM P	ercentile (z) 2480								95%	KM P	'erce	entile (z)) 2	837
479					99%	KM P	ercentile (z) 3506									9!	5% K	KM USL	_ 3	854
480										1											
481					DL/2	Subst	itution Bac	kground	Stati	stics Assur	minę	g Norma	al Dis	stributi	ion						
482							Mea	n 1221											SD) 1	002
483					95% L	JTL95%	% Coverag	e 3500									(95%	UPL (t)) 2	965
484					1	90% P	ercentile (z) 2505								9	5% P	erce	entile (z)) 2	869
485						99% P	ercentile (z) 3551										95	5% USL	_ 3	906
486				DL/2 is n	not a re	ecomm	ended me	hod. DL	/2 pro	ovided for c	omp	parisons	s and	l histo	rical ı	reasor	IS				
																		-			

	A	В		С		D	E		F	G	Н				J	К	L	
487									Tooto on Dr	tested Obs	nationa	Only						
488							Test Stati		3.735	etected Obse	rvations	-	orcon [Dorling	GOF T	t		
489					5 %		Critical Va		0.783	D	ata Not (-		gnificance L		
490							Test Stati		0.343						rnov GC			
491					5%		Critical Va		0.181	D	ata Not (-			gnificance L	evel	
492										ed at 5% Sig								
493													<u> </u>					
494 495							Gam	ima S	Statistics or	Detected D	ata Only	/						
495							k hat (M		0.761					k star ((bias co	rrected ML	E) 0.69	96
497						The	ta hat (M	LE)	1669				The	ta star ((bias co	rrected ML	E) 1824	
498						I	nu hat (M	LE)	38.03					nu	star (bi	as correcte	d) 34.8	
499				ML	LE Me	an (bia	as correct	ed)	1270								I	
500					MLE S	Sd (bia	as correct	ed)	1522			95	5% Perc	centile o	of Chisq	uare (2ksta	ır) 4.74	18
501																	i	
502										sing Imputed								
503										5 NDs with m	5							
504		GROS m	nay not							s <1.0, espec	-				small (e.g., <15-2))	
505				Foi	r such				-	yield incorre			Ls and	BTVs				
506		F		-11			-		-	n the sample				I				
507		For ga	amma	distribute	led det	tected	Minim		63.6	y be comput	ea using	gamm	na distri	bution	on Kivi e	estimates Mea	an 1241	
508							Maxim		2520							Media		
509								SD	981.5								V 0.79)1
510							k hat (M	-	0.777					k star i	(hias co	rrected ML		
511						The	ta hat (M		1597						-	rrected ML		5
512							nu hat (M	· ·	40.4						-	as correcte		7
513				ML	LE Me		as correct		1241						-	as correcte		
514 515			95%				uare (2ks		4.821						-	% Percent		
516						95	% Percer	ntile	4195						99	% Percentil	e 6803	
517				The fo	ollowi	ng stat	istics are	e com	nputed usin	g Gamma R	OS Stati	istics o	on Impu	ited Da	ta			
518				U	Jpper	Limits	using Wi	lson	Hilferty (WI	H) and Hawl	kins Wixl	ley (HV	N) Metl	hods				
519							WH		HW							WH	HW	
520	95% Ap	prox. Gamm	na UTL			-			7668			95%	Approx	x. Gam	ma UPL	4441	4958	
521				95% 0	Gamm	ia USL	8323		10372									
522																		
523						Es				meters using	KM Est	imates	6			00 ///	N 000 0	
524							Mean (k ariance (k		1221						SE 4	SD (KI of Mean (KI		
525						Va	k hat (k		1.545						SEC	k star (Kl		
526							nu hat (k		80.33							nu star (Ki	·	
527						th	ieta hat (k	-	790.3						th	eta star (KI		
528 520				80%	% gam		rcentile (k		1904				ç	0% dai		rcentile (KI	·	-
529 530					-	-	rcentile (k		3261					0		rcentile (KI	-	-
530						•								5		•		\neg
532				The	follow	ving st	atistics a	re co	mputed usi	ng gamma c	listributio	on and	KM es	timates	5			\neg
533				U	Jpper	Limits	using Wi	Ison	Hilferty (WI	H) and Hawl	kins Wixl	ley (HV	N) Metl	hods				
534							WH		HW							WH	HW	
535	95% Ap	prox. Gamm	na UTL	with 959	% Co\	verage	6709	\top	8275			95%			ma UPL		5208	
536		9	95% KN	A Gamm	na Pero	centile	4214		4764				959	% Gam	ma USL	8748	11386	
537																		
538							-			etected Obs	ervation	-						
539							Test Stati		0.695				•		OF Tes			
540				5% Sh	napiro	Wilk C	Critical Va	lue	0.918		Data N	Not Loo	gnorma	l at 5%	Signific	ance Leve		

	А		В		С	D		E	F		G	ł	-			J		K	(L
541					E			est Statistic				Det				SOF Tes				
542					5	% Lillien	ors C			-1 50/	Claudfler			Lognor	mai at :	5% Sigr	incar	ice Le	ever	
543								Data Not	Lognormal a	al 5%	Significa	ance L	Level							
544				Pack	around	ognorm		S Statistic	s Assuming		ormal D	lotribu	ution LL	cina Ir	nnutod	Non D	otoot			
545				Dack				iginal Scale			unnai D	ISUIDU		sing ii	nputeu			s n Log S	Scalo	6.229
546								iginal Scale										Log S		1.7
547								% Coverage							05% 5	BCA UT		-		2440
548				05%	Rootstra			% Coverage							90 % E				PL (t)	9781
549				9070	DUUISIIA			ercentile (z								05			ile (z)	8311
550								ercentile (z								75	7010		5 USL	48366
551							7/0 F		20472									9070) USL	40300
552					Statis	stics usi	na Ki	/ estimate	s on Logged	1 Data	and Ass	umin	a Loan	ormal	Distrib	ution				
553							-	ogged Data				sannių				gnormal	1)05%	6 C 0 14	erade	39139
554					ľ			ogged Data					7370		• •	% KM U	·		0	13735
555					95% KM			gnormal (z								% KM U	-	•	-	
556					7570 100			gnornar (z) 11303						/5				maij	00713
557						B	Backo	round DI /2	Statistics A	Assum	ina Loar	orma	l Distri	bution						
558							-	iginal Scale		Journ	y Logi	Jonna	. 21301	Sation		Me	an in	n Log S	Scale	6.09
559								iginal Scale										Log S		2.086
560								% Coverage										-		16664
561								ercentile (z								95				13644
562								ercentile (z								75	7010			118479
563					DI /2 is n				hod. DL/2 p	provide	d for co	mpari	sons a	nd his	torical	reasons	\$, 03L	110477
564										lonac		mpan	50115 0		loniour	lousen				
565							No	nparametri	c Distributio	n Free	Backor	ound	Statist	ics						
566	. <u></u>							-	follow a Dis		-									
567	. <u></u>												. (0.00	,						
568					Nonpara	metric U	Joper	Limits for	BTVs(no dis	stinctio	n made	betwe	een de	tects a	and nor	detects	5)			
569 570								of Statistic,								UTL witl		6 Cove	erage	2520
			A	oraa/	x, fused			chieved CC		qA	proximat	te Actu	ual Cor	nfidenc					-	0.736
571 572	Appro	ximat		• •				pecified CC			1							5	, 6 UPL	2408
572								95% USI							95	5% KM (Cheb	yshev	/ UPL	5584
574																				
575		Ν	lote: Th	e use	e of USL t	ends to	yield	a conserva	tive estimate	e of B1	rV, espe	cially	when t	he san	nple siz	e starts	sexce	edinç	g 20.	
576			Therefor	re, on	e may us	se USL t	o esti	mate a BTV	/ only when	the da	ita set re	prese	nts a b	ackgro	ound da	ita set f	ree o	of outli	ers	
577						and co	onsis	ts of observ	ations colled	cted fr	om clear	n unim	pacted	d locati	ions.					
578				The u	use of US	L tends	to pro	vide a bala	nce betwee	n false	e positive	es and	false r	negativ	/es pro	vided th	e dat	a		
579			r	epres	sents a ba	ackgrour	nd da	ta set and v	vhen many o	onsite	observat	tions r	need to	be co	mpared	d with th	e BT	V.		
580																				
	TDS																			
582																				
	General	Statis	tics																	
584					Total	Number	r of O	bservations	s 28					N	umber o	of Distin	nct Ob	oserva	ations	22
585														Nu	umber o	of Missir	ng Ob	oserva	ations	3
586								Minimun	n 384								Fi	rst Qu	Jartile	486.5
587							Sec	ond Larges	t 3600									M	edian	3250
588								Maximun	1 3900								Th	ird Qu	Jartile	3463
589								Mear	ו 2275										SD	1482
590						Coeffi	icient	of Variation	n 0.651									Skew	vness	-0.436
591						Mea	an of I	ogged Data	a 7.362							SE	D of Ic	ogged	Data	0.991
592																			I	
593							Criti	cal Values	for Backgro	ound T	hreshold	d Valu	es (BT	⁻Vs)						
594					Tole	rance Fa	actor	K (For UTL) 2.246							C	d2ma	x (for	USL)	2.714
- / 1									1											

	A B C D E	F	G	Н		J	K		L
595		Normal	GOF Test						
596	Shapiro Wilk Test Statistic	0.702			Shapiro V	Wilk GOF T	est		
597 500	5% Shapiro Wilk Critical Value	0.924			•		icance Leve		
598 599	Lilliefors Test Statistic					rs GOF Tes			
599 600	5% Lilliefors Critical Value			Data Not			icance Leve	el .	
601	Data Not	t Normal at 5	5% Significar	nce Level					
602									
603	Background S	statistics Ass	suming Norm	al Distributio	n				
604	95% UTL with 95% Coverage	5603				90	% Percentile	e (z)	4174
605	95% UPL (t)	4844				95	% Percentile	e (z)	4712
606	95% USL	6297				99	% Percentile	e (z)	5722
607		1	1						
608		Gamma	GOF Test						
609	A-D Test Statistic	4.292		Anders	son-Darlir	ng Gamma	GOF Test		
610	5% A-D Critical Value	0.763	Da	ata Not Gamr			-		/el
611	K-S Test Statistic	0.367		-			a GOF Test		
612	5% K-S Critical Value	0.168		ata Not Gamr		uted at 5%	Significance	e Lev	/el
613	Data Not Gam	ma Distribut	ed at 5% Sig	nificance Lev	vel				
614									
615			Statistics						10/7
616	k hat (MLE)	1.504					corrected N		
617	Theta hat (MLE)	1513			Ihet	-	corrected N		
618	nu hat (MLE) MLE Mean (bias corrected)	84.23					(bias correct) (bias correct)		76.54
619	MLE Mean (bias corrected)	2275				WILE SU	(bias correc	lea)	1946
620	Background S	tatistics Ass		na Distributio	מר				
621	95% Wilson Hilferty (WH) Approx. Gamma UPL		Summy Game				90% Perce	ntile	4851
622	95% Wilson Hillery (WH) Approx. Gamma UPL	6767					95% Perce		
623	95% WH Approx. Gamma UTL with 95% Coverage						99% Perce		
624	95% HW Approx. Gamma UTL with 95% Coverage								
625 626	95% WH USL						95% HW	USL	12318
627									
628		Lognorma	I GOF Test						
629	Shapiro Wilk Test Statistic	0.685		Shap	iro Wilk L	ognormal (GOF Test		
630	5% Shapiro Wilk Critical Value	0.924		Data Not L	ognormal	at 5% Sigr	nificance Lev	/el	
631	Lilliefors Test Statistic	0.369		Lilli	efors Log	normal GC	OF Test		
632	5% Lilliefors Critical Value	0.164		Data Not L	ognormal	at 5% Sigr	nificance Lev	/el	
633	Data Not L	ognormal a	t 5% Signific	ance Level					
634									
635	Background Sta		ming Lognor	mal Distribut	ion				
636	95% UTL with 95% Coverage						% Percentile		
637	95% UPL (t)						% Percentile		
638	95% USL	23220				99	% Percentile	e (z)	15804
639									
640	Nonparametric								
641	Data do not f	ollow a Disc	ernible Distr	ibution (0.05))				
642	N	and institut	• Declaration	d Theorem 197	Values				
643	Nonparametric Up		r Backgroun	a inreshold		/ 〒 '''	050/ 0		2000
644	Order of Statistic, r		Appro!	to Actual C			95% Cover	-	
645	Approx, f used to compute achieved CC	1.474		te Actual Cor			-		0.762 59
646	95% Percentile Bootstrap UTL with 95% Coverage	3900	Approxim	nate Sample			95% Cover		
647	95% Percentile Bootstrap UTL with 95% Coverage 95% UPL	3900		70 % BCA	וצווטטם י		95% Cover 90% Perce	-	
648	7370 UPL	5705					7070 T EICE	, IIIE	3000

	А	В	С	D	E	F	G	Н	I	J	К	L
649				90% Che	oyshev UPL	6799				95%	% Percentile	3600
650				95% Che	byshev UPL	8848				999	% Percentile	3819
651					95% USL	3900						
652												
653		Note: The	use of USL t	ends to yield	a conservati	ve estimate	of BTV, espe	cially when t	the sample s	ize starts exc	eeding 20.	
654		Therefore,	, one may us	e USL to esti	mate a BTV	only when th	ne data set re	epresents a b	ackground c	ata set free	of outliers	
655				and consis	ts of observa	ations collect	ed from clea	n unimpacted	d locations.			
656		Tł	ne use of US	L tends to pro	ovide a balar	nce between	false positive	es and false	negatives pr	ovided the da	nta	
657		rep	presents a ba	ickground da	ta set and w	hen many or	nsite observa	tions need to	be compare	ed with the B	ΓV.	
658												

	A B C	D E	F	G	Н	I	J K	L
1		Background Statistics fo	r Data Sets	with Non-De	ects			
2	User Selected Option							
3	Date/Time of Computation	ProUCL 5.11/19/2022 10						
4	From File	ProUCL Input PRPA CCI	R ASH Appe	endix IV Total	2016-202	1.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	Antimony							
11	Animony							
12			General	Statistics				
13	Tota	al Number of Observations	28			Numbe	r of Missing Observations	3
14		er of Distinct Observations	6					
15		Number of Detects	0				Number of Non-Detects	28
16	1	Number of Distinct Detects	0			Numb	er of Distinct Non-Detects	6
17		Minimum Detect	N/A				Minimum Non-Detect	0.5
18 19		Maximum Detect	N/A				Maximum Non-Detect	5
20		Variance Detected	N/A				Percent Non-Detects	100%
20		Mean Detected	N/A				SD Detected	N/A
21	Mear	n of Detected Logged Data	N/A			SD	of Detected Logged Data	N/A
22								
24	Warning: All obs	servations are Non-Detect	s (NDs), the	erefore all stat	istics and	d estimates sh	ould also be NDs!	
25	Specifically, samp	le mean, UCLs, UPLs, and	d other stati	stics are also	NDs lyin	g below the la	rgest detection limit!	
26	The Project Team may o	lecide to use alternative si	te specific	values to estir	nate envi	ironmental pa	rameters (e.g., EPC, BTV).
27								
28		The data set for	r variable A	ntimony was i	not proce	ssed!		
		The data set for	r variable A	ntimony was i	not proce	ssed!		
28		The data set for	r variable A	ntimony was i	not proce	ssed!		
28 29	Arsenic	The data set for	r variable A	ntimony was ı	not proce	ssedl		
28 29 30	Arsenic	The data set for			not proce	ssed!		
28 29 30 31			General	ntimony was i	not proce			
28 29 30 31 32	Tota	al Number of Observations	General 28		not proce		r of Missing Observations	3
28 29 30 31 32 33	Tota	al Number of Observations er of Distinct Observations	General 28 8		not proce			
28 29 30 31 32 33 34	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects	General 28 8 4		not proce	Numbe	Number of Non-Detects	24
28 29 30 31 32 33 34 35	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects	General 28 8 4 2		not proce	Numbe	Number of Non-Detects er of Distinct Non-Detects	24 6
28 29 30 31 32 33 34 35 36	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect	General 28 8 4 2 1.2		not proce	Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect	24 6 0.5
28 29 30 31 32 33 34 35 36 37	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect	General 28 8 4 2 1.2 1.3		not proce	Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect	24 6 0.5 5
28 29 30 31 32 33 34 35 36 37 38	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Jumber of Distinct Detects Minimum Detect Maximum Detect Variance Detected	General 28 8 4 2 1.2 1.3 0.0025			Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects	24 6 0.5 5 85.71%
28 29 30 31 32 33 34 35 36 37 38 39 40 41	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected	General 28 8 4 2 1.2 1.3 0.0025 1.225		not proce	Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected	24 6 0.5 5 85.71% 0.05
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Jumber of Distinct Detects Minimum Detect Maximum Detect Variance Detected	General 28 8 4 2 1.2 1.3 0.0025			Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects	24 6 0.5 5 85.71%
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected n of Detected Logged Data	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202	Statistics		Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected	24 6 0.5 5 85.71% 0.05
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44	Tota Numbe Mumbe Mear	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected of Detected Logged Data Critical Values f	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 or Backgrou	Statistics		Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45	Tota Numbe Mumbe Mear	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected n of Detected Logged Data	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202	Statistics		Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected	24 6 0.5 5 85.71% 0.05
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Tota Numbe Mumbe Mear	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected Mean Detected a of Detected Logged Data Critical Values fo erance Factor K (For UTL)	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 or Backgrou 2.246	Statistics	Values (Numbe	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47	Tota Numbe Mear Mear	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected Mean Detected of Detected Logged Data Critical Values fo erance Factor K (For UTL)	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 or Backgrou 2.246 al GOF Tes	Statistics	Values (Numbe Numbe SD	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data d2max (for USL)	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Jumber of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected Mean Detected of Detected Logged Data Critical Values fo erance Factor K (For UTL) Norm Shapiro Wilk Test Statistic	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 or Backgrou 2.246 al GOF Tes 0.63	Statistics	Values (Numbe Numbe SD BTVs) Shapiro W	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data d2max (for USL)	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49	Tota Numbe	al Number of Observations er of Distinct Observations Number of Detects Number of Detects Minimum Detect Maximum Detect Variance Detected Mean Detected Mean Detected of Detected Logged Data Critical Values fo erance Factor K (For UTL) Norm Shapiro Wilk Test Statistic Shapiro Wilk Critical Value	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 or Backgrou 2.246 al GOF Tes 0.63 0.748	Statistics	Values (Numbe Numbe SD (BTVs) Shapiro W Not Normal at	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data d2max (for USL)	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	Tota Numbe Mear Tole Tole	al Number of Observations er of Distinct Observations Number of Detects Jumber of Distinct Detects Minimum Detect Wariance Detected Mean Detected Mean Detected of Detected Logged Data Critical Values for erance Factor K (For UTL) Norm Shapiro Wilk Test Statistic Shapiro Wilk Critical Value Lilliefors Test Statistic	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 0r Backgrou 2.246 al GOF Tes 0.63 0.748 0.441	Statistics	Values (Donly	Numbe Numbe SD BTVs) Shapiro W Not Normal at Lilliefors	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data d2max (for USL) Ik GOF Test 5% Significance Level GOF Test	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51	Tota Numbe Mear Tole Tole	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected Mean Detected of Detected Logged Data Critical Values f erance Factor K (For UTL) Norm Shapiro Wilk Test Statistic Shapiro Wilk Critical Value Lilliefors Test Statistic 5% Lilliefors Critical Value	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 or Backgrou 2.246 al GOF Tes 0.63 0.748 0.441 0.375	Statistics	Values (Donly Data I	Numbe Numbe SD BTVs) Shapiro W Not Normal at Lilliefors	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data d2max (for USL)	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52	Tota Numbe Mear Tole Tole	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected Mean Detected of Detected Logged Data Critical Values f erance Factor K (For UTL) Norm Shapiro Wilk Test Statistic Shapiro Wilk Critical Value Lilliefors Test Statistic 5% Lilliefors Critical Value	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 or Backgrou 2.246 al GOF Tes 0.63 0.748 0.441 0.375	Statistics	Values (Donly Data I	Numbe Numbe SD BTVs) Shapiro W Not Normal at Lilliefors	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data d2max (for USL) Ik GOF Test 5% Significance Level GOF Test	24 6 0.5 5 85.71% 0.05 0.04
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51	Tota Numbe Mear Tole Tole	al Number of Observations er of Distinct Observations Number of Detects Number of Distinct Detects Minimum Detect Maximum Detect Variance Detected Mean Detected Mean Detected of Detected Logged Data Critical Values f erance Factor K (For UTL) Norm Shapiro Wilk Test Statistic Shapiro Wilk Critical Value Lilliefors Test Statistic 5% Lilliefors Critical Value	General 28 8 4 2 1.2 1.3 0.0025 1.225 0.202 0r Backgrou 2.246 al GOF Tes 0.63 0.748 0.441 0.375 Normal at 1	Statistics Statistics Ind Threshold St on Detects St on Detects St on Significant	Values (Donly Data I Data I Ce Level	Numbe Numbe SD BTVs) Shapiro W Not Normal at Lilliefors Not Normal at	Number of Non-Detects er of Distinct Non-Detects Minimum Non-Detect Maximum Non-Detect Percent Non-Detects SD Detected of Detected Logged Data d2max (for USL) d2max (for USL) Ilk GOF Test 5% Significance Level 5% Significance Level	24 6 0.5 5 85.71% 0.05 0.04

	А	В	С	D		E	F	G	Н		J	K	L
55					050/	KM Mean						KM SD	0.275
56						6 Coverage						6 KM UPL (t)	1.103
57						ercentile (z) ercentile (z)						Percentile (z)	1.079
58				99% KI	vi Pe	ercentile (Z)	1.207				9	5% KM USL	1.374
59					iheti	tution Back	around Stat	ictice Accum	ning Normal I	Distribution			
60				002.30	JUSU	Mean	-		ning Normai L			SD	0.544
61				95% LITI	95%	6 Coverage						95% UPL (t)	1.753
62						ercentile (z)						Percentile (z)	1.704
63						ercentile (z)					,,,,,	95% USL	2.287
64 65			DL/2 is					ovided for co	omparisons a	nd historica	al reasons		
66							•		•				
67					Ga	amma GOF	Tests on De	etected Obs	ervations On	ly			
68				A-	D Te	est Statistic	0.96		Ai	nderson-Da	rling GOF Te	est	
69				5% A-	D Cr	itical Value	0.657	C	ata Not Gam	ma Distribu	ted at 5% Sig	nificance Lev	el
70				K-	S Te	est Statistic	0.468		K	olmogorov	-Smirnov GO	F	
71				5% K-	S Cr	itical Value	0.394	C	ata Not Gam	ma Distribu	ted at 5% Sig	nificance Lev	el
72					Data	a Not Gam	ma Distribut	ed at 5% Sig	gnificance Le	vel			
73													
74						Gamma	Statistics or	Detected E	Data Only				
75					k	k hat (MLE)					star (bias cor	-	205.6
76				Г		a hat (MLE)	0.00149			Theta	star (bias cor	-	0.00596
77						u hat (MLE)					nu star (bia	as corrected)	1645
78			Μ		-	corrected)							
79				MLE Sd	(bias	corrected)	0.0854			95% Perce	ntile of Chisqu	uare (2kstar)	459.5
80								<u> </u>					
81			0000					• •	d Non-Detect				
82			-	-					nany tied observed		-		
83		GRUS may						-	cially when th ect values of l	-		e.g., <15-20)	
84			FU								1 1 5		
85		For dan	oma distribu	Ited detect			5	•	e size is smal			stimates	
86		i oi gan				Minimum	r					Mean	1.038
87						Maximum						Median	1.036
88						SD	0.11					CV	0.106
89 90					k	k hat (MLE)	92.31			k	star (bias cor		82.45
90 91				٦		a hat (MLE)	0.0112				star (bias cor	-	0.0126
92					nı	u hat (MLE)	5170				nu star (bia	as corrected)	4617
92 93			M	ILE Mean		corrected)	1.038				MLE Sd (bia	is corrected)	0.114
94			95% Percer	ntile of Chi	squa	are (2kstar)	195.9				90	% Percentile	1.187
95					95%	Percentile	1.233				99%	6 Percentile	1.323
96			The	following	statis	stics are co	mputed usin	g Gamma F	OS Statistics	s on Impute	d Data		
97			l	Upper Lim	its u	sing Wilso	n Hilferty (W	H) and Haw	kins Wixley (HW) Metho	ds		
98						WH	HW					WH	HW
99	95% App	rox. Gamma	UTL with 95	5% Covera	ige	1.301	1.304		95	6% Approx.	Gamma UPL	1.237	1.238
100			95%	Gamma U	SL	1.362	1.366						
101													
102								meters usin	g KM Estimat	les			
103						Mean (KM)						SD (KM)	0.275
104					Var	iance (KM)					SE o	f Mean (KM)	0.0663
105						k hat (KM)						k star (KM)	4.639
106						hu hat (KM)						nu star (KM)	259.8
107						ta hat (KM)						eta star (KM)	0.135
108			809	% gamma	perc	entile (KM)	0.849			909	% gamma pei	centile (KM)	1.015

	А	В		C	D % gamma per	E contilo (KM)	F 1.168	G	Н		J % gamma per	K contilo (KM)	L 1.491
109				70.	% yamma per		1.100			77	70 yannina per		1.471
110				The	e following sta	atistics are c	omputed usi	na aamma a	distribution a	and KM esti	mates		
111 112					Jpper Limits		-						
112						WH	HW		,			WH	HW
114	95% Appr	ox. Gamn	na UT	L with 95	5% Coverage	1.25	1.25		9	5% Approx.	Gamma UPL	1.072	1.067
115		ç	95% K	M Gamn	na Percentile	1.043	1.038			95%	Gamma USL	1.428	1.437
116													
117					Lo	gnormal GC)F Test on D	etected Obs	ervations O	only			
118				S	Shapiro Wilk T	est Statistic	0.63			Shapiro W	/ilk GOF Test		
119				5% S	hapiro Wilk C		0.748		Data Not	0	at 5% Significa	ance Level	
120						est Statistic	0.441				GOF Test		
121				5	5% Lilliefors C		0.375			Lognormal	at 5% Significa	ance Level	
122						Data Not L	ognormal at	5% Signific	ance Level				
123							<u> </u>						
124			Back	ground	-		-	Lognormal L	distribution l	Jsing Imput	ed Non-Detec		0.0400
125						riginal Scale						n Log Scale	0.0498
126					95% UTL95	riginal Scale	0.0968			050	BCA UTL95	n Log Scale	0.0909
127			95%	Rootstra	93% UTL95	0				937		% COVERAGE 95% UPL (t)	1.2
128			/3/0	Dootstra	• • •	Percentile (z)	1.181					ercentile (z)	1.221
129						Percentile (z)	1.299				,0,01	95% USL	1.345
130 131													
131				Stati	stics using KI	M estimates	on Logged I	Data and As	suming Log	normal Dist	ribution		
132					KM Mean of L		-0.537				Lognormal)959	% Coverage	1.253
134					KM SD of L	ogged Data	0.34			1	95% KM UPL	(Lognormal)	1.053
135				95% KM	Percentile Lo	ognormal (z)	1.022				95% KM USL	(Lognormal)	1.469
136							1	I					
137						round DL/2	Statistics As	suming Log	normal Disti	ribution			
138						riginal Scale	0.809					n Log Scale	-0.38
139						riginal Scale	0.544					n Log Scale	0.556
140					95% UTL95	0						95% UPL (t)	1.794
141						Percentile (z)	1.395				95% P	ercentile (z)	1.707
142						Percentile (z)	2.494	wided for or	maricone	and historia		95% USL	3.095
143					ot a Recomm				mparisons	and historic	ai reasons.		
144					No	nparametric	Distribution	Free Backo	round Statis	stics			
145						Data do not f		-					
146 147										-,			
147				Nonpara	metric Upper	Limits for B	TVs(no disti	nction made	between de	etects and r	ondetects)		
149					Order	of Statistic, r	28			959	% UTL with959	% Coverage	5
150			Appro	x, fused	to compute a	chieved CC	1.474	Approxima	te Actual Co	onfidence Co	pefficient achie	eved by UTL	0.762
151	Approxim	nate Samp	ole Siz	e neede	d to achieve s	specified CC	59					95% UPL	4.55
152						95% USL	5				95% KM Chel	byshev UPL	1.848
153												¥	
154					5			•	5		size starts exc	0	
155		Therefo	ore, on	ie may us							data set free	of outliers	
156			 .			ts of observa							
157					-			-			rovided the da		
158			repres	sents a b	ackground da	ita set and w	nen many or	isite observa	itions need t	o be compa	red with the B	IV.	
159	Parium												
100	Barium												
161	General Sta	tistice											
162	JENEI AI JIA	1131163											

	А	В	С		D	E	F	G	Н		J K	L
163				otal Nur	mber of C	bservations	28				of Distinct Observations	22
164						N 41-11-11-11-11-11-11-11-11-11-11-11-11-1	0			number	of Missing Observations	3
165					Coo	Minimum	8 67				First Quartile Median	9.525 10.5
166					Sec	ond Largest					Third Quartile	56.78
167						Mean	28.78				SD	24.95
168				0	oefficient	of Variation	0.867				Skewness	0.634
169						logged Data					SD of logged Data	0.899
170						loggou Data	21700				02 01 109900 2010	
171 172					Crit	ical Values f	or Backgrou	nd Thresh	old Values (B	TVs)		
172				Toleranc		K (For UTL)	-		•		d2max (for USL)	2.714
174												
175							Normal (GOF Test				
176				Shap	iro Wilk T	est Statistic	0.725			Shapiro Wil	k GOF Test	
177			59	% Shapi	ro Wilk C	critical Value	0.924		Data N	ot Normal at 5	% Significance Level	
178				L	illiefors T	est Statistic	0.358			Lilliefors	GOF Test	
179				5% L	illiefors C	critical Value	0.164		Data N	ot Normal at 5	% Significance Level	
180						Data Not	t Normal at 5	% Signific	ance Level			
181												
182						-		uming Nor	mal Distribut	ion		
183			95	5% UTL		% Coverage					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							Commo	GOF Test				
187						est Statistic	3.59	JOF Test	Ando	rson Darling	Gamma GOF Test	
188				F		critical Value	0.765			-	ed at 5% Significance Lev	el
189						est Statistic					v Gamma GOF Test	
190				ŗ		Critical Value	0.169			-	ed at 5% Significance Lev	el
191 192									ignificance L		5	
192									•			
194							Gamma	Statistics				
195						k hat (MLE)	1.414			k s	tar (bias corrected MLE)	1.287
196					The	ta hat (MLE)	20.35			Theta s	tar (bias corrected MLE)	22.36
197					r	nu hat (MLE)	79.2				nu star (bias corrected)	72.05
198				MLE N	/lean (bia	s corrected)	28.78				MLE Sd (bias corrected)	25.37
199												
200						•		uming Gar	nma Distribu	tion		
201						Gamma UPL					90% Percentile	62.26
202	05					Gamma UPL	83.33				95% Percentile	78.96
203						% Coverage					99% Percentile	117
204	95	70 HVV Аррг	ux. Gami	ma UTL		% Coverage						150.0
205					95	5% WH USL	139.9				95% HW USL	152.3
206							Lognorma	GOF Teel	<u> </u>			
207				Shan	iro Wilk T	est Statistic		GOITES		niro Wilk Loa	normal GOF Test	
208			50	•		critical Value					5% Significance Level	
209						Fest Statistic					rmal GOF Test	
210						critical Value				•	5% Significance Level	
211 212								5% Signif	icance Level	<u> </u>		
212								5				
213					Bac	ckground Sta	atistics assu	ming Logn	ormal Distrib	ution		
214			95	5% UTL		% Coverage					90% Percentile (z)	61.46
215						95% UPL (t)	92.28				95% Percentile (z)	85.21
210						.,	I					

	A B C D E	F	G	Н	I	J K	L				
217	217 95% USL 222.9 99% Percentile (z) 1										
218											
219	Nonparametric		-								
220	Data do not fo	ollow a Disc	ernible Distr	ibution (0.0	5)						
221											
222	Nonparametric Upp	er Limits for	r Backgroun	d Threshold	Values						
223	Order of Statistic, r	28				UTL with 95% Coverage	72.2				
224	Approx, f used to compute achieved CC	1.474				pefficient achieved by UTL	0.762				
225			Approxin	-		ed to achieve specified CC	59				
226	95% Percentile Bootstrap UTL with 95% Coverage	72.2		95% BC/	A 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			L								
232	Note: The use of USL tends to yield a conservative	ve estimate	of BTV, espe	cially when	the sample	size starts exceeding 20.					
233	Therefore, one may use USL to estimate a BTV	only when th	ne data set re	presents a b	background	data set free of outliers					
234	and consists of observa	tions collect	ed from clea	n unimpacte	d locations.						
235	The use of USL tends to provide a balan	ice between	false positive	es and false	negatives p	provided the data					
236	represents a background data set and wh	nen many or	nsite observa	tions need to	o be compa	red with the BTV.					
230											
	Beryllium										
230											
240		General	Statistics								
241	Total Number of Observations	28			Numbe	er 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			Numb	per of Distinct Non-Detects	6				
244	Minimum Detect	N/A				Minimum Non-Detect	0.2				
245	Maximum Detect	N/A				Maximum Non-Detect	2.5				
240	Variance Detected	N/A				Percent Non-Detects	100%				
247	Mean Detected	N/A				SD Detected	N/A				
240	Mean of Detected Logged Data	N/A			SE	of Detected Logged Data	N/A				
250 251	Warning: All observations are Non-Detects	s (NDs), the	refore all sta	tistics and e	estimates s	hould also be NDs!					
	Specifically, sample mean, UCLs, UPLs, and										
252	The Project Team may decide to use alternative si					-).				
253					innennar pe		,.				
254	The data set for	r variable Be	ervllium was	not process	sed!						
255											
256											
257	Cadmium										
200											
259		General	Statistics								
260	Total Number of Observations	28			Numb	er of Missing Observations	3				
261	Number of Distinct Observations	8					~				
262	Number of District Observations	0				Number of Non-Detects	28				
263	Number of Distinct Detects	0			Numh	per of Distinct Non-Detects	8				
264	Minimum Detect	N/A			NUTT	Minimum Non-Detect	8 0.08				
265	Maximum Detect	N/A				Maximum Non-Detect	5				
266	Variance Detected	N/A N/A				Percent Non-Detects	5 100%				
267	Variance Detected Mean Detected	N/A N/A				SD Detected	100% N/A				
268											
269	Mean of Detected Logged Data	N/A			SL	of Detected Logged Data	N/A				
270											

	А	B		D		E	F	G	H Hatiaa and		J should also b	K	L	
271			0											
272		-	• •								largest detec		^	
273		ne Project i	eam may de		JSe allen	lative si	te specific v		nate enviro	onmental p	arameters (e.	.g., EPC, BTV).	
274					The det			admium was i	ant propos	codi				
275					The dat				iot proces:	seui				
276														
277	Chromium													
270	Chiomium													
279							General	Statistics						
280			Total	Number	of Obser	vations	28	5121131103		Numh	er of Missing	Observations	3	
281				r of Distin			13			Nume				
282					umber of [9				Number of	f Non-Detects	19	
283			N	umber of			9			Num		t Non-Detects		
284					Minimum		1.6			- Turin		m Non-Detect		
285					Maximum		42.2					m Non-Detect		
286					ariance D		178.6					t Non-Detects		
287					Mean D		11.11					SD Detected	13.37	
288			Mean	of Detect			1.843			S	D of Detected	Logged Data		
289 290										-		- 33	L	
290					Critical \	Jalues fo	or Backgrou	nd Threshold	Values (B	TVs)				
291			Tole	rance Fa			2.246		•	•	d2r	max (for USL)	2.714	
292												. ,	<u> </u>	
293						Norm	al GOF Tes	t on Detects	Only					
295			S	Shapiro W	/ilk Test S		0.748			Shapiro \	Vilk GOF Tes	st		
296			5% S	hapiro Wi	ilk Critica	al Value	0.829		Data No	-	t 5% Significa			
297		Lilliefors Test Statistic 0.25 Lilliefors GOF Test												
298			5	5% Lilliefo	ors Critica	al Value	0.274	Det	ected Data	a appear No	ormal at 5% S	ignificance Le	vel	
299				Detec	ted Data	appear	Approximat	e Normal at 5	% Signific	ance Leve				
300														
301				Kaplan	Meier (K	M) Back	ground Staf	tistics Assum	ing Norma	I Distributio	on			
302					KN	M Mean	4.224					KM SD	8.576	
303				95% UT	L95% Co	overage	23.48				95	% KM UPL (t)	19.09	
304				90% K	(M Perce	ntile (z)	15.21				95% KM	Percentile (z)	18.33	
305				99% K	(M Perce	ntile (z)	24.17					95% KM USL	27.5	
306														
307				DL/2 S	ubstitutio	on Backę	ground Stati	stics Assumi	ng Normal	Distributio	n			
308						Mean	4.027					SD	8.815	
309					L95% Co	Ŭ	23.83					95% UPL (t)		
310)% Perce		15.32				95%	Percentile (z)		
311					% Perce		24.53					95% USL	27.96	
312			DL/2 is r	not a reco	ommende	ed metho	od. DL/2 pro	ovided for cor	nparisons	and histori	cal reasons			
313					<u> </u>		T			- h -				
314								etected Obser		•		- cot		
315					-D Test S		0.418	D-t- / /			Darling GOF T			
316					-D Critica		0.743	Detected				5% Significan	ce Level	
317					-S Test S		0.191	Dotocto-		-	v-Smirnov G	0F 5% Significar		
318								stributed at 5			וואטוושנים משטעוויזפים משטעניים משטעניים	J 70 SIGNINCAL		
319				Delec		appear								
320						Samma (Statistics or	Detected Da	ata Only					
321						t (MLE)	1.02				k star (hias co	prrected MLE)	0.754	
322					Theta ha		10.89				-	prrected MLE)	14.73	
323						t (MLE)	18.36			met	-	ias corrected)	14.73	
324					nund		10.30				nu siai (D		13.37	

	А	В	С	D	E	F	G	Н		J	К	L	
325				E Mean (bias	-	11.11			050/ D		(0)	4.000	
326				MLE Sd (bias	s corrected)	12.8			95% Percent	ile of Chisqu	are (2kstar)	4.998	
327						<u></u>							
328			0000					d Non-Detec					
329		CDOS may	-					-	servations at n he sample siz	-	a (1E 20)		
330		GRUS IIIay							UCLs and BT		.y., <15-20)		
331			FUI					le size is sma		VS			
332		For dam	oma distribute		•	5			mma distributi	ion on KM es	timates		
333		i or gun			Minimum	0.01	y be compa	lice using gai			Mean	3.578	
334					Maximum	42.2					Median	0.01	
335 336					SD	8.989					CV	2.512	
337					k hat (MLE)	0.194			k s	tar (bias corr	ected MLE)	0.197	
338				Thet	a hat (MLE)	18.43			Theta s	tar (bias corr	ected MLE)	18.15	
339				n	u hat (MLE)	10.87				nu star (bias	s corrected)	11.04	
340			ML	E Mean (bias	s corrected)	3.578				MLE Sd (bias	s corrected)	8.058	
341			95% Percent	tile of Chisqu	are (2kstar)	2.04				90%	6 Percentile	10.82	
342				95%	6 Percentile	18.51				99%	Percentile	39.71	
343			The fo	ollowing stati	stics are co	mputed usin	g Gamma F	ROS Statistic	s on Imputed	Data			
344			U	pper Limits u	using Wilsor	n Hilferty (WI	H) and Haw	kins Wixley	(HW) Method	S			
345					WH	HW					WH	HW	
346	95% App	rox. Gamma	UTL with 959	_	23.83	26.78		9	5% Approx. G	amma UPL	13.8	13.74	
347			95% 0	Gamma USL	36.45	45.31							
348													
349				ESI			meters usin	g KM Estima	ites			0.57(
350				Va	Mean (KM) riance (KM)	4.224 73.54				SE of	SD (KM)	8.576 1.719	
351				Va	k hat (KM)	0.243							
352					nu hat (KM)	13.59		nu star (KM)					
353					eta hat (KM)	17.41					ta star (KM)	13.46 17.57	
354 355			80%	gamma pero		6.047			90%	gamma pero		12.71	
355				gamma pero		20.68				gamma pero		42.02	
357				-						-			
358			The	following sta	itistics are c	omputed usi	ng gamma	distribution a	and KM estimation	ates			
359			U	pper Limits u	using Wilsor	n Hilferty (WI	H) and Haw	kins Wixley	(HW) Method	s			
360					WH	HW					WH	HW	
361	95% App	rox. Gamma	UTL with 959	% Coverage	19.55	19.3		9	5% Approx. G	amma UPL	13.41	12.79	
362		959	% KM Gamm	a Percentile	12.5	11.86			95% G	amma USL	26.58	27.17	
363													
364					-		etected Obs	servations O	-				
365				hapiro Wilk T		0.949			Shapiro Will				
366			5% Sr	hapiro Wilk C		0.829	Det	lected Data a	ippear Lognor		gnificance L	evei	
367			EC	Lilliefors C	est Statistic								
368			57					Significance			grinicarice L		
369				Deiel				-igninicance	_0,0				
370		B	ackground L	ognormal RC	OS Statistics	s Assumina I	_ognormal [Distribution L	Jsing Imputed	Non-Detect	ts		
371 372			J E	-	iginal Scale	3.764			0		n Log Scale	-0.649	
372					iginal Scale	8.916					n Log Scale	2.123	
373				95% UTL95%	-	61.56			95%	BCA UTL959	0	42.2	
375		9	5% Bootstrap		-	42.2				ç	95% UPL (t)	20.73	
376				90% P	ercentile (z)	7.942				95% P	ercentile (z)	17.18	
377				99% P	ercentile (z)	73.01					95% USL	166.4	
378													

	A B C	D E	F	G H I J K	L
379				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%	6 KM Percentile Lognormal (z)	10.16	95% KM USL (Lognormal)	31.96
383				· · · · · ·	
384		Background DL/2	Statistics As	ssuming 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 Meth	nod. DL/2 pr	ovided 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	Non	parametric Upper Limits for B	TVs(no disti	inction 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 ne	eeded to achieve specified CC	59	95% UPL	33.06
399		95% USL	42.2	95% KM Chebyshev UPL	42.27
400					
	Note: The use of L	JSL tends to yield a conservati	ve estimate	of BTV, especially when the sample size starts exceeding 20.	
401		-		ne data set represents a background data set free of outliers	
402		-	-	ted from clean unimpacted locations.	
403	The use of			false positives and false negatives provided the data	
404				nsite observations need to be compared with the BTV.	
405	· · · · ·	5	<u> </u>	· · · · · · · · · · · · · · · · · · ·	
406 407	Cobalt				
407					
408			General	Statistics	
409		Total Number of Observations	28	Number of Missing Observations	3
	Nu	mber of Distinct Observations	6		
411		Number of Detects	0	Number of Non-Detects	28
412		Number of Distinct Detects	0	Number of Distinct Non-Detects	6
413		Minimum Detect	N/A	Minimum Non-Detect	0.5
414		Maximum Detect	N/A	Maximum Non-Detect	5
415		Variance Detected	N/A	Percent Non-Detects	100%
416		Mean Detected	N/A	SD Detected	N/A
417	٨	lean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A
418					
419	 Warning· ΔΙΙ	observations are Non-Detect	s (NDs) the	erefore all statistics and estimates should also be NDs!	
420	-			stics are also NDs lying below the largest detection limit!	
421		ampio mouri, 0003, 01 L3, all			
		av decide to use alternative s	ite snerifir v	values to estimate environmental narameters (e.g. EDC PT\A	
422		ay decide to use alternative s	ite specific \	values to estimate environmental parameters (e.g., EPC, BTV)	
423		<u> </u>			
423 424		<u> </u>		values to estimate environmental parameters (e.g., EPC, BTV) Cobalt was not processed!	
423 424 425		<u> </u>			
423 424 425 426	Eluoride	<u> </u>			
423 424 425 426 427	Fluoride	<u> </u>			
423 424 425 426 427 428	Fluoride	<u> </u>	for variable (Cobalt was not processed!	
423 424 425 426 427 428 429		The data set f	for variable of General	Cobalt was not processed! Statistics	
423 424 425 426 427 428 429 430		The data set f	for variable of General	Cobalt was not processed!	3
423 424 425 426 427 428 429		The data set f	for variable of General	Cobalt was not processed! Statistics	

	А	В		C	D	E	F	G	Н	l I	J	K	L
433				NUr		tinct Detects	17			NUM		t Non-Detects m Non-Detect	1 0.2
434						mum Detect	0.12						
435						imum Detect	1.65					m Non-Detect	0.2
436						an Detected					Percen	t Non-Detects SD Detected	25% 0.359
437				Moon of	-					CI) of Dotootod		
438				iviean oi	Delected	_ogged Data	-0.744			51	J OI Delected	Logged Data	0.68
439					Crit	ical Values f	or Backgrou	nd Thresho	d Values (I	RT\/e)			
440				Tolera		K (For UTL)	-			51 (3)	d2r	max (for USL)	2.714
441				Totora			2.210				421		2.7.11
442						Norm	nal GOF Tes	t on Detect	s Only				
443 444				Sh	apiro Wilk 1	Fest Statistic			, ,	Shapiro V	Vilk GOF Tes	st	
444					-	Critical Value			Data N	•	t 5% Significa		
445					-	Fest Statistic	0.187				s GOF Test		
440				5%	Lilliefors C	Critical Value	0.188	C	Detected Dat	a appear No	rmal at 5% S	ignificance Le	vel
448					Detected	Data appear	· Approximat	e Normal a	t 5% Signifi	cance Level			
449													
450				I	Kaplan Mei	er (KM) Bac	kground Sta	tistics Assu	iming Norm	al Distributio	n		
451						KM Mean	0.465					KM SD	0.363
452				9	5% UTL95	% Coverage	1.281				95	% KM UPL (t)	1.095
453					90% KM F	Percentile (z)	0.931				95% KM	Percentile (z)	1.063
454					99% KM F	Percentile (z)	1.31					95% KM USL	1.451
455													
456					DL/2 Subs	titution Back	ground Stati	stics Assur	ming Norma	I Distribution	า		
457						Mean	0.46		0.375				
458				9		% Coverage	1.302		1.11				
459						Percentile (z)	0.94				95%	Percentile (z)	1.077
460						Percentile (z)	1.332					95% USL	1.478
461			D	_/2 is no	t a recomn	nended meth	nod. DL/2 pro	ovided for c	omparisons	and historic	al reasons		
462							T			No. 1			
463						Samma GOF		etected Obs				F 4	
464						Fest Statistic		r			arling GOF T		val
465						Critical Value		L	Jala Nol Ga		v-Smirnov G	gnificance Lev	/ei
466						Critical Value		г	Data Not Ca	-		gnificance Lev	vol.
467						ata Not Gami						gillicance Lev	
468					De				grinicarice				
469						Gamma	Statistics or	Detected	Data Only				
470						k hat (MLE)				ŀ	star (bias co	prrected MLE)	2.312
471					The	ta hat (MLE)	0.218				-	prrected MLE)	0.251
472 473						nu hat (MLE)	111.7					ias corrected)	97.1
473				MLE		is corrected)					(· · · · '	
474					-	is corrected)				95% Perce	entile of Chiso	quare (2kstar)	10.48
475													
470					C	Gamma ROS	Statistics u	sing Impute	ed Non-Dete	ects			
478			GRO	S may r	ot be used	when data s	et has > 50%	NDs with r	many tied ob	oservations a	t multiple DL	S	
479		GROS may	y not b	e used v	vhen kstar	of detects is	small such a	s <1.0, espe	ecially when	the sample	size is small ((e.g., <15-20)	
480				For	such situat	ions, GROS	method may	yield incorr	ect values o	f UCLs and I	BTVs		
481					Т	his is especi	ally true whe	n the samp	le size is sm	nall.			
482		For gar	mma d	istribute	d detected	data, BTVs a	ind UCLs ma	y be compu	uted using g	amma distrib	ution 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			ŀ	k star (bias co	prrected MLE)	0.94
													·

	А	В	С	D	E	F	G	H			J	K	L
487					eta hat (MLE)	0.44				Theta s	star (bias corr	-	0.481
488					nu hat (MLE)	57.44					nu star (bia		52.62
489				-	as corrected) uare (2kstar)	0.452 5.755					MLE Sd (bia	s corrected) 6 Percentile	0.466
490			93% Percer		% Percentile	1.383						Percentile	2.147
491			The f		tistics are co		a Gamma I	ROS Statis	stics c	n Imputer		Fercentile	2.147
492				•	using Wilsor	•	•			•			
493					WH	HW			<i></i>			WH	HW
494 495	95% Appr	ox. Gamma	UTL with 95	% Coverage		2.264			95%	Approx. C	Gamma UPL	1.426	1.559
495 496				Gamma USL		3.096							
490													
498				E	stimates of G	amma Parai	meters usir	ng KM Estir	mates	5			
499					Mean (KM)	0.465						SD (KM)	0.363
500				V	ariance (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					eta hat (KM)	0.284						ta star (KM)	0.313
504				0 1	rcentile (KM)	0.72					6 gamma per		0.971
505			95%	% gamma pe	rcentile (KM)	1.215				99%	6 gamma per	centile (KM)	1.766
506													
507				-	atistics are c	•							
508			L	Jpper Limits	using Wilsor	HIITERTY (W	H) and Hav	VKINS WIXIE	ey (HN	w) Method	ls		
509	0E% Appr	ov Commo		% Coverage		1.684			05.0/	Approx (Gamma UPL	WH 1.212	HW 1.247
510	9576 Appi			na Percentile		1.182			7370		Gamma USL	2.004	2.175
511		/3/			1.135	1.102				/3/00		2.004	2.175
512 513				L	ognormal GC	F Test on D	etected Ob	servations	only	1			
513			S		Test Statistic	0.912			-		k GOF Test		
514				•	Critical Value	0.908	De	etected Data		•	rmal at 5% S	ignificance L	evel
516				Lilliefors	Test Statistic	0.232				Lilliefors	GOF Test		
517			5	% Lilliefors	Critical Value	0.188		Data N	lot Lo	gnormal at	t 5% Significa	ince Level	
518				Detected D	ata appear A	pproximate	Lognormal	at 5% Sigi	nifica	nce Level			
519													
520		B	ackground L	•	OS Statistics	•	ognormal	Distribution	n Usir	ng Impute			
521					riginal Scale							n Log Scale	-1.086
522					riginal Scale	0.369						n Log Scale	0.857
523		0			% Coverage	2.313				95%	BCA UTL959	0	1.367
524		9	o% Bootstra	• • •	% Coverage Percentile (z)	1.65 1.012						95% UPL (t) ercentile (z)	1.491 1.382
525					Percentile (z) Percentile (z)	2.478					70% P	95% USL	3.456
526				77 /0		2.470						7370 USL	0.400
527			Statis	stics usina k	M estimates	on Loaaed I	Data and A	ssumina I a	oanor	mal Distri	bution		
528 529				-	Logged Data	-1.088		-	-		ognormal)959	% Coverage	2.161
529 530					Logged Data	0.828					5% KM UPL		1.414
530			95% KM		ognormal (z)	1.314					5% KM USL		3.184
532													
533				Back	ground DL/2	Statistics As	suming Lo	gnormal Di	istribu	ution			
534				Mean in C	riginal Scale	0.46						n Log Scale	-1.134
535					riginal Scale	0.375						n Log Scale	0.902
536					% Coverage	2.442						95% UPL (t)	1.538
537					Percentile (z)	1.023					95% P	ercentile (z)	1.42
538			_		Percentile (z)	2.626						95% USL	3.727
539			DL/2 is n	ot a Recom	mended Meth	od. DL/2 pro	ovided for c	comparison	ns and	d historica	l reasons.		
540													

	A B C D E	F	G H			J	K		L
541	Nonparametric Data appear to follow a		Free Background S			1			
542		Discernible		Significance	e Levei				
543	Nonparametric Upper Limits for E	TVs(no disti	nction made betwee	en detects	and no	ndetects)			
544	Order of Statistic, r	•				UTL with95	% Cove	erage	1.65
545 546	Approx, f used to compute achieved CC		Approximate Actu	al Confider				Ũ	0.762
546 547	Approximate Sample Size needed to achieve specified CC		TT				5	UPL	1.286
548	95% USL	1.65			Ç	95% KM Che	byshev	UPL	2.077
549							-		
550	Note: The use of USL tends to yield a conserval	ive estimate	of BTV, especially w	vhen the sa	ample s	ize starts ex	ceeding	g 20.	
551	Therefore, one may use USL to estimate a BTV	only when th	ne data set represen	nts a backg	round c	lata set free	of outli	ers	
552	and consists of observ	ations collect	ed from clean unimp	pacted loca	ations.				
553	The use of USL tends to provide a bala		•	•					
554	represents a background data set and w	hen many or	site observations ne	eed to be c	ompare	ed with the B	TV.		
555									
556	Lead								
557									
558			Statistics						
559	Total Number of Observations			Γ	Number	of Missing C	Jbserva	ations	3
560	Number of Distinct Observations Number of Detects					Number of	Non De	tooto	26
561	Number of Detects				Numbe	r of Distinct			5
562	Minimum Detect				Numbe	Minimum			1
563	Maximum Detect					Maximum			5
564	Variance Detected					Percent			92.86%
565 566	Mean Detected						SD Det		1.061
567	Mean of Detected Logged Data				SD	of Detected I			0.98
568									
569	Warning: [Data set has	only 2 Detected Val	lues.					
570	This is not enough to com	pute meanin	gful or reliable stati	stics and e	estimate	es.			
571									
572									
573		-	nd Threshold Value	es (BTVs)					
574	Tolerance Factor K (For UTL)	2.246				d2m	nax (for	USL)	2.714
575									
576			t on Detects Only						
577	Not Er	lough Data to	Perform GOF Tes	51					
578	Kaplan Meier (KM) Bac	karound Sta	tistics Assuming No	ormal Distr	ibution				
579	KM Mean	•			bullon		К	M SD	0.3
580 581	95% UTL95% Coverage					95%	6 KM U		1.082
	90% KM Percentile (z)					95% KM F			1.056
582 583	99% KM Percentile (z)						95% KN		1.376
583 584		<u> </u>							
585	DL/2 Substitution Bacl	ground Stat	stics Assuming No	rmal Distri	bution				
586	Mean	0.768						SD	0.569
587	95% UTL95% Coverage	2.046					95% U	PL (t)	1.754
588	90% Percentile (z)					95% F	Percent	ile (z)	1.704
589	99% Percentile (z)						95%	USL	2.312
590	DL/2 is not a recommended met	hod. DL/2 pro	ovided for comparis	ons and hi	storica	l reasons			
591									
592			etected Observation	•					
593	Not Er	ough Data to	Perform GOF Tes	t					
594									

	A B C D	E	F Chatlation or	G H	l J	K	L
595				Detected Data Only			N1/ 0
596		hat (MLE)	2.394		k star (bias cor		N/A
597		hat (MLE)	0.522		Theta star (bias cor	-	N/A
598		hat (MLE)	9.577		nu star (bia	as corrected)	N/A
599	MLE Mean (bias o	-	N/A			(0)	N1/A
600	MLE Sd (bias o	corrected)	N/A		95% Percentile of Chisq	uare (2kstar)	N/A
601	Ectin	natos of C	amma Darai	meters using KM Estim	atos		
602		lean (KM)	0.563			SD (KM)	0.3
603		ance (KM)	0.0898		SEO	of Mean (KM)	0.0865
604		chat (KM)	3.522		3E 0	k star (KM)	3.168
605		u hat (KM)	197.2			nu star (KM)	177.4
606		a hat (KM)	0.16			eta star (KM)	0.178
607	80% gamma perce		0.797		90% gamma pe		0.986
608 609	95% gamma perce		1.162		99% gamma per		1.543
610		. ,				. ,	
611	The following statis	stics are co	omputed usi	ng gamma distribution	and KM estimates		
612	Upper Limits us	ing Wilson	Hilferty (WI	H) 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		1		L			
617	Logr	normal GO	F Test on D	etected Observations (Only		
618		Not End	ough Data to	Perform GOF Test			
619							
620	Background Lognormal ROS			ognormal Distribution			
621	Mean in Orig		0.607			in Log Scale	-0.652
622	SD in Orig		0.381			in Log Scale	0.551
623	95% UTL95%	0	1.795		95% BCA UTL95	0	2
624	95% Bootstrap (%) UTL95%	-	2			95% UPL (t)	1.354
625	90% Per		1.055		95% F	Percentile (z)	1.289
626	99% Per	centile (z)	1.876			95% USL	2.323
627	Statistics using KM	octimator		Data and Assuming Log	anormal Distribution		
628	KM Mean of Log		-0.635		i% KM UTL (Lognormal)95	% Coverage	0.987
629	KM Mean of Log KM SD of Log		0.277	7.	95% KM UPL	U	0.856
630	95% KM Percentile Log		0.835		95% KM USL	-	1.124
631	, ere turt ereet me 20g.	101111di (L)				(209.1011114)	
632 633	Backgro	und DL/2 S	Statistics As	suming Lognormal Dis	tribution		
634	Mean in Origi		0.768	5 5		in Log Scale	-0.433
635	- SD in Orig	inal Scale	0.569		SD	in Log Scale	0.525
636	95% UTL95%		2.108			95% UPL (t)	1.61
637	90% Per	centile (z)	1.27		95% F	Percentile (z)	1.537
638	99% Per	centile (z)	2.198			95% USL	2.695
639	DL/2 is not a Recommen	nded Meth	od. DL/2 pro	ovided for comparisons	and historical reasons.		
640							
641	Nonp	arametric	Distribution	Free Background Stat	istics		
642	Dat	ta do not fo	ollow a Disc	ernible Distribution (0.0	05)		
643							
644	Nonparametric Upper Li	imits for B	TVs(no disti	nction made between o	letects and nondetects)		
645		Statistic, r	28		95% UTL with95	0	5
646	Approx, f used to compute ach		1.474	Approximate Actual C	onfidence Coefficient achi	5	0.762
647	Approximate Sample Size needed to achieve spe		59			95% UPL	4.55
648		95% USL	5		95% KM Che	byshev UPL	1.892

	А	В	С	D	E	F	G	Н		J		К	L		
649		Nota, The	uso of LICL +	onde to vial-	2 000000101	vo octimata			the commit-	cizo ctori	6 0105	odina 20			
650				-			-	ecially when	-			-			
651		ineretore	e, one may us			-		represents a l an unimpacte	-		iree of	outliers			
652		т	hausanfiis					ves and false			he data	1			
653				•			•	ations need t	• ·						
654		10										•			
655	Lithium														
656	Litingin														
657 658	General Sta	atistics													
658 659			Total	Number of C	Observations	28			Numb	er of Disti	inct Ob	servations	27		
660									Numb	er of Miss	ing Ob	servations	3		
661					Minimum	51.6					Fire	st Quartile	57.2		
662				Sec	ond Largest	525						Median	398.5		
663					Maximum	570					Thir	d Quartile	410.8		
664					Mean	282.5						SD	187		
665				Coefficient	t of Variation	0.662					1	Skewness	-0.317		
666				Mean of	logged Data	5.272				S	D of lo	gged Data	0.995		
667															
668				Crit	ical Values f	or Backgrou	nd Thresho	old Values (B	TVs)						
669			Tole	rance Factor	K (For UTL)	2.246					d2max	(for USL)	2.714		
670															
671							GOF Test								
672				hapiro Wilk 1		0.759			Shapiro V						
673		5% Shapiro Wilk Critical Value 0.924 Data Not Normal at 5% Significance Level Lilliefors Test Statistic 0.319 Lilliefors GOF Test													
674															
675	5% Lilliefors Critical Value 0.164 Data Not Normal at 5% Significance Level Data Not Normal at 5% Significance Level														
676					Data Not	Normal at 5	5% Significa	ance Level							
677				D	ackaround S	tatistics Acc	uming New	mal Distributi	ion						
678			0F% I		аскground S % Coverage					n	0% Por	centile (z)	522.2		
679			7070		95% UPL (t)	606.7						centile (z)	522.2 590.1		
680					95% USL	790.1						centile (z)	717.5		
681 682										,		(-)			
682 683						Gamma	GOF Test								
683 684				A-D 1	Fest Statistic	3.86		Ande	rson-Darlin	ig Gamma	a GOF	Test			
685					Critical Value	0.763	[Data Not Gan		-			rel		
686				K-S 1	Fest Statistic	0.357		Kolmog	gorov-Smiri	nov Gamr	ma GO	F Test			
687				5% K-S C	Critical Value	0.168	[Data Not Gan	nma Distrib	uted at 5%	6 Signif	icance Lev	el		
688				Da	ita Not Gamr	na Distribut	ed at 5% Si	gnificance Le	evel						
689															
690							Statistics								
691					k hat (MLE)	1.488						cted MLE)	1.353		
692					ta hat (MLE)	189.8			Theta			cted MLE)	208.9		
693					nu hat (MLE)	83.34						corrected)	75.74		
694			M	_E Mean (bia	is corrected)	282.5				MLE So	d (bias	corrected)	242.9		
695															
696		050/11	1,000 - 4-1		-		uming Gar	nma Distribut	lion		<u> </u>	<u> </u>	(02.2		
697			on Hilferty (W			793.4						Percentile	603.8		
698	07		ns Wixley (H			842.6						Percentile	762.1		
699			ox. Gamma l		-	1059					99%	Percentile	1122		
700	95	70 HVV Appr	ox. Gamma l		-	1167					050		1527		
701				9	5% WH USL	1349					95%	6 HW USL	1537		
702															

700	A B C D E	F	G I GOF Test	Н		J	K		L			
703	Shapiro Wilk Test Statistic	0.707		Shapiro	Wilk Lo	gnormal (GOF Test					
704	5% Shapiro Wilk Critical Value	0.924		-		-	nificance Leve	el				
705	Lilliefors Test Statistic	0.362		-	-	normal GC						
706 707	5% Lilliefors Critical Value	0.164			•		nificance Leve	el				
707			t 5% Significa		,	5						
708		5	5									
709	Background Sta	itistics assu	ming Lognorr	nal Distributio	n							
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			I									
715	Nonparametric	Distribution	Free Backgr	ound Statistics	5							
716	Data do not fe	ollow a Disc	ernible Distri	bution (0.05)								
717												
718	Nonparametric Upp	per Limits fo	r Background	Threshold Va	lues							
719	Order of Statistic, r	28					95% Covera	-	570			
720	Approx, f used to compute achieved CC	1.474		e Actual Confic			5		0.762			
721			Approxim	ate Sample Siz			-		59			
722	95% Percentile Bootstrap UTL with 95% Coverage	570		95% BCA B	ootstrap	UTL with	95% Covera	-	570			
723	95% UPL	549.8					90% Percent		439.3			
724	90% Chebyshev UPL	853.4					95% Percent		495.3			
725	95% Chebyshev UPL	1112					99% Percent	tile	557.9			
726	95% USL	570										
727												
728	Note: The use of USL tends to yield a conservati		-	-			-					
729	Therefore, one may use USL to estimate a BTV						ree of outliers	5				
730	and consists of observa The use of USL tends to provide a balar											
731	represents a background data set and wi		-	-	- ·							
732					e compa		e DIV.					
733	Mercury											
734												
735		General	Statistics									
736 737	Total Number of Observations	28			Numbe	er of Missi	ng Observatio	ns	3			
737	Number of Distinct Observations	2					0					
739	Number of Detects	0				Numbe	r of Non-Dete	cts	28			
740	Number of Distinct Detects	0			Numb	er of Disti	nct Non-Dete	cts	2			
740	Minimum Detect	N/A				Minir	num Non-Dete	ect	0.1			
742	Maximum Detect	N/A				Maxir	num Non-Dete	ect	0.2			
743	Variance Detected	N/A				Perc	ent Non-Dete	cts	100%			
744	Mean Detected	N/A					SD Detect	ed	N/A			
r		N/A			SD	of Detect	ed Logged Da	ata	N/A			
745	Mean of Detected Logged Data											
745 746	Mean of Detected Logged Data											
	Wean of Detected Logged Data Warning: All observations are Non-Detect	s (NDs), the	refore all stat	listics and esti	mates s	hould also	be NDs!					
746	Warning: All observations are Non-Detect Specifically, sample mean, UCLs, UPLs, and	d other stati	stics are also	NDs lying bel	ow the la	argest det	ection limit!					
746 747	Warning: All observations are Non-Detect	d other stati	stics are also	NDs lying bel	ow the la	argest det	ection limit!	TV).				
746 747 748	Warning: All observations are Non-Detect Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative si	d other stati	stics are also values to estir	NDs lying bel nate environm	ow the la	argest det	ection limit!	TV).				
746 747 748 749	Warning: All observations are Non-Detect Specifically, sample mean, UCLs, UPLs, and	d other stati	stics are also values to estir	NDs lying bel nate environm	ow the la	argest det	ection limit!	TV).				
746 747 748 749 750	Warning: All observations are Non-Detect Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative si	d other stati	stics are also values to estir	NDs lying bel nate environm	ow the la	argest det	ection limit!	TV).				
746 747 748 749 750 751 752 753	Warning: All observations are Non-Detect Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative si The data set fo	d other stati	stics are also values to estir	NDs lying bel nate environm	ow the la	argest det	ection limit!	TV).				
746 747 748 749 750 751 752 753	Warning: All observations are Non-Detect Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative si	d other stati	stics are also values to estir	NDs lying bel nate environm	ow the la	argest det	ection limit!	TV).				
746 747 748 749 750 751 752 753	Warning: All observations are Non-Detect Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative si The data set fo	d other statis ite specific v or variable M	stics are also values to estir	NDs lying bel nate environm	ow the la	argest det	ection limit!	ΤV).				

	А	В	С	D	E	F	G	Н		J	K	L 3	
757					Observations	28	28 Number of Missing Observation 16						
758			Number		Observations	-							
759					er of Detects	12					Non-Detects	16	
760			Nu		tinct Detects	12			Numbe		Non-Detects	4	
761					mum Detect	2					m Non-Detect	0.5	
762					mum Detect	55.8					m Non-Detect	4	
763					ice Detected	258.9				Percent	Non-Detects	57.14%	
764					an Detected	24.36					SD Detected	16.09	
765			Mean	of Detected L	_ogged Data	2.934			SD	of Detected	Logged Data	0.868	
766													
767					ical Values f	-	nd Threshol	d Values (B	TVs)				
768			Toler	ance Factor	K (For UTL)	2.246				d2r	max (for USL)	2.714	
769													
770						nal GOF Tes	t on Detects	Only					
771				-	Fest Statistic	0.9			Shapiro Wil				
772			5% Sł	•	Critical Value	0.859	De	etected Data			ignificance Lev	vel	
773					Fest Statistic	0.239				GOF Test			
774			59		Critical Value	0.243				nal at 5% Si	ignificance Lev	vel	
775				De	tected Data	appear Norn	nal at 5% Sig	gnificance Le	evel				
776													
777				Kaplan Mei	er (KM) Bacl	-	tistics Assur	ning Normal	Distribution		KM SD		
778					KM Mean	10.73		15.52					
779				95% UTL95	% Coverage	45.6	95% KM UPL (t) 95% KM Percentile (z)						
780				90% KM F	Percentile (z)	30.63		36.27					
781				99% KM F	Percentile (z)	46.84					95% KM USL	52.87	
782													
783				DL/2 Subs	titution Back	ground Stati	stics Assum	ning Normal	Distribution				
784					Mean	10.81					SD	15.76	
785				95% UTL95	% Coverage	46.21					95% UPL (t)	38.13	
786				90% F	Percentile (z)	31.01				95%	Percentile (z)	36.73	
787				99% F	Percentile (z)	47.47					95% USL	53.59	
788			DL/2 is n	ot a recomn	nended meth	od. DL/2 pro	ovided for co	omparisons a	and historica	reasons			
789													
790				Ģ	amma GOF	Tests on De	etected Obse	ervations On	ly				
791				A-D 1	Fest Statistic	0.407		Α	nderson-Dar	ling GOF T	est		
792				5% A-D C	Critical Value	0.741	Detecte	d data appea	ır Gamma Di	stributed at	5% Significan	ce Level	
793				K-S 1	Fest Statistic	0.162		k	Kolmogorov-	Smirnov G	OF		
794				5% K-S C	Critical Value	0.248	Detecte	d data appea	ır Gamma Di	stributed at	5% Significan	ce Level	
795				Detected	data appear	r Gamma Di	stributed at !	5% Significa	nce Level				
796													
797					Gamma	Statistics or	Detected D	ata Only					
798					k hat (MLE)	2.086			ks	tar (bias co	prrected MLE)	1.62	
799				The	ta hat (MLE)	11.68			Theta s	star (bias co	prrected MLE)	15.04	
800				r	nu hat (MLE)	50.06				nu star (bi	as corrected)	38.87	
801			ML	E Mean (bia	is corrected)	24.36	36						
802				MLE Sd (bia	is corrected)	19.14	.14 95% Percentile of Chisquare (2kstar)						
803						1	1						
804				G	Gamma ROS	Statistics u	sing Imputed	d Non-Detec	ts				
805			GROS may	not be used	when data s	et has > 50%	NDs with m	nany tied obs	ervations at i	nultiple DL	S		
806		GROS may	not be used	when kstar	of detects is s	small such a	s <1.0, espe	cially when th	he sample siz	ze is small ((e.g., <15-20)		
807			Fo	r such situati	ions, GROS I	method may	yield incorre	ect values of	UCLs and BT	Vs			
808					his is especi	-	-						
808		For gan	nma distribut		-	-	Ls may be computed using gamma distribution on KM estimates						
					Minimum		- I	3.3			Mean	10.52	
810						-							

Image Image <t< th=""><th></th><th>А</th><th>В</th><th>С</th><th>,</th><th>D</th><th></th><th>E Maximum</th><th>F 55.8</th><th>G</th><th>Н</th><th>I</th><th>J</th><th>K Median</th><th>L 0.01</th></t<>		А	В	С	,	D		E Maximum	F 55.8	G	Н	I	J	K Median	L 0.01	
Bit Kind (MLC) 0.207 K Mar (disc connected) 0.209 Bits																
000 Thesh net (04F) 50.82 Thesh star (Disc corrected) 10.42 816 MLE Mart (bis corrected) 13 14								-				k	star (bias cor			
01 mutal (MEE) 11.59 nutal (MEE) 11.69 nutal (MEE) 12.03 815 MUE Man (Mas connected) 10.52 MUE Sd (bits connected) 23.03 816 95% Percentile 53.6 95% Percentile 13.81 95% Percentile 53.6 95% Percentile 13.22 819 The following statistics are computed using Camma ROS Statistics on finguide Data 13.22 820 Upper Limits using Wilson Hiftery (VH-) and Hawkins Wikky (HW) Methods 14.64 821 95% Approx. Camma UFL with 95%. Coverage 81.76 108.2 95% Approx. Camma UFL 14.66 823 95% Gamma USL 12.75 108.3 - - - 824													-	-		
Bit MLE Kean (bits corrected) 10.5.2 MLE Sol (bits concerned) 23.0.1 816 90% Percentile of Chaquare (Sciar) 2.12.0 90% Percentile 31.81 818 0%% Percentile 53.6 99% Percentile 31.81 819 The following statistics are computed using Gamma ROS Statistics on imputed Data 97% 97% 97% 820 Upper Linits using Wilson Hilfer (WH) and Hawkins Wilsey (HW) Methods 48.86 56.83 823 97% Gamma USL 122.5 180.3 48.86 56.83 824 Estimates of comme Parameters using KM Estimates 30.64 30.64 30.64 826 Maam (MM) 10.73 S.E. ØL(KM) 15.53 30.64 827 Verlinece (KM) 24.1 S.E. of Maam (KM) 30.64 30.64 828 Khat (KM) 0.672 K.stati (KM) 24.53 30.64 829 Intel KMM 24.5 97% Kgamma percentile (KM) 24.53 820 Utel KM 31.84 30.84 30.84 30.84 <t< td=""><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>meta</td><td>-</td><td></td><td></td></t<>												meta	-			
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0 0 95% Percentile 53.6 0 99% Percentile 113.2 819 The following statistics are computed using Gamme ROS Statistics on imputed Data VIII VIIII VIIII VIIII VIIII VIIII VIIII VIIIII VIIIII VIIIIIIIII VIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII				95% Pe				-						· · · · · · · · · · · · · · · · · · ·		
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B23 95% Gamma USL 122 5 180.3 B24		95% Appi	rox. Gamm	a UTL wi	ith 959	% Cover	age	81.76	108.2		9	5% Approx.	Gamma UPL	48.86	56.83	
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Column 95% gamma percentile (KM) 42.78 99% gamma percentile (KM) 75.38 833 The following statistics are computed using samma distribution and KM estimates 55.88 835 Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods 55.88 836 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 91.94 111.7 840 Lognormal GOF Test on Detected Observations Only 111.7 111.7 111.7 841 Shapiro Wilk Critical Value 0.862 Shapiro Wilk GOF Test 111.7 843 Ulliefors Test Statistic 0.612 Ulliefors GOF Test 111.8 844 5% Lilliefors Critical Value 0.243 Detected Data appear Lognormal at 5% Significance Level 845 Detected Data appear Lognormal at 5% Significance Level 1.46 1.178 Mean in Log Scale 1.616 846 SD in Original Scale 15.16	830															
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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 0.243 Detected Data appear Lognormal at 5% Significance Level 846 Detected Data appear Lognormal at 5% Significance Level 0.243 Detected Nata appear Lognormal at 5% Significance Level 846 Mean in Original Scale 11.78 Mean in Log Scale 1.616 847 Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects 1.405 848 Mean in Original Scale 15.16 SD in Log Scale 1.405 850 95% Bootstrap (%) UTL95% Coverage 55.8 95% BCA UTL95% Coverage 55.8 851 95% Bootstrap (%) UTL95% Coverage 132.3 95% USL 228.3 854 95% Forcentile (z) 30.48 95% KM UTL (Lognormal)95% Coverage <th></th> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Lo</td> <td>gnormal GC</td> <td>F Test on D</td> <td>etected Obs</td> <td>servations O</td> <td>nly</td> <td></td> <td></td> <td></td>							Lo	gnormal GC	F Test on D	etected Obs	servations O	nly				
B43 Lilliefors Test Statistic 0.212 Lilliefors GOF Test 843 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 1.616 848 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 15.8 95% BCA UTL95% Coverage 55.8 851 95% Bootstrap (%) UTL95% Coverage 55.8 95% VDL (i) 57.52 852 90% Percentile (z) 30.48 95% VDL (i) 57.52 853 99% Percentile (z) 132.3 95% VDL (i) 57.52 854					Sł	hapiro W	/ilk T	est Statistic	0.862			Shapiro Wi	lk GOF Test			
344 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 1.616 849 Mean in Original Scale 11.78 Mean in Log Scale 1.405 850 95% UTL95% Coverage 18.2 95% BCA UTL95% Coverage 55.8 851 95% Bootstrap (%) UTL95% Coverage 55.8 95% VDL (0) 57.52 852 90% Percentile (z) 30.48 95% Percentile (z) 50.78 853 99% Percentile (z) 132.3 95% USL 28.33 854 95% UTL95% Coverage 55.8 95% KM UTL (Lognormal) 55% Coverage 50.78 855 Statistics using KM estimates on Logged Data 0.868 95% KM UTL (Lognormal) 95% Coverage 159.9 856 Statistics using KM estimates on Logged Data 0.868 95% KM UTL (Lognormal) 95% Coverage 159.9 857 KM SD of Logged Data 1.873 95% KM UDL (Lognormal) 161.22 151.6				5	5% Sh	napiro W	'ilk C	ritical Value	0.859	Det	ected Data a	ppear Logno	ormal at 5% S	ignificance L	evel	
B44 Detected Data appear Lognormal at 5% Significance Level 846 847 Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects 848 849 950 95% UTL 95% Coverage 95% Bootstrap (%) UTL 95% Coverage 855 Statistics using KM estimates on Logged Data 0.868 95% KM UTL (Lognormal) 95% Coverage 1859 860	843															
Bade 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 18.2 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 Statistics using KM estimates Logged Data 0.868 95% KM UTL (Lognormal)95% Coverage 159.9 856 KM Mean of Logged Data 0.868 95% KM UTL (Lognormal) 61.22 858 95% KM Percentile Lognormal (z) 51.86 95% KM USL (Lognormal) 384.4 859 Statistics Assuming Lognormal Distribution 384.4 3859 384.4 859 Sin Original Scale 10.81 Mean in Log Scale 0.925 860 Background DL/2 Stat	844				5%								ormal at 5% S	ignificance L	evel	
Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects B48 Mean in Original Scale 11.78 Mean in Log Scale 1.616 B49 SD in Original Scale 15.16 SD in Log Scale 1.405 B50 95% UTL95% Coverage 18.2 95% BCA UTL95% Coverage 55.8 B51 95% Bootstrap (%) UTL95% Coverage 55.8 95% UPL (t) 57.52 B52 90% Percentile (z) 30.48 95% Percentile (z) 50.78 B53 99% Percentile (z) 132.3 95% USL 28.3 B54 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 50.78 50.78 B55 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 61.22 83.3 B56 KM Mean of Logged Data 0.868 95% KM UTL (Lognormal) 95% Coverage 15.9.9 B57 Statistics using KM estimates on Logged Data 0.868 95% KM UPL (Lognormal) 61.22 B63 95% KM Percentile Lognormal (z) 51.86 95% KM USL (Lognormal) 384.4 B64 Background DL	845					[Dete	cted Data ap	opear Logno	rmal at 5% s	Significance	Level				
347 Composition Composition <thcomposition< th=""> <thcom< td=""><th>846</th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thcom<></thcomposition<>	846															
Statistics Statis Statistics Statistics<	847			Backgrou	und L	•			• •	_ognormal [Distribution L	Jsing Impute				
367 95% UTL95% Coverage 118.2 95% BCA UTL95% Coverage 55.8 850 95% Bootstrap (%) UTL95% Coverage 55.8 95% UPL (t) 57.52 852 90% Percentile (z) 30.48 95% UPL (t) 57.52 853 90% Percentile (z) 132.3 95% USL 228.3 854								-						-		
0.00 95% Bootstrap (%) UTL95% Coverage 55.8 95% UPL (t) 57.52 851 90% Percentile (z) 30.48 95% Percentile (z) 50.78 853 99% Percentile (z) 132.3 95% USL 228.3 854 95% Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 228.3 856 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 61.22 856 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 95% KM USL (Lognormal) 384.4 859 95% KM USL (Lognormal) 384.4 860 Background DL/2 Statistics Assuming Lognormal Distribution 0.925 861 Mean in Original Scale 10.81 Mean in Log Scale 0.925 862 SD in Original Scale 15.76 SD in Log Scale <t< td=""><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td>05%</td><td></td><td>-</td><td></td></t<>								-				05%		-		
bit fill fill fill <th< td=""><th></th><td></td><td></td><td>95% Roo</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>70 %</td><td></td><td>•</td><td></td></th<>				95% Roo								70 %		•		
652 99% Percentile (z) 132.3 95% USL 228.3 853 99% Percentile (z) 132.3 95% USL 228.3 854					up			0								
B33 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 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 0.925 861 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																
855Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution856KM Mean of Logged Data0.86895% KM UTL (Lognormal)95% Coverage159.9857KM SD of Logged Data1.87395% KM UPL (Lognormal)61.2285895% KM Percentile Lognormal (z)51.8695% KM USL (Lognormal)384.4859860Background DL/2 Statistics Assuming Lognormal Distribution0.925861Mean in Original Scale10.81Mean in Log Scale0.925862SD in Original Scale15.76SD in Log Scale1.89863095% UTL95% Coverage17605% UPL (t)66.8		7770 T Groennin						- ()								
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 95% KM USL (Lognormal) 384.4 860 Background DL/2 Statistics Assuming Lognormal Distribution 0.925 861 Mean in Original Scale 10.81 Mean in Log Scale 0.925		Statistics using KM estima							on Logged I	Data and As	suming Logi	normal Distri	ibution			
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 0.925 861 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															159.9	
85895% KM Percentile Lognormal (z)51.8695% KM USL (Lognormal)384.4859860Background DL/2 Statistics Assuming Lognormal Distribution861Mean in Original Scale10.81Mean in Log Scale0.925862SD in Original Scale15.76SD in Log Scale1.8986395% UTL95% Coverage17695% UPL (t)66.8									1.873		(Lognormal)	61.22				
859 860 Background DL/2 Statistics Assuming Lognormal Distribution 861 Mean in Original Scale 10.81 862 SD in Original Scale 15.76 863 95% UTL95% Coverage 176 95% UTL95% Coverage 176 95% UPL (t) 66.8 00% Parapatile (t) 29.44				95%	6 KM I	Percenti	le Lo	ognormal (z)	51.86			9	5% KM USL	(Lognormal)	384.4	
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									1	1						
862 SD in Original Scale 15.76 SD in Log Scale 1.89 863 95% UTL95% Coverage 176 95% UPL (t) 66.8						Ва	ackg	round DL/2	Statistics As							
862 SD in Original Scale 15.76 SD in Log Scale 1.89 863 95% UTL95% Coverage 176 95% UPL (t) 66.8 00% Decembra (c) 29.44 05% Option (c) 56.5						Mean	in Or	riginal Scale	10.81					0	0.925	
								0	15.76					-	1.89	
864 90% Percentile (z) 28.44 95% Percentile (z) 56.5	863							0								
	864					90)% P	ercentile (z)	28.44				95% P	ercentile (z)	56.5	

	A B C D E	F	G	Н		J	K	L
865	99% Percentile (z)	204.9				-	95% USL	426.6
866	DL/2 is not a Recommended Metho	od. DL/2 pro	ovided for co	mparisons a	and historic	al reasons.		
867								
868	Nonparametric I		•					
869	Data appear to follow a D	Discernible	Distribution a	at 5% Signifi	cance Leve	el		
870								
871	Nonparametric Upper Limits for BT		nction made	between de		-		
872	Order of Statistic, r	28					5% Coverage	55.8
873	Approx, f used to compute achieved CC	1.474	Approximat	te Actual Co	nfidence Co	befficient ach	ieved by UTL	0.762
874	Approximate Sample Size needed to achieve specified CC	59				050/ 1/14 01	95% UPL	52.38
875	95% USL	55.8				95% KM Ch	ebyshev UPL	79.59
876	Note: The use of UCL tends to yield a concernation		of DTV/ come			olao otorto o	(acadima 20	
877	Note: The use of USL tends to yield a conservativ Therefore, one may use USL to estimate a BTV of		-	-	-		-	
878	and consists of observat	5		•	0		e of outliers	
879	The use of USL tends to provide a balance					rouidad tha	lata	
880	represents a background data set and wh		•		0 1			
881	represents a backyrounu uata set and wr	ien many Of	ISITE ODZELAS		one compar		עוע.	
882	Radium							
003								
884		General	Statistics					
885	Total Number of Observations	24			Numbe	er of Missing	Observations	7
886	Number of Distinct Observations	24				, et meenig		
887	Number of Detects	22				Number of	Non-Detects	2
888	Number of Distinct Detects	22			Numb		Non-Detects	2
889	Minimum Detect	0.282					m Non-Detect	0.48
890	Maximum Detect	3					m Non-Detect	0.71
891	Variance Detected	0.561				Percent	Non-Detects	8.333%
892 893	Mean Detected	1.31		SD Detected	0.749			
894	Mean of Detected Logged Data	0.117		Logged Data	0.577			
895								
896	Critical Values fo	or Backgrou	nd Threshold	d Values (B	TVs)			
897	Tolerance Factor K (For UTL)	2.309				d2r	max (for USL)	2.644
898								
899	Norma	al GOF Tes	t on Detects	Only				
900	Shapiro Wilk Test Statistic	0.879			Shapiro W	ilk GOF Tes	st	
901	5% Shapiro Wilk Critical Value	0.911		Data No	t Normal at	5% Significa	ince Level	
902	Lilliefors Test Statistic	0.196			Lilliefors	GOF Test		
903	5% Lilliefors Critical Value	0.184		Data No	t Normal at	5% Significa	ince Level	
904	Data Not	Normal at 5	% Significar	nce Level				
905								
906	Kaplan Meier (KM) Back	ground Sta	tistics Assum	ning Normal	Distributio	n		
907	KM Mean	1.229					KM SD	0.751
908	95% UTL95% Coverage	2.962					% KM UPL (t)	2.542
909	90% KM Percentile (z)	2.191					Percentile (z)	2.464
910	99% KM Percentile (z)	2.975					95% KM USL	3.213
911								
912	DL/2 Substitution Backg		istics Assum	ing 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 metho	od. DL/2 pro	ovided for co	mparisons a	and historic	al reasons		
918								

	A B C D E		F Facto on Da	G H I J K	L
919	A-D Test Sta		0.484	Anderson-Darling GOF Test	
920	5% A-D Critical V		0.484	<u> </u>	
921	5% A-D Childai V K-S Test Sta		0.748	Detected data appear Gamma Distributed at 5% Signific Kolmogorov-Smirnov GOF	
922	5% K-S Critical V		0.137	Detected data appear Gamma Distributed at 5% Signific	ance Level
923				stributed at 5% Significance Level	
924		ppcar			
925	Ga	mma S	Statistics or	Detected Data Only	
926	k hat (l		3.442	k star (bias corrected ML	E) 3.003
927	Theta hat (I		0.38	Theta star (bias corrected ML	-
928 929	nu hat (f	-	151.4	nu star (bias correcte	-
929 930	MLE Mean (bias corre		1.31	· · · · · · · · · · · · · · · · · · ·	·
931	MLE Sd (bias corre	cted)	0.756	95% Percentile of Chisquare (2kst	ar) 12.6
932					
933	Gamma	ROSS	Statistics u	sing Imputed Non-Detects	
934	GROS may not be used when d	data sei	t has > 50%	NDs with many tied observations at multiple DLs	
935	GROS may not be used when kstar of detection	cts is sr	mall such a	s <1.0, especially when the sample size is small (e.g., <15-2	0)
936	For such situations, GI	ROS m	nethod may	yield incorrect values of UCLs and BTVs	
937	This is e	especia	lly true whe	n the sample size is small.	
938	For gamma distributed detected data, B	TVs an	nd UCLs ma	y be computed using gamma distribution on KM estimates	
939	Mini	mum	0.16	Ме	
940	Maxi		3	Medi	
941		SD	0.778		CV 0.637
942	k hat (I		2.469	k star (bias corrected ML	-
943	Theta hat (I		0.494	Theta star (bias corrected ML	-
944	nu hat (f		118.5	nu star (bias correcte	-
945	MLE Mean (bias corre	-	1.22	MLE Sd (bias correcte	
946	95% Percentile of Chisquare (2k 95% Perce		10.09 2.814	90% Percent	
947				g Gamma ROS Statistics on Imputed Data	e 5.094
948	-		-	H) and Hawkins Wixley (HW) Methods	
949	WH		HW	WH	HW
950	95% Approx. Gamma UTL with 95% Coverage 3.7		3.971	95% Approx. Gamma UPL 2.89	2.985
951 952	95% Gamma USL 4.3		4.666		
952					
954	Estimates	s of Ga	imma Parai	neters using KM Estimates	
955	Mean	(KM)	1.229	SD (K	VI) 0.751
956	Variance	(KM)	0.563	SE of Mean (K	VI) 0.157
957	k hat	(KM)	2.682	k star (K	VI) 2.375
958	nu hat	(KM)	128.7	nu star (K	VI) 114
959	theta hat	(KM)	0.458	theta star (K	-
960	80% gamma percentile		1.803	90% gamma percentile (K	
961	95% gamma percentile	(KM)	2.764	99% gamma percentile (K	VI) 3.789
962					
963	-			ng gamma distribution and KM estimates	
964				H) and Hawkins Wixley (HW) Methods	
965	WH		HW	WH	HW
966	95% Approx. Gamma UTL with 95% Coverage 3.5 95% KM Gamma Percentile 2.6		3.684	95% Approx. Gamma UPL 2.758 95% Gamma USL 4.05	2.821
967	95% KM Gamma Percentile 2.6	020	2.679	95% Gamma USL 4.05	4.287
968	lognorm	al COL	Test on D	etected Observations Only	
969	Shapiro Wilk Test Sta		0.961	Shapiro Wilk GOF Test	
970	5% Shapiro Wilk Critical V		0.961	Detected Data appear Lognormal at 5% Significance	e l evel
971	Lilliefors Test Sta		0.911	Lillefors GOF Test	
972			0.107		

	A	В	С		D		E	F	G	H			J			K		L
973				5%			al Value			ected Data a		Lognor	mal at	5% Si	ignific	cance L	evel	
974					C	Detected	d Data aj	opear Logno	rmal at 5% S	ignificance	Level							
975																		
976		B	ackgrou	nd Lo	gnorma	al ROS	Statistic	s Assuming	Lognormal Di	istribution U	lsing Ir	mputed	l Non-	Detect	ts			
977					Mean i	in Origin	nal Scale	1.233					Ν	lean i	n Log	g Scale	0	.0298
978					SD i	n Origir	nal Scale	0.761						SD i	n Log	g Scale	С).627
979				9	5% UT	L95% C	coverage	4.383				95% I	BCA U	TL95%	% Co	verage	3	3
980		9	5% Boots	strap	(%) UT	L95% C	Coverage	3						Ç	95% l	UPL (t)	3	3.085
981					90	% Perc	entile (z)	2.301					ç	95% P	ercer	ntile (z)	2	2.89
982	000(Decembra (a) 4.421														959	% USL	5	5.407
983	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution																	
984			S	tatisti	cs usin	ig KM e	stimates	on Logged	Data and Ass	uming Logr	normal	Distrik	oution					
985	KM Mean of Logged Data0.015395% KM UTL (Lognormal)95% CoverageKM SD of Logged Data0.64295% KM UPL (Lognormal)												4	1.473				
986							ged Data	0.642							. 0		3	3.122
987			95%	KM P	ercentil	le Logno	ormal (z)	2.92				95	5% KM	USL ((Logn	ormal)	5	5.546
988																		
989						-			suming Logn	ormal Distr	ibution	I						
990						-	nal Scale						Ν		-	g Scale	0.	005
991						-	nal Scale								-	g Scale).672
992				9			coverage							Ç	95% l	UPL (t)	3	3.259
993							entile (z)	2.379					ç	95% P	ercer	ntile (z)	3	3.038
994							entile (z)	4.804							959	% USL	5	5.947
995			DL/2	is not	a Reco	ommen	ded Meth	nod. DL/2 pr	ovided for co	mparisons a	and his	torical	reaso	ns.				
996																		
997	Nonparametric Distribution Free Background Statistics																	
998				D)ata ap	pear to	follow a	Discernible	Distribution a	it 5% Signifi	cance	Level						
999										<u> </u>								
1000			Nonp	arame	-				inction made	between de	etects a							
1001							tatistic, r	24			C 1					verage	3	
1002		-	prox, f us		-			1.263	Approximat	e Actual Co	nfidenc	ce Coe	fficient	achie		-		0.708
1003	Approximat	te Sample	Size nee	eded to	o achie	•		59	95% UPL 95% KM Chebyshev UPL									2.935
1004						9	95% USL	3				9	5% KN	1 Cheb	byshe	ev UPL	4	1.568
1005															!!	00		
1006					5				of BTV, espen ne data set re	5		•				0		
1007		Therefore,	, one ma	-				-	ted from clear		-		ala sel	nee		liieis		
1008		Т							false positive				wided	tho da	ata			
1009						-			nsite observat		-	-						
1010						a aata o						mparo						
1011	Radium-226																	
1012																		
1013	General Statis	stics																
1014 1015			Т	otal N	umber	of Obse	ervations	16			N	umber	of Dist	inct O	bser	vations	1	6
1015																vations	1	5
						Ν	Vinimum	-0.0627						-		Quartile	C	0.108
1017							Largest	0.947								Vedian).226
1018 1019							1aximum	1.71						Tł		Quartile).659
							Mean	0.396								SD).471
1020 1021					Coeffic	cient of V	Variation	1.188							Ske	wness		1.603
1021																		
						Critical	Values f	or Backgrou	Ind Threshold	J Values (B	ΓVs)							
1022								-		•				d O ma	/6-	or USL)	2	2.443
1023 1024			ſ	olera	nce Fa	ctor K (F	or UIL)	2.524						uzma	ax (ro	1 USL)	2	
1023 1024 1025			1	Folera	nce Fa	ctor K (F	-or UIL)	2.524						uzma	ax (ro	1 USL)	2	

	A B C D E	F	G	Н	 Chanina		K	L
1027	Shapiro Wilk Test Statistic 5% Shapiro Wilk Critical Value	0.839			•	Wilk GOF Test		
1028	5% Shapiro Wilk Chical Value	0.887		Data Not		at 5% Significai rs GOF Test	ice Level	
1029	5% Lilliefors Critical Value	0.218		Data Not		at 5% Significar		
1030			5% Significar			at 576 Significal	ICE LEVEI	
1031			o o o o o o o o o o o					
1032	Background Si	atistics As	sumina Norm	al Distributio	n			
1033 1034	95% UTL with 95% Coverage	1.584	j			90% F	Percentile (z)	0.999
1034	95% UPL (t)	1.247					Percentile (z)	
1035	95% USL	1.546				99% F	Percentile (z)	1.491
1037								
1038		Gamma	Statistics					
1039	Gan	nma Statisti	cs Not Availa	able				
1040								
1041	Dataset Contains Valu	ies <= 0 - C	annot Comp	ute Gamma	Statistics	;		
1042								
1043	Dataset Contains V	alues <= 0 ·	Cannot Con	npute Log Sta	atistics			
1044								
1045	Nonparametric		•					
1046	Data do not fo	ollow a Disc	ernible Distr	ibution (0.05)				
1047				· <u> </u>				
1048	Nonparametric Upp		r Background	d Threshold V				
1049	Order of Statistic, r	16				% UTL with 95	0	
1050	Approx, f used to compute achieved CC	0.842				Coefficient achi ded to achieve	5	
1051	95% Percentile Bootstrap UTL with 95% Coverage	1.71	Approxim	•		p UTL with 95	•	
1052	95% Percentile Bootstrap OTL with 95% Coverage 95% UPL	1.71		95% BCA	DUUISIIA		% Coverage	
1053	90% Chebyshev UPL	1.852					% Percentile	
1054	95% Chebyshev UPL	2.511					% Percentile	
1055	95% USL	1.71						1.070
1056 1057								
1057	Note: The use of USL tends to yield a conservative	ve estimate	of BTV, espe	cially when the	ne sampl	e size starts ex	ceeding 20.	
1050	Therefore, one may use USL to estimate a BTV	only when th	ne data set re	presents a ba	ackgroun	d data set free	of outliers	
1060	and consists of observa	tions collect	ted from clear	n unimpacted	location	S.		
1061	The use of USL tends to provide a balan	ce between	false positive	es and false r	egatives	provided the d	ata	
1062	represents a background data set and wh	nen many or	nsite observa	tions need to	be comp	ared with the B	TV.	
1063								
1064	Radium-228							
1065								
1066	General Statistics		1		. .			
1067	Total Number of Observations	16				ber of Distinct (
1068		0.004			Numl	per of Missing (
1069	Minimum Second Largest	0.234					First Quartile Median	
1070	Maximum	1.76				т	hird Quartile	
1071	Mean	0.894				1	SD	
1072	Coefficient of Variation	0.894					Skewness	
1073	Mean of logged Data	-0.228				SD of	logged Data	
1074 1075							- 33-2 2 4 4	
1075 1076	Critical Values for	or Backgrou	Ind Threshold	d Values (BT	Vs)			
1076	Tolerance Factor K (For UTL)	2.524			-	d2m	nax (for USL)	2.443
1077							,	<u> </u>
1078		Normal	GOF Test					
1079	Shapiro Wilk Test Statistic	0.911			Shapiro	Wilk GOF Test	t	
1000	1		L		•			

	A B C D E 5% Shapiro Wilk Critical Value	F 0.887	G	H Data appea	 ar Normal	J	alficance	K	L
1081	Lilliefors Test Statistic	0.887				rs GOF Te		e Level	
1082	5% Lilliefors Critical Value	0.178		Data appea					
1083			5% Significa				linearies		
1084		ar riornar ar	eve eignite						
1085 1086	Background S	tatistics Ass	uming Norm	al Distributio	n				
1087	95% UTL with 95% Coverage	2	•			90	% Perc	entile (z)	1.455
1088	95% UPL (t)	1.686				95	% Perc	entile (z)	1.615
1089	95% USL	1.965				99	% Perc	entile (z)	1.913
1090									
1091		Gamma (GOF Test						
1092	A-D Test Statistic	0.253		Anders	on-Darlir	ng Gamma	GOF T	est	
1093	5% A-D Critical Value	0.742	Detected	data appear				-	ce Level
1094	K-S Test Statistic	0.132		-		nov Gamm			
1095	5% K-S Critical Value	0.216		data appear		Distributed	at 5% S	Significan	ce Level
1096	Detected data appear	Gamma Dis	stributed at 5	% Significan	ce Level				
1097		-							
1098		Gamma	Statistics						
1099	k hat (MLE)	4.483				k star (bias		-	3.684
1100	Theta hat (MLE)	0.199			Inet	a star (bias		-	0.243
1101	nu hat (MLE) MLE Mean (bias corrected)	143.4 0.894					-	orrected)	0.466
1102	WILE Weatt (Dias corrected)	0.894				IVILE SU	(DIAS CO	Jirected)	0.400
1103	Background St	atistics Ass	uming Gamn	na Distributio	n				
1104	95% Wilson Hilferty (WH) Approx. Gamma UPL	1.824			///		90% P	ercentile	1.518
1105	95% Hawkins Wixley (HW) Approx. Gamma UPL	1.86						ercentile	1.771
1106 1107	95% WH Approx. Gamma UTL with 95% Coverage	2.374						ercentile	2.313
1107	95% HW Approx. Gamma UTL with 95% Coverage	2.47							
1108	95% WH USL	2.307					95%	HW USL	2.394
1110									
1111		Lognormal	GOF Test						
1112	Shapiro Wilk Test Statistic	0.961		Shapi	ro Wilk L	ognormal (GOF Te	st	
1113	5% Shapiro Wilk Critical Value	0.887		Data appear	0		•	ce Level	
1114	Lilliefors Test Statistic	0.129				normal GC			
1115	5% Lilliefors Critical Value	0.213		Data appear	Lognorm	al at 5% Si	gnifican	ce Level	
1116	Data appear	Lognormal	at 5% Signifi	cance Level					
1117			<u> </u>						
1118	Background Sta		ming Lognori	nai Distributi	ion		NO/ Dar	optile (-)	1 - 11
1119	95% UTL with 95% Coverage 95% UPL (t)	2.926 2.021						entile (z) entile (z)	1.541 1.859
1120	95% UPL (t) 95% USL	2.021						entile (z) entile (z)	2.642
1121	40% USL	2.000				99		CHUIC (Z)	2.042
1122	Nonparametric	Distribution	Free Backor	ound Statisti	cs				
1123	•		5% Significa						
1124 1125									
1125	Nonparametric Upp	per Limits for	Background	Threshold \	/alues				
1120	Order of Statistic, r	16				6 UTL with	95% C	overage	1.89
1127	Approx, f used to compute achieved CC	0.842	Approximat	e Actual Con	fidence C	Coefficient a	achieved	d by UTL	0.56
1129	-		Approxim	ate Sample S	Size need	led to achie	eve spec	cified CC	59
1130	95% Percentile Bootstrap UTL with 95% Coverage	1.89		95% BCA	Bootstra	p UTL with	95% C	coverage	1.89
1131	95% UPL	1.89					90% P	ercentile	1.44
1132	90% Chebyshev UPL	2.249					95% P	ercentile	1.793
1133	95% Chebyshev UPL	2.863					99% P	ercentile	1.871
	95% USL	1.89							

	А	В	С	D	E	F	G	Н		J	К	L
1135		Note: The		tends to vial	d a conserva	tivo ostimato	of BTV es	necially when	the sample	e size starts ex	vceeding 20	
1136				-						d data set free	-	
1137		THEFEIDLE	, one may u			-		ean unimpact	-			
1138		Tł	ne use of LIS					-		,. provided the c	tata	
1139				-			-		-	ared with the E		
1140												
1141 1142	Selenium											
1142												
1144						General	Statistics					
1145			Tota	I Number of	Observations	28			Numb	er of Missing	Observations	3
1146			Numbe	er of Distinct	Observations	5 16						
1147				Numb	per of Detects	5 18				Number of	Non-Detects	10
1148			Ν	lumber of Di	stinct Detects	5 14			Num	ber of Distinct	Non-Detects	4
1149				Mir	nimum Detec	t 1				Minimur	m Non-Detect	0.5
1150				Max	kimum Detec	t 45				Maximur	m Non-Detect	4
1151				Varia	nce Detected	182.7				Percent	Non-Detects	35.71%
1152				М	ean Detected	1 17.09					SD Detected	13.52
1153			Mean	of Detected	Logged Data	2.245			S	D of Detected	Logged Data	1.333
1154												
1155						-	und Thresh	nold Values (E	BTVs)			
1156			Tole	erance Facto	r K (For UTL)	2.246				d2r	max (for USL)	2.714
1157					N							
1158				Chapiro Mille		mal GOF Te:	st on Detec		Chapiro I			
1159				-	Test Statistic			Data N		Nilk GOF Tes at 5% Significa		
1160			576 3	•	Test Statistic			Dala N		rs GOF Test		
1161			ŗ		Critical Value			Data N		at 5% Significa	nce l evel	
1162						ot Normal at	5% Sianifia					
1163 1164							j					
1165				Kaplan Me	eier (KM) Bad	kground Sta	tistics Ass	uming Norma	al Distributio	on		
1166					KM Mear	n 11.21					KM SD	13.16
1167				95% UTL9	5% Coverage	e 40.78				959	% 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												<u>.</u>
1171				DL/2 Sub	stitution Bac	kground Stat	istics Assu	uming Norma	l Distributio	n		
1172					Mear						SD	
1173					5% Coverage						95% UPL (t)	
1174					Percentile (z)					95%	Percentile (z)	
1175			DI /0 1		Percentile (z						95% USL	47.56
1176			DL/2 is	not a recom	mended met	noa. DL/2 pr	ovided for	comparisons	and histori	cal reasons		
1177					Camma CO	Tosts on D	otoctod O	oservations O	nly			
1178					Test Statistic					Darling GOF T	est	
1179					Critical Value					uted at 5% Sig		vel
1180					Test Statistic					v-Smirnov G	-	
1181					Critical Value			Data Not Gar		uted at 5% Sig		vel
1182 1183							ed at 5% S	Significance L				
1183								• • • • •				
1184					Gamma	a Statistics o	n Detected	Data Only				
1185					k hat (MLE)			2		k star (bias co	rrected MLE)	0.85
1187	<u> </u>			Th	eta hat (MLE)) 17.53			Thet	a star (bias co	rrected MLE)	20.11
1188					nu hat (MLE)	35.11	1			nu star (bi	as corrected)	30.59
						1	1					<u> </u>

	А	В	С	D LE Mean (bias	E	F	G	Н	I	J	К	L		
1189			IVII	MLE Sd (bias		17.09 18.54			95% Percentile of	Chisaur	aro (2kstar)	5.395		
1190					s correcteu)	10.04			95% Percentile of	Chisque		0.390		
1191				6	amma ROS	Statistics us	sina Impute	d Non-Detec	1 5					
1192			GROS may						servations at multip	ole DLs				
1193 1194		GROS may	-					-	the sample size is		q., <15-20)			
1194				r such situatio										
1196				TI	his is especi	ally true whe								
1197		For gar	nma distribut	ed detected c	lata, BTVs a	nd UCLs ma	y be compu	ited using ga	mma distribution of	n KM est	timates			
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			-		ected MLE)	0.353		
1202					a hat (MLE)	30.42			Theta star (b			31.78		
1203					u hat (MLE)	20.67				•	corrected)	19.78		
1204				LE Mean (bias	-	11.23			MLE	•	corrected)	18.89		
1205			95% Percen	tile of Chisqu		3.063					Percentile	32.37		
1206			Thef		6 Percentile	48.66	- Commo [DOC Claticity	a an Imputed Date		Percentile	90.19		
1207						-	-		s on Imputed Data (HW) Methods	a				
1208					WH	HW	n) anu naw	KIIIS WIKIEY			WH	HW		
1209	95% App	rox. Gamma	UTL with 95	% Coverage	74.3	95.66		9	5% Approx. Gamm	na UPI	47.95	56.21		
1210	, e , e , e , e , e , e , e , e , e , e			Gamma USL	105.5	147.2								
1211 1212														
1212				Est	timates of G	amma Parai	meters usin	g KM Estima	ates					
1213					Mean (KM)	11.21					SD (KM)	13.16		
1215				Va	riance (KM)	173.3				SE of	Mean (KM)	2.56		
1216					k hat (KM)	0.726		0.672						
1217					nu hat (KM)	40.63		37.61						
1218				the	eta hat (KM)	15.45		16.69						
1219				6 gamma pero		18.45			90% gam 99% gam	28.42				
1220			95%	6 gamma pero	centile (KM)	38.74		63.46						
1221			T h a	fallanda a sta	41-41			مالم المرالي م						
1222				•		•			and KM estimates (HW) Methods					
1223			L	pper Limits t	WH	HW	n) and naw	KINS WIXIEY	(HW) Methods		WH	HW		
1224	95% Ann	rox Gamma	UTL with 95	% Coverage	63.9	73.39		9	5% Approx. Gamm	na LIPI	42.55	45.7		
1225	, e , e , e , e , e , e , e , e , e , e			a Percentile	39.42	41.85			95% Gamm		88.79	108.3		
1226 1227							L			. –				
1227				Log	gnormal GC	F Test on D	etected Ob	servations O	only					
1229			S	hapiro Wilk T	est Statistic	0.779			Shapiro Wilk GO	F Test				
1230			5% SI	hapiro Wilk Ci	ritical Value	0.897		Data Not	Lognormal at 5% S	Significar	nce Level			
1231				Lilliefors T	est Statistic	0.332			Lilliefors GOF					
1232			5	% Lilliefors C		0.202			Lognormal at 5% S	Significar	nce Level			
1233					Data Not L	ognormal at	5% Signific	cance Level						
1234														
1235		В	ackground L	-			_ognormal [Distribution l	Jsing Imputed Nor					
1236					iginal Scale	11.26					n Log Scale	1.266		
1237					iginal Scale	13.37					n Log Scale	1.758		
1238			5% Poototra	95% UTL95% p (%) UTL95%	-	183.9 45			95% BCA		6 Coverage 5% UPL (t)	41.05 74.69		
1239		9			ercentile (z)	45 33.75								
1240					ercentile (z)	211.8	95% Percentile (z) 63.92 95% USL 419							
1241				77/0 F		211.0					7370 USL	· · · /		
1242														

	А	В	C	D	E	F	G	H		J	K	L
1243			Star	-	KM estimates		Data and As:					1/10
1244					Logged Data	1.237		955	% KM UTL		I)95% Coverage	164.2
1245					Logged Data	1.72					JPL (Lognormal)	68
1246			95% KI	/ Percentile I	Lognormal (z)	58.39				95% KM U	JSL (Lognormal)	367.6
1247							<u> </u>					
1248					ground DL/2 S		ssuming Logi	normal Dist	ribution			
1249					Original Scale	11.25					ean in Log Scale	1.26
1250					Driginal Scale	13.38					SD in Log Scale	1.747
1251					5% Coverage	178.5					95% UPL (t)	72.89
1252					Percentile (z)	33.09				95	% Percentile (z)	62.43
1253					Percentile (z)	205.4					95% USL	404.7
1254			DL/2 is	not a Recom	mended Meth	od. DL/2 pro	ovided for co	mparisons	and histo	rical reasons	s	
1255												
1256				N	lonparametric		-					
1257					Data do not fo	ollow a Disc	ernible Distr	ibution (0.0	5)			
1258												
1259			Nonpar		er Limits for B	-	inction made	between de			-	
1260					r of Statistic, r	28					h95% Coverage	45
1261			•	•	achieved CC	1.474	Approxima	te Actual Co	onfidence	Coefficient a	achieved by UTL	0.762
1262	Approxim	nate Sample	Size need	ed 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 yiel	d a conservativ	ve estimate	of BTV, espe	ecially when	the samp	le size starts	exceeding 20.	
1266		Therefore	, one may i	use USL to es	stimate a BTV o	only when th	ne data set re	epresents a	backgrour	nd data set f	ree of outliers	
1267				and cons	ists of observa	tions collect	ted from clea	n unimpacte	ed location	IS.		
1268		Tł	he use of U	SL tends to p	provide a balan	ce between	false positive	es and false	negatives	s provided th	e data	
1269		rep	presents a	background c	lata set and wh	ien many or	nsite observa	tions need t	o be com	pared with th	e BTV.	
1270												
1271	Thallium											
1272												
1273							Statistics					
1274					Observations	28			Num	ber of Missir	ng Observations	3
1275			Numb		Observations	6						
1276					per of Detects	0					r of Non-Detects	28
1277					stinct Detects	0			Nur		nct Non-Detects	6
1278					nimum Detect	N/A					num Non-Detect	0.1
1279					ximum Detect	N/A					num Non-Detect	5
1280					ince Detected	N/A				Perce	ent Non-Detects	100%
1281					lean Detected	N/A					SD Detected	N/A
1282			Mea	1 of Detected	Logged Data	N/A				SD of Detect	ed Logged Data	N/A
1283												
1284			-		re Non-Detects							
1285		-			CLs, UPLs, and					•		
1286	Т	he Project T	leam may	lecide to use	alternative si	te specific \	alues to est	imate enviro	onmental	parameters	(e.g., EPC, BTV).
1287												
1288				Т	The data set fo	r variable T	hallium was	not process	sed!			
1289												
1290												