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Submitted to:
Platte River Power Authority
Fort Collins, CO

Submitted by:
AECOM
Fort Collins, CO
60684835
January 31, 2023

Final

# Platte River Power Authority Ash Monofill Annual Groundwater Monitoring and Corrective Action Report for 2022

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Submitted to:
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# Platte River Power Authority Ash Monofill Draft Annual Groundwater Monitoring and Corrective Action Report for 2022

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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/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 and corrective action activities completed between January 1 and December 31, 2022 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 Section 257.90(e) of the United States Environmental Protection Agency 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.

Platte River performed assessment-mode groundwater monitoring of the Ash Monofill in 2022. Assessment monitoring data reported the detection of Appendix IV constituent selenium in downgradient monitoring wells at concentrations that represent statistically significant increases (SSIs) over background. 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 2022 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.
- Initiated construction of a new engineered landfill cell (referred to as Cell 2B) for ash management. Cell 2B has an engineered leachate 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 next 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 2022 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 2022 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, 2023.

## 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 2022, and references appendices to this report that contain detailed documentation of those activities.
- Section 4.0 summarizes the groundwater sampling, analysis and results.
- Section 5.0 provides the statistical analyses and results.
- Section 6.0 provides a projection of the key activities anticipated in 2023.
- Section 7.0 provides a summary of findings.
- Section 8.0 provides a list of references cited in the report.

The report also includes three appendices that provide supporting documentation of the groundwater monitoring and related activities conducted in 2022:

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

# 2.0 Facility Description

## 2.1 Facility Location and Operational History

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

## 2.2 Ash Monofill Description

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

## 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 2022, was present at depths from approximately 15 to 33 feet bgs at wells located within the footprint of Cell 2 in piezometers PZ-2 through PZ-6. Piezometers PZ-2 and PZ-6 were abandoned in July 2022 as part of the Cell 2 liner installation project. Groundwater flow is generally from northwest to south-southeast, from the Ash Monofill towards Hamilton Reservoir, generally following the topographic slope of the valley.

# 3.0 Groundwater Monitoring Activities in 2022

This section summarizes groundwater monitoring activities conducted in 2022 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 detection (Appendix III) and assessment (Appendix IV) monitoring 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, and
- Statistical analysis of the 2022 Appendix III detection and Appendix IV assessment monitoring data to determine if there were any statistically significant increases (SSIs) over background and whether any of the SSIs were above groundwater protection standards (GWPS) at a statistically significant level (SSL).

## 3.1 Water Level Measurements

During each monitoring event, groundwater levels were measured using an electronic water level meter. AECOM also measured the total depth of each monitoring well by lowering the meter sensor to the bottom of the well. Groundwater levels and total depth 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 July and October 2022 monitoring events.

## 3.2 Groundwater Sample Collection

Two rounds of semi-annual Appendix III detection monitoring and Appendix IV assessment monitoring 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 27 to May 2, 2022, and October 18 to November 1, 2022.

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 occurred after well recharge, but within 24 hours of purging. Purge water volumes were recorded on groundwater sampling forms (**Appendix A**).

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

## 3.3 Analytical Program

Groundwater samples collected from the Ash Monofill wells were analyzed using U.S. Environmental Protection Agency (USEPA) SW-846 methods for Appendix III and Appendix IV constituents. All analytical results are reported as totals (unfiltered). **Table 3** summarizes the groundwater analytical results for 2022 for each sampling event. The laboratory analytical reports are provided in **Appendix B**.

**Appendix III constituents include:**

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

TDS = total dissolved solids.

**Appendix IV constituents include:**

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

## 3.4 Quality Control/Quality Assurance

Quality assurance and quality control samples collected during sampling activities included one field duplicate for each round of detection and assessment monitoring, one equipment rinse blank, and one

matrix spike/matrix spike duplicate sample. The field duplicate samples were collected immediately following collection of the primary samples using the same sampling procedures. The equipment rinse blank samples were collected after decontaminating the bladder pump casing or water level meter using techniques outlined in the sampling and analysis plan.

## 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 2022 at the Ash Monofill.

## 4.1 Groundwater Potentiometric Surface

The groundwater elevations were used to prepare potentiometric surface maps for July and October sampling events (**Figure 2** and **Figure 3**). These maps were used to determine that groundwater in the uppermost aquifer beneath the Ash Monofill flows from northwest to southeast at an average hydraulic gradient of 0.0142 feet per foot (ft/ft) between monitoring wells ASH-01 and ASH-02 in 2022. This is similar to the gradient calculated in 2021 of 0.0146 ft/ft between ASH-01 and ASH-08 and is consistent with the average gradients previously reported in past annual reports (AECOM 2018, 2019, 2020, 2021, 2022).

## 4.2 Groundwater Flow Rate

An average flow rate was calculated for groundwater in the uppermost aquifer beneath the Ash Monofill using the historic average hydraulic gradient (0.0142 ft/ft) determined between monitoring wells ASH-01 and ASH-02, the minimum [(0.085 foot per day] and maximum (1.44 foot per day), and geometric mean (0.935 foot per day [ft/day]) hydraulic conductivities determined from slug tests, 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 8.086E-3 to 1.370E-1 ft/day, with a geometric mean of 8.894E-2 ft/day.

## 4.3 Groundwater Analytical Results

Groundwater samples were collected and analyzed for Appendix III and IV parameters specified in Section 3.3 in July and October 2022. The samples were analyzed by Pace Analytical in Lenexa, Kansas. 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 verification reports found 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 April and October events to comply with assessment monitoring requirements.

## 4.4 Groundwater Monitoring System Evaluation

All monitoring wells comprising the Ash Monofill groundwater monitoring system were inspected during each sampling round and were found to be in good condition and capable of supplying a representative sample. However, several of the 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.

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

## 4.5 Problems Encountered and Actions Taken

There were no problems encountered or actions taken during 2022.

# 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 C**.

## 5.1 Appendix III SSI Determination

The Appendix III detection monitoring 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 confirmed 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 2022 are consistent with those identified during 2021 and previously during 2019. Specific events where exceedances were observed, and analytical concentrations of detections can be found in **Table 3**.

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

**Notes**:

----- = concentration below UPL.

SSI = statistically significant increase (Indicating concentrations above the background UPL).

## 5.2 Appendix IV SSI Determination

The Appendix IV assessment monitoring results were compared against their respective background UPLs to determine if they exhibited SSIs above background. This comparison indicates that selenium at monitoring wells ASH-03, ASH-04, and ASH-07 exhibit SSIs over the background UPL as shown in the table below. No other Appendix IV constituents exhibited verified SSIs over background. SSLs were calculated for select constituents and are described in Section 5.4 below.

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

Notes:
---- = concentration below UPL.
SSI = statistically significant increase (Indicating concentrations above the background UPL).
SSL = statistically significant level (indicating 95% LCL exceeded GWPS).
TDS = total dissolved solids.

## 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 exceed 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 an 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 No. | Parameter | 95% LCL (mg/L) | GWPS (mg/L) |
|---|---|---|---|
| ASH-03 | Selenium | 0.08022 | 0.05 |
| ASH-04 | Selenium | 0.06172 | 0.05 |
| ASH-07 | Selenium | 0.10832 | 0.05 |

**Notes:**

constituent's 95% LCL exceeds the GWPS.

GWPS = groundwater protection standard.

95% LCL = 95 percent lower confidence limit.

mg/L = milligrams per liter.

# 6.0 Projected Activities in 2023

The following activities are anticipated to be performed at the Ash Monofill during calendar year 2023:

- Platte River will continue groundwater monitoring at the Ash Monofill on a semiannual basis for the Appendix III detection monitoring constituents and Appendix IV assessment monitoring 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.
- High turbidities reported at some of the Ash Monofill monitoring wells has led to increased sample purge times to achieve an acceptable groundwater sample turbidity. To improve yield and reduce turbidity, wells with elevated turbidity values or excessive purge times will be re-developed using a surge block and bailer or a submersible electric pump. During well development, personnel will sample the development water for pH, temperature, specific conductance, turbidity, and other observations (i.e., color and clarity) after each well casing volume is removed. Each well will be developed to obtain water that is relatively clear (i.e., turbidity is less than 50-100 nephelometric turbidity units) and/or all field parameters stabilized (i.e., less than a 10 percent change between measurements). A well is considered developed when the field parameters have stabilized, when 10 well casing volumes have been removed, or when the well is pumped dry.
- Platte River initiated construction of a new engineered landfill cell (referred to as Cell 2B) for ash management. Construction is expected to be complete and Cell 2B to be operational early 2023. 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 2023, the corrective actions 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.

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 confirmed SSIs above the background UPLs. Selenium concentrations in groundwater at monitoring wells ASH-03, ASH-04, ASH-07 were found to represent 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 2023, the corrective actions presented in the ACM will be evaluated for a final remedy selection and implementation. The evaluation will also consider any influence the newly engineered landfill Cell 2B may have on groundwater flow and constituent concentrations.

# 8.0 References

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# Tables

**Table 1**
**Ash Monofill Monitoring Well Construction Details**
**PRPA Ash Monofill Annual Report for 2022**
**PRPA Rawhide Facility, Colorado**

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

**Notes:**
ft amsl = feet above mean sea level; ft bgs = feet below ground surface
ASH-01 was installed in December 1980 as MW-1 by Black & Veatch.
ASH-02 was installed in December 1980 as MW-2 by Black & Veatch.
Wells surveyed in North American Datum 1983 (NAD83)

**Table 2**
**Ash Monofill Groundwater Level Measurements 2022**
**PRPA Ash Monofill Annual Report for 2022**
**PRPA Rawhide Facility, Colorado**

| Well ID | Sampling Event | Measurement Date | Measuring Point Elevation (ft amsl) | Depth To Water (ft btoc) | Measured Depth of Well (ft btoc) | Groundwater Elevation (ft amsl) |
|---|---|---|---|---|---|---|
| ASH-01 | April 2022 | 4/26/2022 | 5760.15 | 13.65 | -- | 5746.35 |
| ASH-01 | October 2022 | 10/17/2022 | 5760.15 | 13.68 | 31.53 | 5746.62 |
| ASH-02 | April 2022 | 4/26/2022 | 5679.87 | 1.98 | -- | 5677.89 |
| ASH-02 | October 2022 | 10/17/2022 | 5679.87 | 3.2 | 53.28 | 5676.67 |
| ASH-03 | April 2022 | 4/26/2022 | 5717.18 | 36.31 | -- | 5680.87 |
| ASH-03 | October 2022 | 10/17/2022 | 5717.18 | 37.12 | 51.78 | 5680.06 |
| ASH-04 | April 2022 | 4/26/2022 | 5692.57 | 11.81 | -- | 5680.76 |
| ASH-04 | October 2022 | 10/17/2022 | 5692.57 | 12.51 | 32.36 | 5680.06 |
| ASH-05 | April 2022 | 4/26/2022 | 5698.71 | 19.9 | -- | 5678.81 |
| ASH-05 | October 2022 | 10/17/2022 | 5698.71 | 20.51 | 31.3 | 5678.2 |
| ASH-06 | April 2022 | 4/26/2022 | 5786.41 | 62.45 | -- | 5723.96 |
| ASH-06 | October 2022 | 10/17/2022 | 5786.41 | 62.49 | 71.2 | 5723.92 |
| ASH-07 | April 2022 | 4/26/2022 | 5690.56 | 12.95 | -- | 5677.61 |
| ASH-07 | October 2022 | 10/17/2022 | 5690.56 | 13.34 | 30.04 | 5677.22 |
| ASH-08 | April 2022 | 4/26/2022 | 5684.41 | 8.81 | -- | 5675.6 |
| ASH-08 | October 2022 | 10/17/2022 | 5684.41 | 10.22 | 29.83 | 5674.19 |

**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 2022**
**PRPA ASH Monofill Annual Report for 2022**
**PRPA Rawhide Facility, Colorado**

| | | | | Sample Location | ASH-01 | ASH-01 | ASH-02 | ASH-02 | ASH-03 Duplicate | ASH-03 | ASH-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample Type | | | | | | | |
| | | | | Sample Date | 4/27/2022 | 10/18/2022 | 4/29/2022 | 10/19/2022 | 4/29/2022 | 4/29/2022 | 10/18/2022 |
| **Chemical Name** | **Analytical Method** | **Background UPL** | **GWPS** | **Unit** | | | | | | | |
| **Appendix III Parameters** | | | | | | | | | | | |
| Boron | SW6010 | 0.608 | -- | mg/L | **0.467** | **0.434** | **1.94** | **1.74** | **0.795** | **0.805** | **0.68** |
| Calcium | SW6010 | 380.55 | -- | mg/L | **357** | **345** | **166** | **153** | **460** | **444** | **406** |
| Chloride | EPA9056 | 27.74 | -- | mg/L | **20.6** | **20.1** | **20.7** | **24.8** | **88.7** | **86.9** | **128** |
| Fluoride | EPA9056 | 1.49 | -- | mg/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Sulfate | EPA9056 | 2408 | -- | mg/L | **2470** | **2060** | **2150** | **2000** | **3130** | **2960** | **3110** |
| Total Dissolved Solids | SM2540C | 3900 | -- | mg/L | **3330** | **2150** | **2240** | **3490** | **4800** | **4850** | **4530** |
| **Appendix IV Parameters** | | | | | | | | | | | |
| Antimony | SW6020 | 0.004 | 0.006 | mg/L | < 0.0010 | < 0.0010 | < 0.0050 | < 0.0030 | < 0.0050 | < 0.0050 | < 0.0030 |
| Arsenic | SW6020 | 0.004 | 0.05 | mg/L | < 0.0010 | < 0.0010 | < 0.0050 | < 0.0030 | < 0.0010 | < 0.0010 | < 0.0030 |
| Barium | SW6020 | 0.070 | 2.0 | mg/L | **0.0090** | **0.0104** | **0.0178** | **0.0200** | **0.0097** | **0.0128** | **0.0094** |
| Beryllium | SW6020 | 0.002 | 0.004 | mg/L | < 0.00050 | < 0.0015 | < 0.00050 | < 0.0015 | < 0.00050 | < 0.00050 | < 0.0015 |
| Cadmium | SW6020 | 0.002 | 0.005 | mg/L | < 0.00050 | < 0.00050 | < 0.0025 | < 0.0015 | < 0.0025 | < 0.0025 | < 0.0015 |
| Chromium | SW6020 | 0.033 | 0.10 | mg/L | < 0.0010 | < 0.0010 | < 0.0050 | < 0.0030 | < 0.0010 | < 0.0010 | < 0.0010 UJ |
| Cobalt | SW6020 | 0.042 | 0.006 | mg/L | < 0.0010 | < 0.0010 | < 0.0050 | < 0.0030 | < 0.0010 | < 0.0010 | < 0.0030 |
| Fluoride | EPA9056 | 1.49 | 4.0 | mg/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Lead | SW6020 | 0.004 | 0.015 | mg/L | < 0.0010 | < 0.0030 | < 0.0050 | < 0.0030 | < 0.0050 | < 0.0050 | < 0.0030 |
| Lithium | SW6010 | 0.549 | 0.549 | mg/L | **0.413** | **0.427** | **0.304** | **0.3** | **0.419** | **0.408** | **0.399** |
| Mercury | EPA7470 | 0.0002 | 0.002 | mg/L | < 0.00020 | < 0.00020 | R | < 0.00020 | R | R | < 0.00020 |
| Molybdenum | SW6020 | 0.052 | 0.10 | mg/L | < 0.0010 | < 0.0010 | **0.0064** | **0.0069** | < 0.0010 | < 0.0010 | < 0.0030 |
| Radium, total | TRC | 3.09 | 5.0 | pCi/L | **0.521** | **1.14** | **0.926** | **0.410** | **1.31** | **1.28** | **1.01** |
| Radium-226 | E903.1 | 3.09 | 5.0 | pCi/L | **-0.0753** | **0.109** | **0.208 J** | **-0.310** | **0.370** | **0.308** | **0.147** |
| Radium-228 | E904.0 | 3.09 | 5.0 | pCi/L | **0.521** | **1.03** | **0.718** | **0.410** | **0.939** | **0.971** | **0.867** |
| Selenium | SW6020 | 0.039 | 0.05 | mg/L | < 0.0010 | < 0.0010 | < 0.0050 | < 0.0030 | **0.119** | **0.107** | **0.142 J+** |
| Thallium | SW6020 | 0.004 | 0.004 | mg/L | < 0.0010 | < 0.0030 | < 0.0050 | < 0.0030 | < 0.0050 | < 0.0050 | < 0.0030 |
| **Field Parameters** | | | | | | | | | | | |
| Conductivity | Field Measure | -- | -- | us/cm | **3300** | **3555** | **3723** | **3985** | -- | **4865** | **5147** |
| Dissolved Oxygen | Field Measure | -- | -- | mg/l | **3.73** | **7.65** | **3.79** | **0.62** | -- | **0.23** | **4.61** |
| ORP | Field Measure | -- | -- | mv | **155.2** | **92.5** | **116.4** | **149** | -- | **132.1** | **649.6** |
| pH | Field Measure | 8.84 | -- | su | **7.37** | **7.2** | **7.8** | **7.57** | -- | **7.03** | **-1.75** |
| Turbidity | Field Measure | -- | -- | NTU | **12.6** | **12.2** | **14.1** | **14.7** | -- | **12** | **12.4** |
| Temperature | Field Measure | -- | -- | Degress C | **1.37** | **4.84** | **1.87** | **1.28** | -- | **4.96** | **0.86** |

**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)

**Table 3**
**ASH Monofill Analytical Results and Statistical Summary 2022**
**PRPA ASH Monofill Annual Report for 2022**
**PRPA Rawhide Facility, Colorado**

| | | | | Sample Location | ASH-04 | ASH-04 | ASH-04 | ASH-05 | ASH-05 Duplicate | ASH-05 | ASH-05 | ASH-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample Type | | | | | | | | |
| | | | | Sample Date | 5/2/2022 | 10/20/2022 | 11/1/2022 | 5/2/2022 | 10/20/2022 | 10/20/2022 | 11/1/2022 | 4/27/2022 |
| **Chemical Name** | **Analytical Method** | **Background UPL** | **GWPS** | **Unit** | | | | | | | | |
| **Appendix III Parameters** | | | | | | | | | | | | |
| Boron | SW6010 | 0.608 | -- | mg/L | **0.606** | **0.623** | -- | **0.873** | **0.851** | **0.853** | -- | **0.313** |
| Calcium | SW6010 | 380.55 | -- | mg/L | **454** | **440** | -- | **507** | **480** | **483** | -- | **26.9** |
| Chloride | EPA9056 | 27.74 | -- | mg/L | **186** | -- | **221 J+** | **234** | -- | -- | **529** | **7.7** |
| Fluoride | EPA9056 | 1.49 | -- | mg/L | **0.35** | -- | **0.22 J-** | < 0.20 | -- | -- | < 0.20 | **0.55** |
| Sulfate | EPA9056 | 2408 | -- | mg/L | **3360** | -- | **3790 J-** | **2630** | -- | -- | **4360** | **93.2** |
| Total Dissolved Solids | SM2540C | 3900 | -- | mg/L | **5760** | -- | **5760** | **4500** | -- | -- | **4700** | **486** |
| **Appendix IV Parameters** | | | | | | | | | | | | |
| Antimony | SW6020 | 0.004 | 0.006 | mg/L | < 0.0050 | < 0.0030 | -- | < 0.0010 | < 0.0010 | < 0.0010 | -- | < 0.0010 |
| Arsenic | SW6020 | 0.004 | 0.05 | mg/L | < 0.0010 | < 0.0010 | -- | < 0.0010 | < 0.0010 | < 0.0010 | -- | < 0.0010 |
| Barium | SW6020 | 0.070 | 2.0 | mg/L | **0.0151** | **0.0085** | -- | **0.0155** | **0.0131** | **0.0135** | -- | **0.0380** |
| Beryllium | SW6020 | 0.002 | 0.004 | mg/L | < 0.00050 | < 0.00050 UJ | -- | < 0.00050 | < 0.00050 | < 0.00050 | -- | < 0.00050 |
| Cadmium | SW6020 | 0.002 | 0.005 | mg/L | < 0.0025 | < 0.0015 | -- | < 0.00050 | < 0.00050 | < 0.00050 | -- | < 0.00050 |
| Chromium | SW6020 | 0.033 | 0.10 | mg/L | < 0.0010 | < 0.0010 | -- | **0.0014** | < 0.0010 | < 0.0010 | -- | **0.0021** |
| Cobalt | SW6020 | 0.042 | 0.006 | mg/L | < 0.0010 | < 0.0010 | -- | < 0.0010 | < 0.0030 | < 0.0030 | -- | < 0.0010 |
| Fluoride | EPA9056 | 1.49 | 4.0 | mg/L | **0.35** | -- | **0.22 J-** | < 0.20 | -- | -- | < 0.20 | **0.55** |
| Lead | SW6020 | 0.004 | 0.015 | mg/L | < 0.0050 | < 0.0010 | -- | < 0.0010 | < 0.0010 | < 0.0010 | -- | < 0.0010 |
| Lithium | SW6010 | 0.549 | 0.549 | mg/L | **0.376** | **0.379** | -- | **0.323** | **0.324** | **0.325** | -- | **0.0554** |
| Mercury | EPA7470 | 0.0002 | 0.002 | mg/L | < 0.00020 | -- | < 0.00020 | < 0.00020 | -- | -- | < 0.00020 | < 0.00020 |
| Molybdenum | SW6020 | 0.052 | 0.10 | mg/L | < 0.0010 | < 0.0030 | -- | < 0.0010 | < 0.0030 | < 0.0030 | -- | **0.0140** |
| Radium, total | TRC | 3.09 | 5.0 | pCi/L | **1.46** | **2.31** | -- | **0.961** | **1.28** | **0.785** | -- | **0.247** |
| Radium-226 | E903.1 | 3.09 | 5.0 | pCi/L | **0.646** | **0.443** | -- | **0.570** | **0.618** | **0.178** | -- | **0.247** |
| Radium-228 | E904.0 | 3.09 | 5.0 | pCi/L | **0.810** | **1.87 J+** | -- | **0.391** | **0.661** | **0.607** | -- | **-0.0221** |
| Selenium | SW6020 | 0.039 | 0.05 | mg/L | **0.119** | **0.1 J+** | -- | **0.0256** | **0.0269** | **0.0259** | -- | **0.0404** |
| Thallium | SW6020 | 0.004 | 0.004 | mg/L | < 0.0050 | < 0.0010 | -- | < 0.0050 | < 0.0010 | < 0.0010 | -- | < 0.0010 |
| **Field Parameters** | | | | | | | | | | | | |
| Conductivity | Field Measure | -- | -- | us/cm | **5145** | **5456** | -- | **4454** | -- | **4412** | **2597** | **598.1** |
| Dissolved Oxygen | Field Measure | -- | -- | mg/l | **0.23** | **1.03** | -- | **0.36** | -- | **3.19** | **2.2** | **0.37** |
| ORP | Field Measure | -- | -- | mv | **154.6** | **245.4** | -- | **168.3** | -- | **231.5** | **135.3** | **75.9** |
| pH | Field Measure | 8.84 | -- | su | **7.4** | **7.32** | -- | **7.09** | -- | **7.03** | **7.03** | **8** |
| Turbidity | Field Measure | -- | -- | NTU | **10.5** | **14.2** | -- | **12** | -- | **13.3** | **13.6** | **13.4** |
| Temperature | Field Measure | -- | -- | Degress C | **10.6** | **4.37** | -- | **12.5** | -- | **3.87** | **9.4** | **1.67** |

**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)

**Table 3**
**ASH Monofill Analytical Results and Statistical Summary 2022**
**PRPA ASH Monofill Annual Report for 2022**
**PRPA Rawhide Facility, Colorado**

| | | | | Sample Location | ASH-06 | ASH-07 | ASH-07 | ASH-08 | ASH-08 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample Type | | | | | |
| | | | | Sample Date | 10/18/2022 | 5/2/2022 | 10/21/2022 | 5/2/2022 | 10/19/2022 |
| **Chemical Name** | **Analytical Method** | **Background UPL** | **GWPS** | **Unit** | | | | | |
| **Appendix III Parameters** | | | | | | | | | |
| Boron | SW6010 | 0.608 | -- | mg/L | **0.278** | **0.786** | **0.81** | **0.904** | **0.818** |
| Calcium | SW6010 | 380.55 | -- | mg/L | **23.5** | **426** | **410** | **447** | **400** |
| Chloride | EPA9056 | 27.74 | -- | mg/L | **8.4** | **2230** | **277** | **26.3** | **31.5** |
| Fluoride | EPA9056 | 1.49 | -- | mg/L | **0.60** | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Sulfate | EPA9056 | 2408 | -- | mg/L | **65.6** | **5200** | **4290** | **2620** | **2540** |
| Total Dissolved Solids | SM2540C | 3900 | -- | mg/L | **544** | **6660** | **6630** | **4460** | **4470** |
| **Appendix IV Parameters** | | | | | | | | | |
| Antimony | SW6020 | 0.004 | 0.006 | mg/L | < 0.0010 | < 0.0050 | < 0.0050 | < 0.0010 | < 0.0010 |
| Arsenic | SW6020 | 0.004 | 0.05 | mg/L | < 0.0030 | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0030 |
| Barium | SW6020 | 0.070 | 2.0 | mg/L | **0.0479** | **0.0147** | **0.0115** | **0.0129** | **0.0159** |
| Beryllium | SW6020 | 0.002 | 0.004 | mg/L | < 0.0015 | < 0.00050 | < 0.00050 | < 0.00050 | < 0.0015 |
| Cadmium | SW6020 | 0.002 | 0.005 | mg/L | < 0.00050 | < 0.0025 | < 0.0025 | < 0.00050 | < 0.00050 |
| Chromium | SW6020 | 0.033 | 0.10 | mg/L | < 0.0030 | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0030 |
| Cobalt | SW6020 | 0.042 | 0.006 | mg/L | < 0.0030 | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0030 |
| Fluoride | EPA9056 | 1.49 | 4.0 | mg/L | **0.60** | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Lead | SW6020 | 0.004 | 0.015 | mg/L | < 0.0030 | < 0.0050 | < 0.0010 | < 0.0010 | < 0.0030 |
| Lithium | SW6010 | 0.549 | 0.549 | mg/L | **0.0545** | **0.541** | **0.538** | **0.314** | **0.306** |
| Mercury | EPA7470 | 0.0002 | 0.002 | mg/L | < 0.00020 | < 0.00020 | < 0.00020 | < 0.00020 | < 0.00020 |
| Molybdenum | SW6020 | 0.052 | 0.10 | mg/L | **0.0123** | < 0.0010 | < 0.0030 | < 0.0010 | < 0.0010 |
| Radium, total | TRC | 3.09 | 5.0 | pCi/L | **0.254** | **1.25** | **0.896** | **0.360** | **1.64** |
| Radium-226 | E903.1 | 3.09 | 5.0 | pCi/L | **-0.109** | **0.382 J** | **0.391 J** | **-0.168** | **0.513 J** |
| Radium-228 | E904.0 | 3.09 | 5.0 | pCi/L | **0.254** | **0.865** | **0.505** | **0.360** | **1.13** |
| Selenium | SW6020 | 0.039 | 0.05 | mg/L | **0.0327** | **0.164** | **0.0817** | < 0.0010 | < 0.0030 |
| Thallium | SW6020 | 0.004 | 0.004 | mg/L | < 0.0030 | < 0.0100 | < 0.0010 | < 0.0050 | < 0.0030 |
| **Field Parameters** | | | | | | | | | |
| Conductivity | Field Measure | -- | -- | us/cm | **663** | **6524** | **6934** | **4068** | **4243** |
| Dissolved Oxygen | Field Measure | -- | -- | mg/l | **6.8** | **0.19** | **0.3** | **0.16** | **2.66** |
| ORP | Field Measure | -- | -- | mv | **218.8** | **150.2** | **255.9** | **136.4** | **46.9** |
| pH | Field Measure | 8.84 | -- | su | **7.95** | **7.15** | **7.11** | **6.98** | **6.94** |
| Turbidity | Field Measure | -- | -- | NTU | **14.4** | **10.9** | **13.2** | **9.8** | **14.9** |
| Temperature | Field Measure | -- | -- | Degress C | **0.74** | **6.07** | **4.73** | **4.69** | **3.79** |

**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)

**Table 4**
**Ash Monofill Appendix III Background Upper Prediction Limits**
**PRPA Ash Monofill Annual Report for 2022**
**PRPA Rawhide Facility, Colorado**

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

**Notes:**

mg/L = milligrams per liter

UPL = upper prediction limit

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

**Table 5**
**Ash Monofill Appendix IV Background Upper Prediction Limits**
**PRPA Ash Monofill Annual Report for 2022**
**PRPA Rawhide Facility, Colorado**

| Parameter (Units) | Number of Samples | Percent Non-detects | Normal or Lognormal Distribution? | Statistical Test | Background UPL | GWPS |
|---|---|---|---|---|---|---|
| Antimony (mg/L) | 28 | 100 | No/No | MDL | 0.004 | 0.006 |
| Arsenic (mg/L) | 28 | 85 | No/No | MDL | 0.004 | 0.05 |
| 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 | 0.006 |
| 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 |
| 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 |
| Radium-226+228 Combined (pCi//L) | 24 | 8 | No/Yes | Parametric | 3.09 | 5 |

**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).

# Figures

Last saved: 1/11/2023
Path: C:\Users\lilianageorgeta.croi\AECOM Directory\GDS GIS Services - GIS CAD PROJECTS\DCS AMERICAS\CENTRAL REGION US\PRPA\20230111\Work\Figure 1 ASH.mxd
Project Management Initials: Design RLH Drawn AGS Checked JH Approved VK ANSI B 11" x 17"

**CCR 2022 Annual Groundwater Report**
Platte River Power Authority Wellington, CO
Project No.: 60684835 Date: 2023-01-11

**Rawhide Energy Station**
**ASH Monitoring Well Network**

AECOM

**Figure 1**

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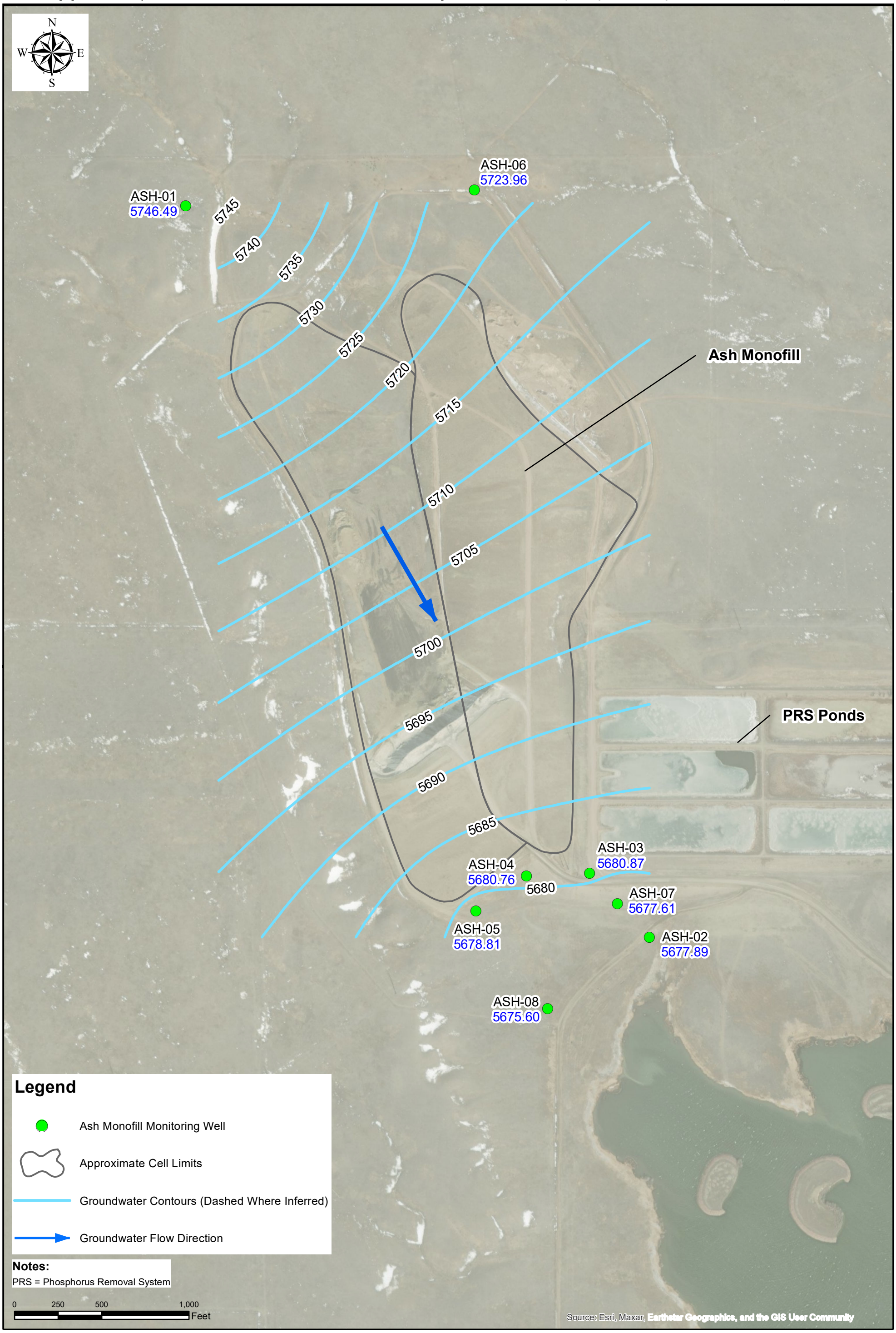
Path: C:\Users\lilianageorgeta.croi\AECOM Directory\GDS GIS Services - GIS CAD PROJECTS\DCS AMERICAS\CENTRAL REGION US\PRPA\20230111\Work\Figure 2 ASH.mxd
Project Management Initials: Design RLH Drawn AGS Checked JH Approved VK ANSI B 11" x 17"




**CCR 2022 Annual Groundwater Report**
Platte River Power Authority Wellington, CO
Project No.: 60684835 Date: 2023-01-11

**Rawhide Energy Station**
**ASH Monitoring Well Networks**
**April 2022 Water Levels**

AECOM

**Figure 2**

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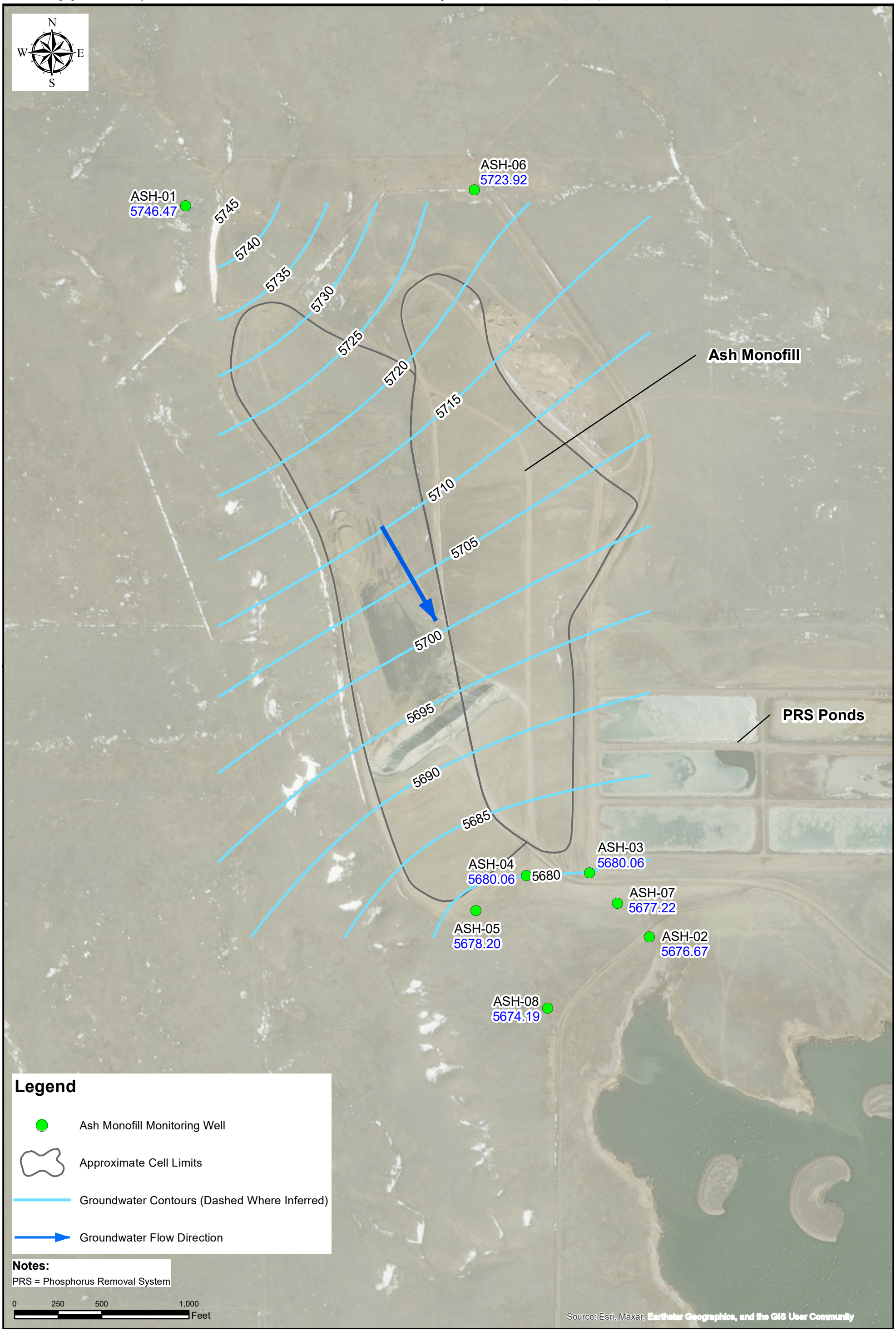
Path: C:\Users\lilianageorgeta.croi\AECOM Directory\GDS GIS Services - GIS CAD PROJECTS\DCS AMERICAS\CENTRAL REGION US\PRPA\20230111\Work\Figure 3 ASH.mxd
Project Management Initials: Design RLH Drawn AGS Checked JH Approved VK ANSI B 11" x 17"




**CCR 2022 Annual Groundwater Report**
Platte River Power Authority Wellington, CO
Project No.: 60684835 Date: 2023-01-11

**Rawhide Energy Station**
**ASH Monitoring Well Networks**
**October 2022 Water Levels**

AECOM

**Figure 3**

# Appendix A

# Groundwater Sampling Forms

# April 2022

AECOM

Well/Piezo ID: ASH-01

# Ground Water Sample Collection Record

| | | | |
|---|---|---|---|
| Client: | Platte River Power Authority | Date: | 4.27.22 |
| Project No: | CDPHE = 60630004, CCR = 60630103 | Time: Start | 11:03 |
| Site Location: | Rawhide Generating Station | Finish | 1210 |
| Weather Conds: | mid 9; 70°F, Sunny | Collector(s) | J. Levy / J. Leverton |

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

a. Total Well Length —

b. Water Table Depth 13.65

c. Casing Material PVC

d. Casing Diameter 4

e. Length of Water Column _____ (a-b)

f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 300

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| Make | Model | Serial Number |
|---|---|---|
| YSI 556 | Cal Log | |
| Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 1108 | 0.1 | 12.4 | 7.47 | 3295 | 165.5 | 4.11 | 1.82 | Clear | 14.16 |
| 1111 | 0.5 | 12.4 | 7.39 | 3297 | 163.1 | 3.77 | 1.69 | Clear | 14.24 |
| 1114 | 0.7 | 12.7 | 7.37 | 3295 | 158.6 | 3.77 | 1.31 | Clear | 14.25 |
| 1117 | 0.7 | 12.6 | 7.37 | 3300 | 155.2 | 3.73 | 1.37 | Clear | 14.31 |
| | | | | | | | | | |
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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.

Low Flow

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-01-CDPHE | | CoC | | KS + PA | 1130 |
| ASH-01-CCR | | | | KS + PA | |
| | | | | | |
| | | | | | |
| | | | | | |

Comments

Signature [signature] Date 4/27/22

AECOM

Well/Piezo ID: ASH-02

# Ground Water Sample Collection Record

| | | | |
|---|---|---|---|
| Client: | Platte River Power Authority | Date: | 4/29/12 |
| Project No: | CDPHE = 60630004, CCR = 60630103 | Time: Start | 1250 |
| Site Location: | Rawhide Generating Station | Finish | 1620 |
| Weather Conds: | windy; 50°F | Collector(s) | J. Ley + J. Leverton |

**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 1.98  d. Casing Diameter 4"  f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 140

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI 556 | | | |
| Turbidity | | Cal Log | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft | |
| 1257 | 0.1 | 11.7 | 7.93 | 3715 | 161.8 | 4.47 | 3.66 | clear | 2.28 | 200mL/min |
| 1300 | 0.3 | 12.0 | 7.88 | 3703 | 158.0 | 4.21 | 3.03 | clear | 2.51 | |
| 1305 | 0.5 | 12.2 | 7.84 | 3699 | 152.8 | 4.07 | 2.82 | clear | 2.81 | |
| 1308 | 0.7 | 12.3 | 7.83 | 3716 | 149.7 | 4.14 | 2.26 | clear | 3.15 | 210mL/min |
| 1313 | 1 | 12.3 | 7.82 | 3707 | 145.3 | 4.14 | 2.10 | clear | 3.54 | |
| 1316 | 1.2 | 12.6 | 7.82 | 3703 | 141.9 | 3.96 | 1.92 | clear | 3.81 | |
| 1319 | 1.4 | 12.6 | 7.82 | 3710 | 138.3 | 4.05 | 1.55 | clear | 4.09 | |
| 1322 | 1.6 | 12.8 | 7.82 | 3709 | 135.8 | 3.93 | 1.93 | clear | 4.35 | 240mL/min |
| 1327 | 1.8 | 12.7 | 7.78 | 3713 | 132.3 | 4.07 | 1.51 | clear | 4.85 | |
| 1331 | 2.2 | 12.4 | 7.81 | 3707 | 128.7 | 4.11 | 1.43 | clear | 5.40 | |
| 1337 | 2.66 | 12.3 | 7.83 | 3711 | 126.3 | 3.99 | 1.54 | clear | 5.98 | 290mL/min |
| 1342 | 2.95 | 12.4 | 7.81 | 3719 | 123.5 | 4.03 | 1.29 | clear | 6.54 | |
| 1347 | 3.25 | 12.4 | 7.80 | 3715 | 120.9 | 4.04 | 1.65 | clear | 7.18 | 140mL/min |
| 1350 | 3.4 | 13.8 | 7.79 | 3670 | 119.4 | 3.86 | 1.76 | clear | 7.36 | |
| 1353 | 3.55 | 14.0 | 7.80 | 3711 | 117.9 | 3.87 | 1.76 | clear | 7.55 | |
| 1353 | 3.7 | 14.1 | 7.80 | 3723 | 116.4 | 3.78 | 1.87 | clear | 7.66 | |
| | | | | | | | | | | |
| | | | | | | | | | | |

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.

Low flow

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-02-CDPHE | | 30 | | KC+PA | 1430 |
| ASH-02-CCR | | 15 | | KS+PA | 1430 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments MS/MSD for CDPHE + CCR collected here

Signature _____ Date 4/29/12

AECOM

Well/Piezo ID: ASH-03

# Ground Water Sample Collection Record

| | | | |
|---|---|---|---|
| Client: | Platte River Power Authority | Date: | 4.29.22 |
| Project No: | CDPHE = 60630004, CCR = 60630103 | Time: Start | 1100 |
| Site Location: | Rawhide Generating Station | Finish | 12:45 |
| Weather Conds: | Windy; Hazy; 50°F | Collector(s) | J. Levy + J. Leventer |

**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 36.31 d. Casing Diameter 2" f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 210

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI 556 | | | |
| Turbidity | | | Cal Log |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft | |
| 1103 | Initial | 12.3 | 7.20 | 4882 | 153.6 | 1.26 | 27.4 | Clear | 37.21 | 320 mL/min |
| 1108 | 0.45 | 12.0 | 7.05 | 4852 | 145.4 | 0.75 | 10.4 | Clear | 37.55 | |
| 1112 | 0.75 | 12.3 | 7.04 | 4851 | 140.4 | 0.48 | 6.90 | Clear | 37.94 | 210 mL/min |
| 1115 | 0.9 | 12.3 | 7.02 | 4849 | 135.1 | 0.36 | 5.90 | Clear | 37.91 | |
| 1118 | 1.1 | 12.0 | 7.03 | 4865 | 132.1 | 0.23 | 4.96 | Clear | 37.89 | |
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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.

Low flow

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-03-CDPHE | | | | KS+PA | 1145 |
| ASH-03-CCR | | | | KS+PA | 1145 |
| DUP-01-CDPHE | | | | KS+PA | — |
| DUP-01-CCR | | | | KS+PA | — |
| | | | | | |

Comments CDPHE + CCR DUP-01 collected

Signature [signature] Date 4/~~28~~ 29/22

AECOM

Well/Piezo ID: ASH-04

# Ground Water Sample Collection Record

| | | | |
|---|---|---|---|
| Client: | Platte River Power Authority | Date: | 5/2/22 |
| Project No: | CDPHE = 60630004, CCR = 60630103 | Time: Start | 0940 |
| Site Location: | Rawhide Generating Station | Finish | 1040 |
| Weather Conds: | Lt snow; Cloudy; 40°F | Collector(s) | J. Levy, J. Lewton |

**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 11.81 d. Casing Diameter 2" f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 360

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI 556 | | | |
| Turbidity | | Cal Log | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft | |
| 0945 | 0.1 | 10.4 | 7.52 | 5155 | 162.8 | 0.61 | 20.9 | Clear | 12.44 | 360 mL/min |
| 0950 | 0.5 | 10.6 | 7.44 | 5153 | 159.7 | 0.30 | 13.9 | Clear | 12.65 | |
| 0955 | 0.8 | 10.5 | 7.41 | 5147 | 156.3 | 0.26 | 13.5 | Clear | 12.75 | |
| 0958 | 1 | 10.5 | 7.40 | 5145 | 154.6 | 0.23 | 10.6 | Clear | 12.74 | |
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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.
Low flow

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-04-CDPHE | CoC | | | KS+PA | 1030 |
| ASH-04-CCR | | | | KS+PA | 1030 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments _____

Signature [signature] Date 5/2/22

AECOM

Well/Piezo ID: ASH-05

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Lt-Snowy Cloudy; 40°F Collector(s) J. Ley + J. Lawton

Date: 5/2/22
Time: Start 1050
Finish 1145

**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 19.90
d. Casing Diameter 2"
f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 400

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI 556 | | | |
| Turbidity | | Cal | Log |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft | |
| 1055 | 0.1 | 11.6 | 7.22 | 4488 | 177.6 | 0.76 | 20.0 | Clear | 20.21 | 400mL/min |
| 1100 | 0.6 | 12.0 | 7.12 | 4509 | 173.6 | 6.55 | 13.2 | Clear | 20.23 | |
| 1103 | 1 | 12.0 | 7.10 | 4511 | 170.7 | 0.40 | 12.3 | Clear | 20.26 | |
| 1106 | 1.4 | 12.0 | 7.09 | 4454 | 168.3 | 6.36 | 12.5 | Clear | 20.34 | |

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.
Low flow

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-05-CDPHE | CoC | | | TKS+PA | 1130 |
| ASH-05-CCR | | | | TKS+PA | 1130 |
| | | | | | |
| | | | | | |
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Comments

Signature [signature] Date 5/2/22

AECOM

Well/Piezo ID: ASH-06

CDPHE, CCR

# Ground Water Sample Collection Record

| | | | |
|---|---|---|---|
| Client: | Platte River Power Authority | Date: | 4.26.22 |
| Project No: | CDPHE = 60630004, CCR = 60630103 | Time: Start | 13:45 |
| Site Location: | Rawhide Generating Station | Finish | 1520 |
| Weather Conds: | 66° | Collector(s) | J. Hershman / J. Leverton |

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

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

b. Water Table Depth 62.45 d. Casing Diameter 2" f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): ~250

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI | ~~550~~ Pro | | |
| Turbidity | Hach | | |

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

| Time | Volume L Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft | |
| 1425 | 1 L | 14.4 | 7.89 | 578.6 | 133.7 | 2.37 | 3.85 | clear | 63.25 | |
| 1430 | 2.2 L | 13.9 | 7.93 | 563.0 | 122.3 | 1.75 | 4.22 | clear | 63.55 | |
| 1435 | 4.0 L | 13.9 | 7.93 | 560.7 | 111.4 | 0.22 | 3.31 | clear | 64.00 | |
| 1440 | 5.2 L | 14.1 | 7.89 | 559.7 | 104.2 | error | 1.97 | clear | 64.40 | |
| 1444 | 6.5 L | 14.2 | 7.89 | 560.5 | 96.2 | 0.00 | 2.21 | clear | 65.00 | |
| 1449 | 8.0 L | 14.1 | 7.87 | 564.8 | 89.5 | 0.12 | 2.21 | clear | 65.40 | |
| 1455 | 9.4 L | 14.2 | 7.86 | 574.2 | 86.3 | 0.39 | 1.67 | clear | 65.85 | |
| 1500 | 10.5 L | 14.2 | 7.93 | 583.3 | 80.7 | 0.33 | 1.06 | clear | 66.20 | |
| 1505 | 11.5 L | 13.9 | 8.00 | 598.1 | 75.9 | 0.37 | 1.67 | clear | 67.00 | Dry |
| | | | Purged Dry at pump intake | | | | | | | |

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.

Purged Dry. will come back to sample.

**SAMPLE COLLECTION:** Method: bladder pump

| Date | Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|---|
| 4.27.22 | ASH-06-CCR | Sec | COC | → | KS+PA | 1225 |
| | ASH-06-CDPHE | Sec | COC | → | KS+PA | 1225 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Comments _____

Signature [signature] Date 4.27.2022

AECOM

Well/Piezo ID: ASH-07

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Sunny, Cloudy, 35°F Collector(s) J. Ley + J. Leverton

Date: 5/2/22
Time: Start 0830
Finish 0935

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☑ Piezometer ☐

a. Total Well Length –
b. Water Table Depth 12.95
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 400

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI 556 | | | |
| Turbidity | | Cal | LOS |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft | |
| 0835 | 0.1 | 11.2 | 7.20 | 6466 | 186.0 | 0.91 | 54.6 | Clear | 13.36 | 400 mL/min |
| 0838 | 0.5 | 11.1 | 7.15 | 6476 | 179.0 | 0.50 | 35.8 | Clear | 13.64 | |
| 0843 | 1.1 | 11.1 | 7.14 | 6496 | 168.7 | 0.41 | 19.3 | Clear | 13.56 | |
| 0846 | 1.6 | 11.0 | 7.14 | 6528 | 161.9 | 0.50 | 12.4 | Clear | 13.62 | |
| 0853 | 2.2 | 10.9 | 7.14 | 6528 | 156.3 | 0.25 | 11.5 | Clear | 13.64 | |
| 0856 | 2.4 | 10.9 | 7.15 | 6525 | 153.6 | 0.26 | 7.61 | Clear | 13.66 | |
| 0859 | 2.6 | 10.9 | 7.15 | 6524 | 150.2 | 0.19 | 6.07 | Clear | 13.66 | |

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.
Low Flow

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-07-CDPHE | COC | | | KS+PA | 0915 |
| ASH-07-CCR | | | | KS+PA | 0915 |
| | | | | | |
| | | | | | |

Comments

Signature _____ Date 5/2/22

AECOM

Well/Piezo ID: ASH-08

# Ground Water Sample Collection Record

| | | | |
|---|---|---|---|
| Client: | Platte River Power Authority | Date: | 5/2/22 |
| Project No: | CDPHE = 60630004, CCR = 60630103 | Time: Start | 1230 |
| Site Location: | Rawhide Generating Station | Finish | 1415 |
| Weather Conds: | Cloudy; 40°F | Collector(s) | J. Levy + J. Levanda |

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

a. Total Well Length —

b. Water Table Depth 8.81

c. Casing Material PVC

d. Casing Diameter 2"

e. Length of Water Column _____ (a-b)

f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 210

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| Make | Model | Serial Number |
|---|---|---|
| YSI 556 | | |
| Turbidity | Cal Log | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft | |
| 1240 | 0.5 | 9.9 | 7.10 | 4075 | 175.2 | 0.50 | 19.8 | Clear | 11.05 | 440 mL/min |
| 1245 | 1 | 9.8 | 7.02 | 4072 | 167.3 | 0.29 | 9.97 | Clear | 13.13 | |
| 1250 | 1.5 | 9.8 | 7.00 | 4069 | 162.7 | 0.26 | 8.42 | Clear | 14.76 | |
| 1254 | 1.9 | 9.6 | 6.99 | 4068 | 157.9 | 0.37 | 6.43 | Clear | 15.42 | 300 mL/min |
| 1257 | 2.1 | 9.7 | 6.99 | 4067 | 153.0 | 0.24 | 7.64 | Clear | 15.63 | |
| 1300 | 2.3 | 9.6 | 6.99 | 4058 | 148.1 | 0.20 | 5.93 | Clear | 15.72 | 240 mL/min |
| 1303 | 2.5 | 9.8 | 6.99 | 4065 | 143.4 | 0.18 | 4.32 | Clear | 16.10 | |
| 1306 | 2.7 | 9.7 | 6.99 | 4066 | 140.0 | 0.20 | 3.97 | Clear | 16.18 | 210 mL/min |
| 1309 | 2.9 | 9.8 | 6.98 | 4068 | 136.4 | 0.16 | 4.69 | Clear | 16.28 | |
| | | | | | | | | | | |
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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.

Low flow

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-08-CDPHE | CoC | | | KS+PA | 1330 |
| ASH-08-CCR | | | | KS+PA | 1330 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments

Signature [signature] Date 5/2/22

Event: April 2022 Date: 4/26/22

MP: Top of Casing Recorder: J. Hutchinson, J. Leverton

| Location | Group | DTW | TD | Notes |
|---|---|---|---|---|
| PZ-2 | Piezometer | 18.12 | | |
| PZ-3 | Piezometer | 32.30 | | |
| PZ-4 | Piezometer | 21.96 | | |
| PZ-5 | Piezometer | 35.31 | | |
| PZ-6 | Piezometer | 26.40 | | |
| ASH-01 | ASH | 13.65 | | Buffalo Area - Need Escort |
| ASH-02 | ASH | 1.98 | | |
| ASH-03 | ASH | 36.31 | | |
| ASH-04 | ASH | 11.81 | | |
| ASH-05 | ASH | 19.90 | | |
| ASH-06 | ASH | 62.45 | | |
| ASH-07 | ASH | 12.95 | | |
| ASH-08 | ASH | 8.81 | | |
| BAT-01 | BAT | 12.98 | | Flush mount |
| BAT-02 | BAT | 17.35 | | " " |
| BAT-03 | BAT | 12.22 | | " " |
| BAT-04R | BAT | 14.05 | | |
| BAT-05 | BAT | 19.38 | | Flush Mount |
| BAT-06 | BAT | 14.24 | | |
| BAT-08 | BAT | 14.10 | | Flush Mount / No Sample |
| BAT-09 | BAT | 20.38 | | |
| BAT-10 | BAT | 11.90 | | |
| BAT-11 | BAT | 26.81 | | |
| BAT-12 | BAT | 29.00 | | |
| PRS-01 | PRS | 14.01 | | |
| PRS-02 | PRS | 12.94 | | |
| PRS-03 | PRS | 47.30 | | |
| PRS-04 | PRS | 27.99 | | |
| PRS-05 | PRS | 27.92 | | |
| PRS-06 | PRS | 18.60 | | |
| MW-3 | Sitewide | 24.78 | | |
| MW-4 | Sitewide | 18.90 | | |
| MW-5 | Sitewide | 21.85 | | Buffalo Area - Need Escort |
| MW-6 | Sitewide | 1.15 | | Cross Barbed Wire Fence and Access by Foot |
| MW-7 | Sitewide | 1.97 | | Cross Barbed Wire Fence and Access by Foot |
| MW-8 | Sitewide | 9.65 | | |

*Acronyms:*

*DTW - Depth to Water*

*MP - Measuring Point*

*TD - Total Depth*

# October 2022

AECOM

Well/Piezo ID: ASH-01

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Clear, Sunny
Collector(s): G. Davson, D. Woodward
Date: 10/18/22
Time Start: 9:40
Finish: 10:50

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☒ Piezometer ☐

a. Total Well Length: _____
b. Water Table Depth: 13.72
c. Casing Material: PVC
d. Casing Diameter: 4"
e. Length of Water Column: _____ (a-b)
f. Calculated Well Volume (see back): _____

**Flow Rate** (< 500 ml/min): 400 mL/min

**WELL PURGING DATA**

a. Purge Method: bladder pump

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| | YSI 556 | | |
| | Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 9:50 | | 12.1 | 7.15 | 3608 | 251.7 | 14.17 | 4.43 | Clear | 14.23 |
| 9:53 | 1.00 | 12.2 | 7.13 | 3613 | 248.5 | 5.92 | 4.40 | | 14.36 |
| 9:56 | | 12.2 | 7.13 | 3556 | 246.7 | 6.41 | 4.13 | | 14.45 |
| 9:59 | 1.60 | 12.3 | 7.14 | 3542 | 240.5 | 6.95 | 3.06 | Clear | 14.46 |
| 10:02 | 1.90 | 12.3 | 7.13 | 3590 | 222.3 | 7.22 | 3.30 | | 14.52 |
| 10:05 | | 12.3 | 7.15 | 3459 | 201.6 | 6.90 | 7.25 | Clear | 14.53 |
| 10:08 | | 12.1 | 7.14 | 3658 | 154.0 | 6.50 | 3.22 | | 14.54 |
| 10:11 | | 12.3 | 7.19 | 3655 | 129.0 | 7.10 | 3.80 | | 14.54 |
| 10:14 | | 12.2 | 7.16 | 3639 | 123.8 | 6.45 | 3.21 | | 14.53 |
| 10:17 | | 12.2 | 7.16 | 3644 | 105.9 | 6.07 | 4.61 | | 14.55 |
| 10:20 | | 12.3 | 7.17 | 3635 | 98.3 | 7.02 | 4.97 | | 14.56 |
| 10:23 | | 12.2 | 7.19 | 3615 | 93.3 | 7.13 | 4.38 | | 14.55 |
| 10:26 | 5.00 | 12.2 | 7.20 | 3555 | 92.5 | 7.65 | 4.84 | | 14.55 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below: DO reading fluctuated a lot between readings

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-01-CDPHE | Poly/Glass | 10 | None, $H_2O_2$, $H_2SO_4$ | Refer to COC | 10:30 |
| ASH-01-CCR | Poly | 5 | None, $HNO_3$ | Refer to COC | 10:30 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments: Same YSI from previous day. pH value, not fluctuations as previously seen from yesterday

Signature: DG

Date: 10/18/2022

AECOM

Well/Piezo ID: ASH-02

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: _____ Collector(s) G. Dawson, D. Woodward

Date: 10/19/22
Time: Start 8:40
Finish 10:40

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☒ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth 3.44
c. Casing Material PVC
d. Casing Diameter 4"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

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

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| Make | Model | Serial Number |
|---|---|---|
| YSI 556 | | |
| Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 8:53 | | 13.9 | 7.57 | 3911 | 146.5 | 1.95 | 3.76 | Clear | |
| 8:56 | | 13.9 | 7.44 | 2182 | 159.7 | 7.47 | 2.80 | | 3.71 |
| 8:59 | | 13.9 | 7.44 | 3347 | 178.2 | 8.02 | 1.62 | | 3.98 |
| 9:02 | | 13.8 | 7.45 | 3613 | 105.0 | 8.26 | 2.76 | | 4.30 |
| 9:05 | 1.00 | 14.2 | 7.48 | 3910 | 176.6 | 3.80 | 1.53 | | 4.45 |
| 9:08 | 1.20 | 14.5 | 7.49 | 3790 | 175.4 | 6.02 | 1.71 | Clear | 4.70 |
| 9:11 | | 14.6 | 7.48 | 3922 | 175.7 | 1.40 | 1.48 | | 4.88 |
| 9:14 | 1.60 | 14.6 | 7.56 | 4143 | 165.0 | 0.99 | 1.52 | Clear | 5.04 |
| 9:17 | | 14.6 | 7.54 | 4071 | 165.0 | 1.48 | 1.92 | | 5.25 |
| 9:20 | | 14.6 | 7.57 | 3799 | 161.3 | 1.61 | 2.49 | | 5.50 |
| 9:23 | | 14.7 | 7.54 | 3539 | 155.6 | 1.41 | 1.74 | " " | 5.84 |
| 9:26 | | 14.6 | 7.57 | 3955 | 154.4 | 0.50 | 0.70 | | 5.94 |
| 9:29 | | 14.7 | 7.57 | 4062 | 152.0 | 0.52 | 0.86 | | 6.10 |
| 9:32 | 2.00 | 14.7 | 7.57 | 3985 | 149.9 | 0.62 | 1.28 | | 6.29 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

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.
Lots of Air bubbles when knocked off
DO returned to stable values

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-02-CDPHE | Glass/Poly | 10 None | $HNO_3$, $H_2SO_4$ | Refer to CoC | 9:35 |
| ASH-02-CCR | Poly | 5 | None, $HNO_3$ | Refer to CoC | 9:35 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments: Found imperfect seal for inlet on bladder pump. Adjusted and appears to have resolved DO problems.

Signature _____ Date 10/19/2022

AECOM

Well/Piezo ID: ASH-02

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Cool, clear, Sunny Collector(s) J. Henry, D. Woodward

Date: 11/1/22
Time: Start 10:10
Finish 11:30

**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 3.70 d. Casing Diameter 4" f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): _____

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| | YSI 556 | | |
| | Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 10:17 | Init. | 14.3 | 7.64 | 4287 | 157.0 | 2.30 | 22.2 | Clear | 3.80 |
| 10:20 | 0.15 | 14.2 | 7.61 | 4292 | 151.8 | 1.63 | 7.68 | Clear | 3.92 |
| 10:23 | 0.33 | 14.2 | 7.60 | 4272 | 143.2 | 1.25 | 4.02 | Clear | 4.02 |
| 10:26 | 0.50 | 14.2 | 7.60 | 4301 | 137.9 | 1.24 | 2.36 | Clear | 4.25 |
| 10:29 | 0.66 | 14.2 | 7.59 | 4299 | 134.5 | 1.32 | 2.45 | Clear | 4.33 |
| 10:32 | 0.80 | 14.2 | 7.59 | 4289 | 131.4 | 1.15 | 2.41 | Clear | 4.45 |
| 10:35 | 1.00 | 14.3 | 7.59 | 4294 | 127.9 | 1.13 | 2.47 | Clear | 4.62 |
| ~~10:38~~ 10:40 | 1.15 | 14.3 | 7.59 | 4292 | 122.6 | 1.08 | 2.38 | Clear | 4.84 |
| 10:43 | 1.33 | 14.4 | 7.59 | 4290 | 119.8 | 1.15 | 2.55 | Clear | 4.96 |
| 10:46 | 1.50 | 14.4 | 7.59 | 4295 | 117.6 | 1.16 | 2.45 | Clear | 5.02 |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below

_____

_____

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-02-CDPHE | Glass / poly | 6 None, HNO3, H2SO4 | | Refer to COC | 10:50 |
| ASH-02-CCR | Poly | 3 | None, HNO3 | Refer to COC | 10:50 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments: DUP-01-CCR (ASH wells) DUP-01-CDPHE, Collected here for Kansas resample

Signature _____ Date 11/1/2022

AECOM

Well/Piezo ID: ASH-03

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Date: 10/18/22
Project No: CDPHE = 60630004, CCR = 60630103
Time: Start 13:50
Site Location: Rawhide Generating Station
Finish 15:15
Weather Conds: Warm, Clear, Sunny
Collector(s) G. Dawson, D. Woodward

**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 36.90
d. Casing Diameter 2"
f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): 350 mL/min

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| | YSI 556 | | |
| | Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 13:55 | | 13.9 | -1.48 | 5214 | 748.1 | 3.72 | 12.7 | Clear | 38.28 |
| 13:58 | | 12.8 | -1.57 | 5212 | 739.2 | 3.91 | 5.94 | | 38.71 |
| 14:01 | 0.66 | 12.5 | -1.66 | 5184 | 725.1 | 3.50 | 6.77 | Clear | 39.06 |
| 14:04 | | 12.5 | -1.69 | 5176 | 715.1 | 3.39 | 4.04 | Clear | 39.29 |
| 14:07 | | 12.5 | -1.59 | 5141 | 704.4 | 0.35 | 3.12 | Clear | 39.50 |
| 14:10 | | 12.5 | -1.80 | 5123 | 697.1 | 0.41 | 3.01 | Clear | 39.56 |
| 14:13 | 2.00 | 12.5 | -1.79 | 5092 | 682.3 | 2.87 | 1.24 | Clear | 39.70 |
| 14:16 | | 12.5 | -1.72 | 5103 | 668.5 | 4.87 | 1.29 | | 39.73 |
| 14:19 | | 12.5 | -1.74 | 5128 | 666.7 | 5.64 | 2.11 | Clear | 39.77 |
| 14:22 | | 12.5 | -1.71 | 5104 | 658.7 | 4.61 | 0.96 | | 39.77 |
| 14:25 | 3.00 | 12.5 | -1.74 | 5110 | 654.5 | 4.70 | 1.20 | Clear | 39.73 |
| 14:28 | | 12.4 | -1.75 | 5147 | 649.6 | 4.61 | 0.86 | Clear | 39.76 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

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.
Fawty pH Sensor, DO value very inconsistent and would suddenly rise and drop

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-03-CDPHE | Glass/Poly | 10 | None, $HNO_3$, $H_2SO_4$ | Refer to COC | 14:35 |
| ASH-03-CCR | Poly | 5 | None, $HNO_3$ | Refer to COC | 14:35 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments _____

Signature [signature]

Date 10/18/2022

AECOM

Well/Piezo ID: ASH-04

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Cool, Clear, Sunny Collector(s) W. Weichart, D. Woodward

Date: 10/20/22
Time: Start 12:55
Finish 16:00

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☒ Piezometer ☐

a. Total Well Length ____
b. Water Table Depth 12.32
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column ____ (a-b)
f. Calculated Well Volume (see back) ____

**Flow Rate** (< 500 ml/min): ____

**WELL PURGING DATA**

a. Purge Method bladder pump

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI 556 | | | |
| Turbidity | | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 13:06 | Initial | 15.1 | 7.32 | 5731 | 273.6 | 1.60 | 49.1 | Clear | 12.71 |
| 13:09 | 0.25 | 14.6 | 7.34 | 5682 | 266.5 | 1.37 | 33.7 | Cloudy | 12.77 |
| 13:12 | 0.50 | 14.3 | 7.34 | 5638 | 261.7 | 1.29 | 21.2 | Clear | 12.82 |
| 13:15 | 0.66 | 14.3 | 7.33 | 5601 | 258.4 | 1.20 | 9.36 | Clear | 12.84 |
| 13:18 | 0.80 | 14.3 | 7.32 | 5579 | 255.2 | 1.24 | 6.80 | Clear | 12.87 |
| 13:21 | 1.00 | 14.2 | 7.32 | 5527 | 252.4 | 1.17 | 6.10 | Clear | 12.87 |
| 13:24 | 1.25 | 14.2 | 7.32 | 5510 | 249.8 | 1.09 | 4.96 | Clear | 12.89 |
| 13:27 | 1.40 | 14.1 | 7.32 | 5482 | 247.2 | 1.10 | 4.60 | Clear | 12.88 |
| 13:30 | 1.66 | 14.2 | 7.32 | 5456 | 246.4 | 1.03 | 4.37 | Clear | 12.90 |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below.

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| | | | | | 14:09 |
| | | | | | 14:00 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments: MS/MSD for CCR and CDPHE Collected here

Signature ____ Date 10/20/2022

AECOM

Well/Piezo ID: ASH-04

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Warm, Clear, Sunny Collector(s): J. Henry, D. Woodward

Date: 11/1/22
Time: Start ~~13:55~~ 13:50
Finish 14:40

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☒ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth 12.30
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): _____

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| | YSI 556 | | |
| | Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 13:55 | Initial | 14.9 | 7.33 | 6156 | 190.2 | 3.59 | 29.7 | Cloudish | 12.45 |
| 13:58 | 0.15 | 14.5 | 7.33 | 6131 | 185.7 | 2.80 | 23.6 | Cloudish | 12.55 |
| 14:01 | 0.33 | 14.2 | 7.33 | 6142 | 180.7 | 2.68 | 22.6 | Cloudish | 12.60 |
| 14:04 | 0.50 | 13.9 | 7.32 | 6129 | 175.9 | 2.35 | 13.6 | Clear | 12.63 |
| 14:07 | 0.66 | 13.9 | 7.32 | 6129 | 172.4 | 2.12 | 9.56 | Clear | 12.62 |
| 14:10 | 0.75 | 14.1 | 7.32 | 6109 | 167.9 | 2.00 | 6.17 | Clear | 12.65 |
| 14:13 | 0.90 | 14.2 | 7.32 | 6113 | 164.6 | 2.06 | 4.66 | Clear | 12.63 |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-04-CDPHE | Glass/Poly | 6 None | HNO3, H2SO4 | Refer to COC | 14:15 |
| ASH-04-CCR | Poly | 3 | None, HNO3 | Refer to COC | 14:15 |

Comments _____

Signature _____ Date 11/1/2022

AECOM

Well/Piezo ID: ASH-05

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: _____ Collector(s) W. Veichart, D. Woodward

Date: 10/20/22
Time: Start 9:15
Finish 11:25

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☑ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth 20.73
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): _____

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| Make | Model | Serial Number |
|---|---|---|
| YSI 556 | | |
| Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 9:20 | Initial | 14.1 | 7.04 | 4559 | 304.4 | 6.34 | | Clear | |
| 9:23 | | 13.4 | 7.01 | 4735 | 279.8 | 4.34 | 26.3 | | |
| 9:26 | 0.50 | 13.3 | 6.99 | 4502 | 267.5 | 7.59 | 15.5 | | 20.79 |
| 9:29 | 0.75 | 13.4 | 7.01 | 4507 | 257.4 | 7.15 | 15.8 | | 20.80 |
| 9:32 | 1.00 | 13.3 | 7.00 | 4017 | 252.6 | 4.05 | 10.3 | Clear | 20.81 |
| 9:35 | 1.30 | 13.3 | 6.99 | 4071 | 248.7 | 6.48 | 12.8 | Clear | 20.80 |
| 9:38 | 1.50 | 13.3 | 7.01 | 4480 | 244.4 | 5.21 | 10.0 | Clear | 20.81 |
| 9:41 | 1.75 | 13.3 | 7.02 | 4439 | 240.1 | 4.04 | 6.65 | Clear | 20.82 |
| 9:44 | 2.00 | 13.3 | 7.02 | 4483 | 237.7 | 3.92 | 4.38 | Clear | 20.83 |
| 9:47 | 2.25 | 13.3 | 7.03 | 4437 | 234.1 | 3.38 | 5.34 | | 20.84 |
| 9:50 | 2.50 | 13.3 | 7.03 | 4412 | 231.5 | 3.19 | 3.87 | Clear | 20.85 |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below. DO reading high, bubbles in full cell

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-05-CDPHE | Poly/Glass | 10 | None, $HNO_3$, $H_2SO_4$ | Refer to COC | 10:00 |
| ASH-05-CCR | Poly | 5 | None, $HNO_3$ | Refer to COC | 10:00 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments DUP-01-CCR collected here and ~~DUP-01-CDPHE collected here~~ DUP-01-CDPHE collected here

Signature _____ Date 10/20/2022

AECOM

Well/Piezo ID: ASH-05

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Cool, Clear, Sunny Collector(s): J. Henry, D. Woodward

Date: 11/1/22
Time: Start 12:55
Finish 13:40

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☑ Piezometer ☐

a. Total Well Length _____
b. Water Table Depth 20.41
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): _____

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| YSI 556 | | | |
| Turbidity | | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 13:02 | Initial | 13.9 | 7.04 | 2381 | 141.3 | 2.72 | 33.7 | Cloudy | 20.55 |
| 13:05 | 0.25 | 13.9 | 7.01 | 2371 | 139.6 | 2.16 | 20.6 | Clear | 20.61 |
| 13:08 | 0.40 | 13.7 | 7.02 | 2616 | 137.8 | 1.93 | 15.5 | Clear | 20.61 |
| 13:11 | 0.65 | 13.7 | 7.02 | 2609 | 136.8 | 1.85 | 12.4 | Clear | 20.61 |
| 13:14 | 0.85 | 13.6 | 7.03 | 2605 | 136.2 | 2.06 | 9.81 | Clear | 20.61 |
| 13:17 | 1.00 | 13.6 | 7.03 | 2601 | 135.6 | 2.05 | 9.44 | Clear | 20.61 |
| 13:20 | 1.15 | 13.6 | 7.03 | 2597 | 135.3 | 2.30 | 8.40 | Clear | 20.61 |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| | | | | | | | | | |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below.

_____

_____

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-05-CDPHE | HDPE 250/Poly | 6 None | $HNO_3$, $H_2SO_4$ | Refer to COC | 13:25 |
| ASH-05-CCR | Poly | 3 | None, $HNO_3$ | Refer to COC | 13:25 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments _____

Signature DCW

Date 11/1/2022

AECOM

Well/Piezo ID: ASH-06

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Cool, Clear, Sunny Collector(s) G. Dawson, D. Woodward
Date: 10/18/22
Time Start 11:35
Finish 13:30

**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 62.30 d. Casing Diameter 2" f. Calculated Well Volume (see back) _____

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

**WELL PURGING DATA**

a. Purge Method __bladder pump_____

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| | YSI 556 | | |
| | Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 11:43 | | 15.2 | 7.97 | 792 | 237.7 | 1.25 | 2.38 | | 62.74 |
| 11:46 | 0.25 | 14.4 | 7.96 | 787 | 220.1 | 0.94 | 1.17 | Clear | 62.91 |
| 11:49 | 0.50 | 14.2 | 8.02 | 757 | 200.4 | 1.58 | 0.62 | Clear | 63.23 |
| 11:52 | | 14.1 | 8.06 | 710 | 195.7 | 3.65 | | | 63.43 |
| 11:55 | | 14.0 | 8.03 | 690 | 196.8 | 4.65 | 1.26 | | 63.62 |
| 11:58 | 1.00 | 14.2 | 8.04 | 677 | 196.9 | 5.25 | 1.10 | Clear | 63.80 |
| 12:01 | 1.15 | 14.1 | 8.08 | 669 | 201.0 | 5.82 | 1.53 | | 64.01 |
| 12:04 | | 14.2 | 8.09 | 666 | 204.3 | 6.09 | 1.26 | Clear | 64.22 |
| 12:07 | | 14.2 | 8.04 | 663 | 210.5 | 6.33 | 0.85 | | 64.43 |
| 12:10 | 1.50 | 14.2 | 3.95 | 660 | 369.4 | 6.60 | 0.33 | Clear | 64.61 |
| 12:13 | 1.75 | 14.1 | 4.06 | 659 | 377.8 | 6.72 | 1.18 | Clear | 64.87 |
| 12:16 | | 14.0 | 4.15 | 658 | 396.0 | 6.75 | 1.00 | Clear | 65.11 |
| 12:19 | | 14.0 | 8.03 | 657 | 196.2 | 6.81 | 0.82 | | 65.45 |
| 12:22 | | 14.2 | 7.90 | 658 | 211.3 | 6.80 | 0.97 | | 65.65 |
| 12:25 | 2.40 | 14.2 | 7.98 | 658 | 213.5 | 6.80 | 1.42 | Clear | 65.82 |
| 12:28 | | 14.4 | 7.95 | 663 | 218.8 | 6.80 | 0.74 | Clear | 65.93 |
| | | | | | | | | | |
| | | | | | | | | | |

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 YSI randomly turned off at 12:10 caused readings to become sporadic for pH and ORP

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-06-CCR | Poly | 5 | None, $HNO_3$ | Refer to CoC | 12:30 |
| ASH-06-CDPHE | Poly/Glass | 10 | None, $HNO_3$, $H_2SO_4$ | Refer to CoC | |
| | | | | | |
| | | | | | |
| | | | | | |

At 12:19 Parameters returned to values before 12:10

Comments Only able to fill CCR bottles and Pittsburg CDPHE. Will return tomorrow to gather CDPHE Kansas bottles

Signature DLe Date 10/18/2022

AECOM

Well/Piezo ID: ASH-07

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Cool, Clear, Sunny Collector(s) B. Weichart, D. Woodward
Date: 10/21/22
Time: Start 8:55
Finish 10:15

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

a. Total Well Length _____
b. Water Table Depth 14.14
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column _____ (a-b)
f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): _____

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| | Make | Model | Serial Number |
|---|---|---|---|
| | YSI 556 | | |
| | Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 9:04 | Initial | 13.1 | 7.13 | 6916 | 282.0 | 4.16 | 48.9 | Clear | |
| 9:09 | 0.66 | 12.8 | 7.04 | 6354 | 273.3 | 4.31 | 36.1 | Clear | 14.59 |
| 9:12 | 1.10 | 12.9 | 7.04 | 6319 | 270.7 | 4.00 | 27.8 | Cloudy | 14.58 |
| 9:15 | 1.50 | 13.0 | 7.05 | 6327 | 268.2 | 3.60 | 35.1 | Clear | 14.60 |
| 9:18 | 1.85 | 13.1 | 7.06 | 6726 | 265.4 | 0.70 | 17.3 | Clear | 14.59 |
| ~~9:20~~ 9:21 | 2.15 | 13.2 | 7.08 | 6847 | 263.3 | 0.55 | 10.4 | Clear | 14.61 |
| 9:24 | 2.50 | 13.2 | 7.09 | 6882 | 261.7 | 0.47 | 8.12 | Clear | 14.61 |
| 9:27 | 2.90 | 13.2 | 7.10 | 6929 | 260.1 | 0.38 | 6.38 | Clear | 14.61 |
| 9:30 | 3.20 | 13.2 | 7.10 | 6955 | 258.3 | 0.39 | 5.09 | Clear | 14.62 |
| 9:33 | 3.50 | 13.2 | 7.11 | 6971 | 256.8 | 0.41 | 3.58 | Clear | 14.63 |
| 9:36 | | 13.2 | 7.11 | 6934 | 255.9 | 0.30 | 4.73 | Clear | 14.62 |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below.

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-07-CDPHE | 6 liter/Poly | 10 None | HNO3 H2SO4 | Refer to COC | 10:00 |
| ASH-07-CCR | Poly | 5 | None HNO3 | Refer to COC | 10:00 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments _____

Signature _____ Date 10/21/2022

AECOM

Well/Piezo ID: ASH-08

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Cool, Sunny, Windy, Hazy
Date: 10/19/22
Time: Start 10:50 Finish 2:20
Collector(s): G. Dawson and D. Woodward

**WATER LEVEL DATA: (measured from Top of Casing)**

Well ☒ Piezometer ☐

a. Total Well Length ____
b. Water Table Depth 9.87
c. Casing Material PVC
d. Casing Diameter 2"
e. Length of Water Column ____ (a-b)
f. Calculated Well Volume (see back) ____

**Flow Rate** (< 500 ml/min): 350 mL/min

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used:

| Make | Model | Serial Number |
|---|---|---|
| YSI 556 | | |
| Turbidity | | |

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 11:09 | | 13.3 | 6.98 | 4046 | 80.8 | 1.17 | 23.3 | | 11.80 |
| 11:12 | | 13.3 | 6.94 | 4349 | 69.3 | 3.09 | 12.8 | | 13.15 |
| 11:15 | 0.50 | 14.9 | 6.95 | 4350 | 61.4 | 3.09 | 8.77 | clear | 13.47 |
| 11:18 | | 14.8 | 6.95 | 4337 | 57.9 | 3.04 | 6.36 | Clear | 13.71 |
| 11:21 | | 14.8 | 6.94 | 4320 | 55.3 | 3.02 | 4.38 | Clear | 13.93 |
| 11:24 | 1.00 | 15.0 | 6.94 | 4283 | 51.7 | 2.97 | 4.65 | | 14.11 |
| 11:27 | | 14.9 | 6.94 | 4295 | 50.0 | 2.80 | 4.78 | | 14.30 |
| 11:30 | 1.48 | 14.9 | 6.94 | 4262 | 48.2 | 2.70 | 4.60 | | 14.43 |
| 11:33 | | 14.9 | 6.94 | 4243 | 46.9 | 2.66 | 3.79 | | 14.57 |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below.

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-08-CDPHE | 6-Glass/Poly | 10 NONE | $HNO_3$, $H_2SO_4$ | Refer to COC | 11:35 |
| ASH-08-CCR | Poly | 5 | None, $HNO_3$ | Refer to COC | 11:35 |

Comments ____

Signature [signature] Date 10/19/2022

AECOM

Well/Piezo ID: ASH - 08

# Ground Water Sample Collection Record

Client: Platte River Power Authority
Project No: CDPHE = 60630004, CCR = 60630103
Site Location: Rawhide Generating Station
Weather Conds: Cool, Clear, Sunny Collector(s): J. Henry, D. Woodward
Date: 11/1/22
Time: Start 12:00
Finish 12:45

**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 10.70 d. Casing Diameter 2" f. Calculated Well Volume (see back) _____

**Flow Rate** (< 500 ml/min): _____

**WELL PURGING DATA**

a. Purge Method __bladder pump

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

c. Field Testing Equipment Used: Make / Model / Serial Number
YSI 556
Turbidity

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

| Time | Volume Removed (gal) | T° (C) | pH | Spec. Cond (µs/cm) | ORP | DO mg/L | Turbidity (NTU) | Color | DTW (ft) |
|---|---|---|---|---|---|---|---|---|---|
| Stabilization | -- | +/- 3% | +/- 0.1 | +/- 3% | +/- 10 MV | +/- 10% | 5 NTU, 10% | | 0.3 ft |
| 12:10 | Initial | 13.8 | 6.93 | 4771 | 90.2 | 4.03 | 12.8 | Clear | 10.27 |
| 12:13 | 0.25 | 13.8 | 6.90 | 4712 | 73.3 | 2.97 | 8.69 | Clear | 10.95 |
| 12:16 | 0.40 | 14.0 | 6.90 | 4637 | 66.3 | 2.76 | 6.74 | Clear | 11.22 |
| 12:19 | 0.55 | 14.2 | 6.90 | 4657 | 61.7 | 2.71 | 5.88 | Clear | 11.40 |
| 12:22 | 0.65 | 14.1 | 6.90 | 4655 | 59.4 | 2.53 | 8.93 | Clear | 11.51 |
| 12:25 | 0.75 | 14.2 | 6.90 | 4646 | 57.3 | 2.75 | 5.56 | Clear | 11.67 |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |

e. Acceptance criteria pass/fail

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

If no or N/A - Explain below.

**SAMPLE COLLECTION:** Method: bladder pump

| Sample ID | Container Type | No. of Containers | Preservation | Analysis | Time |
|---|---|---|---|---|---|
| ASH-08-CDPHE | Glass/Poly | 6 None | $HNO_3$, $H_2SO_4$ | Refer to COC | 12:30 |
| ASH-08-CCR | Poly | 3 | $HNO_3$, None | Refer to COC | 12:30 |
| | | | | | |
| | | | | | |
| | | | | | |

Comments: Resample Collected for KS, CDPHE/CCR bottles, MS/MSD run on these samples for CDPHE, CCR

Signature _____ Date 11/1/2022

Event: PRPA GW Sampling
MP: Top of Casing

Date: 10/17/2022
Recorder: G. Dawson, D. Woodward

| Location | Group | DTW | TD | Notes |
|---|---|---|---|---|
| PZ-3 | Piezometer | 32.64 | 43.29 | |
| PZ-4 | Piezometer | 22.92 | 43.32 | |
| PZ-5 | Piezometer | 36.23 | 41.72 | |
| ASH-01 | ASH | 13.68 | 31.53 | Buffalo Area - Need Escort |
| ASH-02 | ASH | 3.20 | 53.28 | |
| ASH-03 | ASH | 37.12 | 51.78 | |
| ASH-04 | ASH | 12.51 | 32.36 | |
| ASH-05 | ASH | 20.51 | 31.30 | |
| ASH-06 | ASH | 62.49 | 71.20 | |
| ASH-07 | ASH | 13.34 | 30.04 | |
| ASH-08 | ASH | 10.22 | 29.83 | |
| BAT-01 | BAT | 9.11 | 30.88 | Collected 0900 on 10/18/2022 |
| BAT-02 | BAT | 15.83 | 33.37 | Collected 0915 on 10/18/2022 |
| BAT-03 | BAT | 11.64 | 35.20 | Collected 0915 on 10/18/2022 |
| BAT-04R | BAT | 14.72 | 36.13 | |
| BAT-05 | BAT | 20.38 | 36.92 | Collected 0900 on 10/18/2022 |
| BAT-06 | BAT | 16.16 | 37.52 | |
| BAT-08 | BAT | 12.62 | 31.71 | |
| BAT-09 | BAT | 16.33 | 34.44 | |
| BAT-10 | BAT | 12.56 | 31.26 | |
| BAT-11 | BAT | 27.37 | 38.95 | |
| BAT-12 | BAT | 29.91 | 45.02 | |
| PRS-01 | PRS | 13.96 | 43.98 | |
| PRS-02 | PRS | 12.76 | 34.79 | |
| PRS-03 | PRS | 47.19 | 62.10 | |
| PRS-04 | PRS | 29.10 | 36.91 | |
| PRS-05 | PRS | 29.45 | 37.09 | |
| PRS-06 | PRS | 19.36 | 35.55 | |
| MW-3 | Sitewide | 24.88 | 37.72 | |
| MW-4 | Sitewide | 19.26 | 36.52 | |
| MW-5 | Sitewide | 22.58 | 73.50 | Buffalo Area - Need Escort |
| MW-6 | Sitewide | 1.60 | 29.02 | Cross Barbed Wire Fence and Access by Foot |
| MW-7 | Sitewide | 3.91 | 23.03 | Cross Barbed Wire Fence and Access by Foot |
| MW-8 | Sitewide | 10.30 | 38.01 | |

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

# Appendix B

# Laboratory Analytical and Data Validation Reports

# April 2022

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

June 03, 2022

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

RE: Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on April 28, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Greensburg

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

Sincerely,

Heather M. Wilson

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

**Pace Analytical Services Pennsylvania**
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
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 #: PA014572018-1
New Hampshire/TNI Certification #: 297617
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 #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
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
Wyoming Certification #: 8TMS-L



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## SAMPLE SUMMARY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60398917001** | **ASH-01-CCR** | Water | 04/27/22 11:30 | 04/28/22 15:21 |
| **60398917002** | **ASH-06-CCR** | Water | 04/27/22 12:25 | 04/28/22 15:21 |



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## SAMPLE ANALYTE COUNT

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60398917001** | **ASH-01-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60398917002** | **ASH-06-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |

PASI-PA = Pace Analytical Services - Greensburg



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

**Sample: ASH-01-CCR** **Lab ID: 60398917001** Collected: 04/27/22 11:30 Received: 04/28/22 15:21 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **-0.0753 ± 0.256 (0.565) C:NA T:84%** | pCi/L | 05/25/22 14:35 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.521 ± 0.587 (1.23) C:75% T:84%** | pCi/L | 05/16/22 20:43 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.521 ± 0.843 (1.80)** | pCi/L | 05/27/22 11:24 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

**Sample: ASH-06-CCR** **Lab ID: 60398917002** Collected: 04/27/22 12:25 Received: 04/28/22 15:21 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.247 ± 0.185 (0.0955) C:NA T:91%** | pCi/L | 05/25/22 14:35 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **-0.0221 ± 0.465 (1.09) C:84% T:91%** | pCi/L | 05/16/22 20:43 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.247 ± 0.650 (1.19)** | pCi/L | 05/27/22 11:24 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

QC Batch: 502421
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60398917001, 60398917002

METHOD BLANK: 2432501 Matrix: Water
Associated Lab Samples: 60398917001, 60398917002

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-226 | -0.123 ± 0.268 (0.617) C:NA T:85% | pCi/L | 05/25/22 14:21 | |

**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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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

QC Batch: 502422
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60398917001, 60398917002

METHOD BLANK: 2432503 Matrix: Water
Associated Lab Samples: 60398917001, 60398917002

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-228 | 0.949 ± 0.416 (0.658) C:82% T:85% | pCi/L | 05/16/22 16:44 | |

**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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# QUALIFIERS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

**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.



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398917

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60398917001** | **ASH-01-CCR** | EPA 903.1 | 502421 | | |
| **60398917002** | **ASH-06-CCR** | EPA 903.1 | 502421 | | |
| **60398917001** | **ASH-01-CCR** | EPA 904.0 | 502422 | | |
| **60398917002** | **ASH-06-CCR** | EPA 904.0 | 502422 | | |
| **60398917001** | **ASH-01-CCR** | Total Radium Calculation | 507445 | | |
| **60398917002** | **ASH-06-CCR** | Total Radium Calculation | 507445 | | |



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CCR - PA

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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.



| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | |
|---|---|---|---|---|---|
| Company: | AECOM | Report To: | Vasanta Kalluri | Attention: | Accounts Payable |
| Address: | 6200 South Quebec St | Copy To: | Brian Rothmeyer | Company Name: | AECOM |
| | Greenwood Village, CO 80111 | | | Address: | Same as Section A |
| Email To: | brian.rothmeyer@aecom.com | Purchase Order No.: | 136205 | Pace Quote Reference: | 42700 |
| Phone: | (303) 740-2614 Fax: | Project Name: | 60659991 PRPA CCR | Pace Project Manager: | Heather Wilson |
| Requested Due Date/TAT: | | Project Number: | 60659991 | Pace Profile #: | 11033, 3 |

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Section D Required Client Information**

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

**Valid Matrix Codes**

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

Requested Analysis Filtered (Y/N)

| ITEM # | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED: COMPOSITE START DATE | COLLECTED: COMPOSITE START TIME | COLLECTED: COMPOSITE END/GRAB DATE | COLLECTED: COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | Preservatives: $H_2SO_4$ | Preservatives: $HNO_3$ | Preservatives: HCl | Preservatives: NaOH | Preservatives: $Na_2S_2O_3$ | Preservatives: Methanol | Preservatives: Other | Analysis Test Y/N | Analysis Test: Radium-226 | Analysis Test: Radium-228 | Analysis Test: Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | — | | 4.27.22 | 11:30 | | 2 | | 2 | | | | | | | | ✓ | ✓ | ✓ | N | |
| 2 | | | — | | 4.27.22 | 1225 | | 2 | | 2 | | | | | | | | ✓ | ✓ | ✓ | N | |
| 3 | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Jack Levy AECOM | 4.27.22 | 1706 | | 4/27/22 | 1500 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Jason Levy

SIGNATURE of SAMPLER: _____ DATE Signed (MM/DD/YY): 04/27/2022

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

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

# Quality Control Sample Performance Assessment

Pace Analytical
www.pacelabs.com

| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | RPS |
| Date: | 5/7/2022 |
| Batch ID: | 66542 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| **Method Blank Assessment** | |
|---|---|
| MB Sample ID | 2432501 |
| MB concentration: | -0.123 |
| M/B Counting Uncertainty: | 0.267 |
| MB MDC: | 0.617 |
| MB Numerical Performance Indicator: | -0.90 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| **Laboratory Control Sample Assessment** | LCSD (Y or N)? | Y |
|---|---|---|
| | **LCS66542** | **LCSD66542** |
| Count Date: | 5/25/2022 | 5/25/2022 |
| Spike I.D.: | 21-031 | 21-031 |
| Spike Concentration (pCi/mL): | 39.891 | 39.891 |
| Volume Used (mL): | 0.10 | 0.10 |
| Aliquot Volume (L, g, F): | 0.808 | 0.807 |
| Target Conc. (pCi/L, g, F): | 4.939 | 4.945 |
| Uncertainty (Calculated): | 0.232 | 0.232 |
| Result (pCi/L, g, F): | 4.144 | 4.041 |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 0.824 | 0.552 |
| Numerical Performance Indicator: | -1.82 | -2.96 |
| Percent Recovery: | 83.91% | 81.72% |
| Status vs Numerical Indicator: | N/A | N/A |
| Status vs Recovery: | Pass | Pass |
| Upper % Recovery Limits: | 135% | 135% |
| Lower % Recovery Limits: | 73% | 73% |

| **Sample Matrix Spike Control Assessment** | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | | |
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Spike I.D.: | | |
| MS/MSD Decay Corrected Spike Concentration (pCi/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): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| MS Numerical Performance Indicator: | | |
| 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 Upper % Recovery Limits: | | |
| MS/MSD Lower % Recovery Limits: | | |

| **Duplicate Sample Assessment** | | |
|---|---|---|
| Sample I.D.: | LCS66542 | Enter Duplicate sample IDs if other than LCS/LCSD in the space below. |
| Duplicate Sample I.D. | LCSD66542 | |
| Sample Result (pCi/L, g, F): | 4.144 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.824 | |
| Sample Duplicate Result (pCi/L, g, F): | 4.041 | |
| Sample Duplicate Result Counting Uncertainty (pCi/L, g, F): | 0.552 | |
| Are sample and/or duplicate results below RL? | NO | |
| Duplicate Numerical Performance Indicator: | 0.203 | |
| (Based on the LCS/LCSD Percent Recoveries) Duplicate RPD: | 2.64% | |
| Duplicate Status vs Numerical Indicator: | N/A | |
| Duplicate Status vs RPD: | Pass | |
| % RPD Limit: | 32% | |

| **Matrix Spike/Matrix Spike Duplicate Sample Assessment** | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

RPS 5/26/22

5/26/22

# Quality Control Sample Performance Assessment

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| | |
|---|---|
| Test: | Ra-228 |
| Analyst: | JSM |
| Date: | 5/9/2022 |
| Worklist: | 66543 |
| Matrix: | WT |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2432503 |
| MB concentration: | 0.949 |
| M/B 2 Sigma CSU: | 0.416 |
| MB MDC: | 0.658 |
| MB Numerical Performance Indicator: | 4.47 |
| MB Status vs Numerical Indicator: | Fail* |
| MB Status vs. MDC: | See Comment* |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | Y |
|---|---|---|
| | LCS66543 | LCSD66543 |
| Count Date: | 5/16/2022 | 5/16/2022 |
| Spike I.D.: | 22-016 | 22-016 |
| Decay Corrected Spike Concentration (pCi/mL): | 35.729 | 35.729 |
| Volume Used (mL): | 0.10 | 0.10 |
| Aliquot Volume (L, g, F): | 0.808 | 0.807 |
| Target Conc. (pCi/L, g, F): | 4.423 | 4.429 |
| Uncertainty (Calculated): | 0.217 | 0.217 |
| Result (pCi/L, g, F): | 4.478 | 2.881 |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 1.079 | 0.718 |
| Numerical Performance Indicator: | 0.10 | -4.04 |
| Percent Recovery: | 101.23% | 65.05% |
| Status vs Numerical Indicator: | N/A | N/A |
| Status vs Recovery: | Pass | Pass |
| Upper % Recovery Limits: | 135% | 135% |
| Lower % Recovery Limits: | 60% | 60% |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | | |
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Spike I.D.: | | |
| MS/MSD Decay Corrected Spike Concentration (pCi/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): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | | |
| 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): | | |
| MS Numerical Performance Indicator: | | |
| 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 Upper % Recovery Limits: | | |
| MS/MSD Lower % Recovery Limits: | | |

| Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D.: | LCS66543 | Enter Duplicate sample IDs if other than LCS/LCSD in the space below. |
| Duplicate Sample I.D. | LCSD66543 | |
| Sample Result (pCi/L, g, F): | 4.478 | |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 1.079 | |
| Sample Duplicate Result (pCi/L, g, F): | 2.881 | |
| Sample Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 0.718 | |
| Are sample and/or duplicate results below RL? | NO | |
| Duplicate Numerical Performance Indicator: | 2.413 | |
| (Based on the LCS/LCSD Percent Recoveries) Duplicate RPD: | 43.52% | |
| Duplicate Status vs Numerical Indicator: | Warning | |
| Duplicate Status vs RPD: | Fail*** | |
| % RPD Limit: | 36% | |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

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

05/18/22

VAL
5/17/22

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60398917**
Sampling Event: April 27, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: July 13, 2022
Peer Reviewer: Katie Abbott — Date Completed: July 18, 2022

This report contains the final results of the data validation conducted for the water samples collected April 27th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

__X__ Data are usable without qualification.
_____ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB.<br>**Analyte** / **Concentration**<br>**MB 2432503**<br>Ra-228 / 0.949 ± 0.416 pCi/L<br>± – Plus or Minus<br>pCi/L – Picocuries Per Liter<br>MB – Method Blank<br>Ra – Radium | | X[2] | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• The agreement between parent sample results and laboratory duplicate sample results were evaluated. The duplicate error ratios (DER) met the criterion of a DER ≤2. | | | X |

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>• The agreement between parent sample results and field duplicate sample results were evaluated. The DER met the criterion of a DER ≤2. | | | X |
| Equipment Blanks | No target analytes reported in the associated equipment blank. | X | | |
| Detection Limits Mets | For radiochemical results 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. | X | | |
| Tracer and/or Carrier Recovery | The sample specific recoveries were within the laboratory limits. | X | | |
| Reporting | No reporting issues were found and further qualification was not considered necessary. | X | | |
| Package Completeness | No results were qualified as unusable and the data are 100% complete. | X | | |

**Comments**

1 – Samples were received intact; however, no cooler temperature was recorded upon receipt at the laboratory. Due to the stability of the radiological parameters, data qualification on the basis of temperature exceedance is not considered necessary.

2 – As the associated radium-228 sample results were reported at concentrations less than the minimum detectable concentration (MDC), qualification was not considered necessary.

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
± – Plus or Minus/High or Low Bias
σ – Sigma (Uncertainty)
pCi/L – Picocuries Per Liter
% – Percent
DER – Duplicate Error Ratio
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MB – Method Blank
MDC – Minimum Detectable Concentration
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
Ra – Radium
RPD – Relative Percent Difference

**Pace Analytical Services, LLC**
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June 02, 2022

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

RE: Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on April 28, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Kansas City

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

**Pace Analytical Services Kansas**
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 20-020-0
Arkansas Drinking Water
Illinois Certification #: 2000302021-3
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-21-15
Utah Certification #: KS000212019-9
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070



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## SAMPLE SUMMARY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60398961001** | **ASH-01-CCR** | Water | 04/27/22 11:30 | 04/28/22 08:30 |
| **60398961002** | **ASH-06-CCR** | Water | 04/27/22 12:25 | 04/28/22 08:30 |



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## SAMPLE ANALYTE COUNT

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60398961001** | **ASH-01-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | JGP | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | CRN2, KB | 3 | PASI-K |
| **60398961002** | **ASH-06-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | JGP | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | CRN2 | 3 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City



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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

**Sample: ASH-01-CCR** **Lab ID: 60398961001** Collected: 04/27/22 11:30 Received: 04/28/22 08:30 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **467** | ug/L | 100 | 1 | 04/29/22 14:44 | 05/03/22 21:30 | 7440-42-8 | |
| Calcium | **357000** | ug/L | 200 | 1 | 04/29/22 14:44 | 05/03/22 21:30 | 7440-70-2 | M1 |
| Lithium | **413** | ug/L | 10.0 | 1 | 04/29/22 14:44 | 05/03/22 21:30 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-38-2 | |
| Barium | **9.0** | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-43-9 | |
| Chromium | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-48-4 | |
| Lead | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7439-98-7 | |
| Selenium | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7782-49-2 | |
| Thallium | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:28 | 7440-28-0 | |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 05/06/22 16:39 | 05/09/22 11:48 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **3330** | mg/L | 66.7 | 1 | | 05/04/22 15:20 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **20.6** | mg/L | 2.0 | 2 | | 05/13/22 23:08 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/12/22 20:07 | 16984-48-8 | |
| Sulfate | **2470** | mg/L | 400 | 400 | | 05/12/22 20:20 | 14808-79-8 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

**Sample: ASH-06-CCR** **Lab ID: 60398961002** Collected: 04/27/22 12:25 Received: 04/28/22 08:30 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **313** | ug/L | 100 | 1 | 04/29/22 14:44 | 05/03/22 21:36 | 7440-42-8 | |
| Calcium | **26900** | ug/L | 200 | 1 | 04/29/22 14:44 | 05/03/22 21:36 | 7440-70-2 | |
| Lithium | **55.4** | ug/L | 10.0 | 1 | 04/29/22 14:44 | 05/03/22 21:36 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-38-2 | |
| Barium | **38.0** | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-43-9 | |
| Chromium | **2.1** | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-48-4 | |
| Lead | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7439-92-1 | |
| Molybdenum | **14.0** | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7439-98-7 | |
| Selenium | **40.4** | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7782-49-2 | |
| Thallium | ND | ug/L | 1.0 | 1 | 04/29/22 14:44 | 05/04/22 15:46 | 7440-28-0 | |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 05/06/22 16:39 | 05/09/22 11:50 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **486** | mg/L | 10.0 | 1 | | 05/04/22 15:21 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **7.7** | mg/L | 1.0 | 1 | | 05/12/22 20:34 | 16887-00-6 | |
| Fluoride | **0.55** | mg/L | 0.20 | 1 | | 05/12/22 20:34 | 16984-48-8 | |
| Sulfate | **93.2** | mg/L | 10.0 | 10 | | 05/12/22 20:48 | 14808-79-8 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

QC Batch: 785498
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60398961001, 60398961002

METHOD BLANK: 3131705 Matrix: Water
Associated Lab Samples: 60398961001, 60398961002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 05/09/22 11:11 | |

LABORATORY CONTROL SAMPLE: 3131706

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Mercury | ug/L | 5 | 4.5 | 90 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3131707 3131708

| Parameter | Units | 60398594001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 3.2 | 3.1 | 64 | 63 | 75-125 | 1 | 20 | M1 |

**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.**

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# QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

QC Batch: 784166
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60398961001, 60398961002

METHOD BLANK: 3126862 Matrix: Water
Associated Lab Samples: 60398961001, 60398961002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Boron | ug/L | ND | 100 | 05/03/22 21:26 | |
| Calcium | ug/L | ND | 200 | 05/03/22 21:26 | |
| Lithium | ug/L | ND | 10.0 | 05/03/22 21:26 | |

LABORATORY CONTROL SAMPLE: 3126863

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Boron | ug/L | 1000 | 947 | 95 | 80-120 | |
| Calcium | ug/L | 10000 | 10300 | 103 | 80-120 | |
| Lithium | ug/L | 1000 | 985 | 98 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3126864 3126865

| Parameter | Units | 60398961001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | 467 | 1000 | 1000 | 1440 | 1400 | 97 | 94 | 75-125 | 3 | 20 | |
| Calcium | ug/L | 357000 | 10000 | 10000 | 372000 | 367000 | 150 | 103 | 75-125 | 1 | 20 | M1 |
| Lithium | ug/L | 413 | 1000 | 1000 | 1490 | 1480 | 107 | 106 | 75-125 | 1 | 20 | |

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# QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

QC Batch: 784164
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60398961001, 60398961002

METHOD BLANK: 3126854 Matrix: Water
Associated Lab Samples: 60398961001, 60398961002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Arsenic | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Barium | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Beryllium | ug/L | ND | 0.50 | 05/04/22 15:23 | |
| Cadmium | ug/L | ND | 0.50 | 05/04/22 15:23 | |
| Chromium | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Cobalt | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Lead | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Molybdenum | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Selenium | ug/L | ND | 1.0 | 05/04/22 15:23 | |
| Thallium | ug/L | ND | 1.0 | 05/04/22 15:23 | |

LABORATORY CONTROL SAMPLE: 3126855

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 40 | 38.0 | 95 | 80-120 | |
| Arsenic | ug/L | 40 | 38.3 | 96 | 80-120 | |
| Barium | ug/L | 40 | 39.9 | 100 | 80-120 | |
| Beryllium | ug/L | 40 | 41.5 | 104 | 80-120 | |
| Cadmium | ug/L | 40 | 39.0 | 98 | 80-120 | |
| Chromium | ug/L | 40 | 39.3 | 98 | 80-120 | |
| Cobalt | ug/L | 40 | 38.3 | 96 | 80-120 | |
| Lead | ug/L | 40 | 39.5 | 99 | 80-120 | |
| Molybdenum | ug/L | 40 | 38.5 | 96 | 80-120 | |
| Selenium | ug/L | 40 | 40.0 | 100 | 80-120 | |
| Thallium | ug/L | 40 | 38.2 | 95 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3126856 3126857

| Parameter | Units | 60398961001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 33.2 | 34.5 | 83 | 86 | 75-125 | 4 | 20 | |
| Arsenic | ug/L | ND | 40 | 40 | 39.2 | 39.8 | 97 | 99 | 75-125 | 2 | 20 | |
| Barium | ug/L | 9.0 | 40 | 40 | 46.0 | 46.9 | 93 | 95 | 75-125 | 2 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 37.4 | 37.6 | 94 | 94 | 75-125 | 1 | 20 | |
| Cadmium | ug/L | ND | 40 | 40 | 33.9 | 34.3 | 85 | 86 | 75-125 | 1 | 20 | |
| Chromium | ug/L | ND | 40 | 40 | 37.8 | 38.1 | 94 | 94 | 75-125 | 1 | 20 | |

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

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3126856 3126857

| Parameter | Units | 60398961001 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 | 35.9 | 35.9 | 90 | 90 | 75-125 | 0 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 36.5 | 36.9 | 91 | 92 | 75-125 | 1 | 20 | |
| Molybdenum | ug/L | ND | 40 | 40 | 41.3 | 41.8 | 102 | 104 | 75-125 | 1 | 20 | |
| Selenium | ug/L | ND | 40 | 40 | 42.1 | 43.3 | 105 | 108 | 75-125 | 3 | 20 | |
| Thallium | ug/L | ND | 40 | 40 | 36.5 | 36.9 | 91 | 92 | 75-125 | 1 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

QC Batch: 784876
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60398961001, 60398961002

METHOD BLANK: 3129242 Matrix: Water
Associated Lab Samples: 60398961001, 60398961002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | ND | 5.0 | 05/04/22 15:18 | |

LABORATORY CONTROL SAMPLE: 3129243

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1000 | 995 | 100 | 80-120 | |

SAMPLE DUPLICATE: 3129244

| Parameter | Units | 60398823003 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 732 | 695 | 5 | 10 | |

SAMPLE DUPLICATE: 3129245

| Parameter | Units | 60398943001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 274 | 270 | 2 | 10 | |

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# QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

QC Batch: 786169
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60398961001, 60398961002

METHOD BLANK: 3134056 Matrix: Water
Associated Lab Samples: 60398961001, 60398961002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/12/22 13:39 | |
| Fluoride | mg/L | ND | 0.20 | 05/12/22 13:39 | |
| Sulfate | mg/L | ND | 1.0 | 05/12/22 13:39 | |

METHOD BLANK: 3139329 Matrix: Water
Associated Lab Samples: 60398961001, 60398961002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/13/22 09:00 | |
| Fluoride | mg/L | ND | 0.20 | 05/13/22 09:00 | |
| Sulfate | mg/L | ND | 1.0 | 05/13/22 09:00 | |

METHOD BLANK: 3139366 Matrix: Water
Associated Lab Samples: 60398961001, 60398961002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/17/22 08:57 | |
| Fluoride | mg/L | ND | 0.20 | 05/17/22 08:57 | |
| Sulfate | mg/L | ND | 1.0 | 05/17/22 08:57 | |

LABORATORY CONTROL SAMPLE: 3134057

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.8 | 97 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.6 | 102 | 80-120 | |
| Sulfate | mg/L | 5 | 5.4 | 107 | 80-120 | |

LABORATORY CONTROL SAMPLE: 3139330

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 94 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 99 | 80-120 | |

**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.**

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

LABORATORY CONTROL SAMPLE: 3139367

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.8 | 97 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 5.1 | 101 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3134058 3134059

| Parameter | Units | 20242864002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 12.9 | 10 | 10 | 26.9 | 23.0 | 140 | 101 | 80-120 | 16 | 15 | E,M1, R1 |
| Fluoride | mg/L | 0.42 | 5 | 5 | 7.4 | 5.4 | 139 | 99 | 80-120 | 31 | 15 | M1,R1 |
| Sulfate | mg/L | 49.0 | 100 | 100 | 204 | 208 | 155 | 159 | 80-120 | 2 | 15 | M1 |

SAMPLE DUPLICATE: 3134060

| Parameter | Units | 20242864001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 11.8 | 11.9 | 1 | 15 | |
| Fluoride | mg/L | 0.56 | 0.55 | 2 | 15 | |
| Sulfate | mg/L | 35.6 | 35.0 | 1 | 15 | |

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# QUALIFIERS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

## 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

| | |
|---|---|
| E | Analyte concentration exceeded the calibration range. The reported result is estimated. |
| M1 | Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery. |
| R1 | RPD value was outside control limits. |



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60398961

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60398961001** | **ASH-01-CCR** | EPA 3010 | 784166 | EPA 6010 | 784213 |
| **60398961002** | **ASH-06-CCR** | EPA 3010 | 784166 | EPA 6010 | 784213 |
| **60398961001** | **ASH-01-CCR** | EPA 3010 | 784164 | EPA 6020 | 784212 |
| **60398961002** | **ASH-06-CCR** | EPA 3010 | 784164 | EPA 6020 | 784212 |
| **60398961001** | **ASH-01-CCR** | EPA 7470 | 785498 | EPA 7470 | 785626 |
| **60398961002** | **ASH-06-CCR** | EPA 7470 | 785498 | EPA 7470 | 785626 |
| **60398961001** | **ASH-01-CCR** | SM 2540C | 784876 | | |
| **60398961002** | **ASH-06-CCR** | SM 2540C | 784876 | | |
| **60398961001** | **ASH-01-CCR** | EPA 9056 | 786169 | | |
| **60398961002** | **ASH-06-CCR** | EPA 9056 | 786169 | | |



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WO# : 60398961

60398961

| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-LENE-0009_Sample | | |
|---|---|---|---|
| | Revision: 2 | Effective Date: 01/12/2022 | Issued By: Lenexa |

Client Name: AECOM

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

**Tracking #:** 5645 8493 3214 Pace Shipping Label Used? Yes ☐ No ☑

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

**Packing Material:** Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ Ziplc

**Thermometer Used:** T301 **Type of Ice:** (Wet) Blue None

**Cooler Temperature (°C):** **As-read** 6.1 **Corr. Factor** -1.0 **Corrected** 5.1

**Date and initials of person examining contents:** 04-28-2022 CM

Temperature should be above freezing to 6°C

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 55192 | ☑Yes ☐No ☐N/A | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks: Lead acetate strip turns dark? (Record only) | ☐Yes ☐No | |
| Potassium iodide test strip turns blue/purple? (Preserve) | ☐Yes ☐No | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Qualtrax Document ID: 30468

Page 1 of 1

CCR - KS

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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.

Page: 1 of 1

**Section A** — **Required** Client Information:

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

**Section B** — **Required** Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** — Invoice Information:

| | |
|---|---|
| Attention: | Accounts Payable |
| Company Name: | AECOM |
| Address: | Same as Section A |
| Pace Quote Reference: | 42700 |
| Pace Project Manager: | Heather Wilson |
| Pace Profile #: | No RLI - 11033, 3 |

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Section D** — **Required** Client Information

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

Valid Matrix Codes

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

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-01-CCR | | | — | | 4.27.22 | 1130 | | 3 | 2 | | | 1 | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | N | 60398961 |
| 2 | ASH-06-CCR | | | — | | 4.27.22 | 1225 | | 3 | 2 | | | 1 | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | N | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Jack Lay AECOM | 4.27.22 | 1700 | Pace | 4/28 | 0830 | 5.1 | Y | Y | Y |
| **B, Ca, Li | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Jason Lawton

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY): 04/27/2022

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

Page 17 of 17

*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.

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60398961**
Sampling Event: April 27, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: July 12, 2022
Peer Reviewer: Katie Abbott — Date Completed: July 18, 2022

This report contains the final results of the data validation conducted for the water samples collected April 27, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

__X__ Data are usable without qualification.
_____ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | X | | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges.<br>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. | X | | |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• 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%. | | | X |

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| | • 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. | | | |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>• When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.<br>• 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. | | | X |
| Equipment Blanks | No target analytes reported in the associated equipment blank. | X | | |
| Reporting Limits Met | No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits. | X | | |
| Reporting | No reporting issues were found and further qualification was not considered necessary. | X | | |
| Package Completeness | No results were qualified as unusable and the data are 100% complete. | X | | |

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
% – Percent
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MB – Method Blank
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
RL – Reporting Limit
RPD – Relative Percent Difference

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July 13, 2022

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

RE: Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on May 02, 2022. 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

Revised report_rev1

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

Sincerely,

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

Enclosures

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



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# CERTIFICATIONS

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

**Pace Analytical Services Kansas**
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Arkansas Drinking Water
Illinois Certification #: 2000302021-3
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-21-15
Utah Certification #: KS000212019-9
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60399083001** | **ASH-03-CCR** | Water | 04/29/22 11:45 | 05/02/22 09:15 |
| **60399083002** | **DUP-01-CCR** | Water | 04/29/22 08:00 | 05/02/22 09:15 |
| **60399083003** | **ASH-02-CCR** | Water | 04/29/22 14:30 | 05/02/22 09:15 |

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## SAMPLE ANALYTE COUNT

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60399083001** | **ASH-03-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | JGP | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | CRN2, KB | 3 | PASI-K |
| **60399083002** | **DUP-01-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | JGP | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | CRN2 | 3 | PASI-K |
| **60399083003** | **ASH-02-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | JGP | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | CRN2, KB | 3 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City

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# PROJECT NARRATIVE

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

**Date:** July 13, 2022

Amended report revised for the correction of the dilution factor applied for the chloride analysis result for samples ASH-03-CCR and Dup-01-CCR.



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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

**Sample: ASH-03-CCR** **Lab ID: 60399083001** Collected: 04/29/22 11:45 Received: 05/02/22 09:15 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **805** | ug/L | 100 | 1 | 05/03/22 09:25 | 05/06/22 18:25 | 7440-42-8 | |
| Calcium | **444000** | ug/L | 200 | 1 | 05/03/22 09:25 | 05/06/22 18:25 | 7440-70-2 | |
| Lithium | **408** | ug/L | 10.0 | 1 | 05/03/22 09:25 | 05/06/22 18:25 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:29 | 7440-36-0 | D3 |
| Arsenic | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:24 | 7440-38-2 | |
| Barium | **12.8** | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:29 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/03/22 09:25 | 05/11/22 14:24 | 7440-41-7 | |
| Cadmium | ND | ug/L | 2.5 | 5 | 05/03/22 09:25 | 05/11/22 14:29 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:24 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:24 | 7440-48-4 | |
| Lead | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:29 | 7439-92-1 | D3 |
| Molybdenum | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:24 | 7439-98-7 | |
| Selenium | **107** | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:24 | 7782-49-2 | |
| Thallium | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:29 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 06/03/22 08:14 | 06/03/22 15:26 | 7439-97-6 | H1,H2 |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **4850** | mg/L | 100 | 1 | | 05/05/22 16:17 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **86.9** | mg/L | 10.0 | 10 | | 05/13/22 15:03 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/12/22 18:44 | 16984-48-8 | |
| Sulfate | **2960** | mg/L | 400 | 400 | | 05/13/22 15:17 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

**Sample: DUP-01-CCR** **Lab ID: 60399083002** Collected: 04/29/22 08:00 Received: 05/02/22 09:15 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **795** | ug/L | 100 | 1 | 05/03/22 09:25 | 05/06/22 18:27 | 7440-42-8 | |
| Calcium | **460000** | ug/L | 200 | 1 | 05/03/22 09:25 | 05/06/22 18:27 | 7440-70-2 | |
| Lithium | **419** | ug/L | 10.0 | 1 | 05/03/22 09:25 | 05/06/22 18:27 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:42 | 7440-36-0 | D3 |
| Arsenic | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:37 | 7440-38-2 | |
| Barium | **9.7** | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:42 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/03/22 09:25 | 05/11/22 14:37 | 7440-41-7 | |
| Cadmium | ND | ug/L | 2.5 | 5 | 05/03/22 09:25 | 05/11/22 14:42 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:37 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:37 | 7440-48-4 | |
| Lead | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:42 | 7439-92-1 | D3 |
| Molybdenum | ND | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:37 | 7439-98-7 | |
| Selenium | **119** | ug/L | 1.0 | 1 | 05/03/22 09:25 | 05/11/22 14:37 | 7782-49-2 | |
| Thallium | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:42 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 06/03/22 08:14 | 06/03/22 15:28 | 7439-97-6 | H1,H2 |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **4800** | mg/L | 100 | 1 | | 05/05/22 16:18 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **88.7** | mg/L | 10.0 | 10 | | 05/12/22 19:55 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/12/22 20:23 | 16984-48-8 | |
| Sulfate | **3130** | mg/L | 400 | 400 | | 05/12/22 20:09 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

**Sample: ASH-02-CCR** **Lab ID: 60399083003** Collected: 04/29/22 14:30 Received: 05/02/22 09:15 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **1940** | ug/L | 100 | 1 | 05/03/22 09:25 | 05/06/22 18:29 | 7440-42-8 | |
| Calcium | **166000** | ug/L | 200 | 1 | 05/03/22 09:25 | 05/06/22 18:29 | 7440-70-2 | M1 |
| Lithium | **304** | ug/L | 10.0 | 1 | 05/03/22 09:25 | 05/06/22 18:29 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7440-36-0 | D3 |
| Arsenic | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7440-38-2 | D3 |
| Barium | **17.8** | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/03/22 09:25 | 05/12/22 12:55 | 7440-41-7 | |
| Cadmium | ND | ug/L | 2.5 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7440-47-3 | D3 |
| Cobalt | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7439-92-1 | D3 |
| Molybdenum | **6.4** | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7439-98-7 | |
| Selenium | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7782-49-2 | D3 |
| Thallium | ND | ug/L | 5.0 | 5 | 05/03/22 09:25 | 05/11/22 14:55 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 06/02/22 15:57 | 06/03/22 12:18 | 7439-97-6 | H1,H2 |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **2240** | mg/L | 40.0 | 1 | | 05/05/22 16:18 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **20.7** | mg/L | 5.0 | 5 | | 05/13/22 16:53 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/13/22 15:58 | 16984-48-8 | |
| Sulfate | **2150** | mg/L | 200 | 200 | | 05/12/22 22:58 | 14808-79-8 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

QC Batch: 790199
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399083001, 60399083002

METHOD BLANK: 3149265 Matrix: Water
Associated Lab Samples: 60399083001, 60399083002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 06/03/22 15:03 | |

LABORATORY CONTROL SAMPLE: 3149266

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Mercury | ug/L | 5 | 4.6 | 91 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3149267 3149268

| Parameter | Units | 60399081001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 4.4 | 4.4 | 89 | 88 | 75-125 | 1 | 20 | H1 |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

QC Batch: 790200
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399083003

METHOD BLANK: 3149269 Matrix: Water
Associated Lab Samples: 60399083003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 06/03/22 12:09 | |

LABORATORY CONTROL SAMPLE: 3149270

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

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3149271 3149272

| Parameter | Units | 60399083003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 4.9 | 4.8 | 98 | 97 | 75-125 | 1 | 20 | H1 |

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# QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

QC Batch: 784546
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399083001, 60399083002, 60399083003

METHOD BLANK: 3128180 Matrix: Water
Associated Lab Samples: 60399083001, 60399083002, 60399083003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Boron | ug/L | ND | 100 | 05/06/22 18:04 | |
| Calcium | ug/L | ND | 200 | 05/06/22 18:04 | |
| Lithium | ug/L | ND | 10.0 | 05/06/22 18:04 | |

LABORATORY CONTROL SAMPLE: 3128181

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Boron | ug/L | 1000 | 1060 | 106 | 80-120 | |
| Calcium | ug/L | 10000 | 10800 | 108 | 80-120 | |
| Lithium | ug/L | 1000 | 1070 | 107 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3128182 3128183

| Parameter | Units | 60399081001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | 2010 | 1000 | 1000 | 2950 | 2960 | 94 | 95 | 75-125 | 0 | 20 | |
| Calcium | ug/L | 171000 | 10000 | 10000 | 177000 | 178000 | 64 | 66 | 75-125 | 0 | 20 | M1 |
| Lithium | ug/L | 317 | 1000 | 1000 | 1380 | 1390 | 107 | 107 | 75-125 | 0 | 20 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3128184 3128185

| Parameter | Units | 60399083003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | 1940 | 1000 | 1000 | 3000 | 2960 | 106 | 103 | 75-125 | 1 | 20 | |
| Calcium | ug/L | 166000 | 10000 | 10000 | 182000 | 181000 | 152 | 149 | 75-125 | 0 | 20 | M1 |
| Lithium | ug/L | 304 | 1000 | 1000 | 1410 | 1380 | 110 | 107 | 75-125 | 2 | 20 | |

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# QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

QC Batch: 784543
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399083001, 60399083002, 60399083003

METHOD BLANK: 3128165 Matrix: Water
Associated Lab Samples: 60399083001, 60399083002, 60399083003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Arsenic | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Barium | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Beryllium | ug/L | ND | 0.50 | 05/11/22 12:56 | |
| Cadmium | ug/L | ND | 0.50 | 05/11/22 12:56 | |
| Chromium | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Cobalt | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Lead | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Molybdenum | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Selenium | ug/L | ND | 1.0 | 05/11/22 12:56 | |
| Thallium | ug/L | ND | 1.0 | 05/11/22 12:56 | |

LABORATORY CONTROL SAMPLE: 3128166

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 40 | 39.8 | 100 | 80-120 | |
| Arsenic | ug/L | 40 | 40.7 | 102 | 80-120 | |
| Barium | ug/L | 40 | 41.3 | 103 | 80-120 | |
| Beryllium | ug/L | 40 | 41.1 | 103 | 80-120 | |
| Cadmium | ug/L | 40 | 42.4 | 106 | 80-120 | |
| Chromium | ug/L | 40 | 41.4 | 104 | 80-120 | |
| Cobalt | ug/L | 40 | 41.2 | 103 | 80-120 | |
| Lead | ug/L | 40 | 42.4 | 106 | 80-120 | |
| Molybdenum | ug/L | 40 | 41.1 | 103 | 80-120 | |
| Selenium | ug/L | 40 | 41.3 | 103 | 80-120 | |
| Thallium | ug/L | 40 | 40.0 | 100 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3128167 3128168

| Parameter | Units | 60399081001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 34.9 | 34.8 | 87 | 87 | 75-125 | 0 | 20 | |
| Arsenic | ug/L | ND | 40 | 40 | 34.8 | 38.1 | 86 | 94 | 75-125 | 9 | 20 | |
| Barium | ug/L | 19.1 | 40 | 40 | 55.5 | 54.5 | 91 | 89 | 75-125 | 2 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 36.0 | 41.5 | 90 | 104 | 75-125 | 14 | 20 | |
| Cadmium | ug/L | ND | 40 | 40 | 33.5 | 33.0 | 84 | 82 | 75-125 | 2 | 20 | |
| Chromium | ug/L | ND | 40 | 40 | 36.9 | 39.6 | 91 | 98 | 75-125 | 7 | 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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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3128167 3128168

| Parameter | Units | 60399081001 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 | 34.5 | 37.2 | 86 | 93 | 75-125 | 7 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 41.0 | 40.3 | 102 | 100 | 75-125 | 2 | 20 | |
| Molybdenum | ug/L | 6.5 | 40 | 40 | 30.6 | 42.5 | 60 | 90 | 75-125 | 32 | 20 | M1,R1 |
| Selenium | ug/L | ND | 40 | 40 | 30.4 | 35.4 | 76 | 88 | 75-125 | 15 | 20 | |
| Thallium | ug/L | ND | 40 | 40 | 40.3 | 39.8 | 101 | 99 | 75-125 | 1 | 20 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3128169 3128170

| Parameter | Units | 60399083003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 34.8 | 34.7 | 87 | 87 | 75-125 | 0 | 20 | |
| Arsenic | ug/L | ND | 40 | 40 | 38.9 | 37.8 | 96 | 93 | 75-125 | 3 | 20 | |
| Barium | ug/L | 17.8 | 40 | 40 | 55.8 | 54.8 | 95 | 93 | 75-125 | 2 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 37.3 | 35.4 | 93 | 88 | 75-125 | 5 | 20 | |
| Cadmium | ug/L | ND | 40 | 40 | 33.2 | 33.0 | 83 | 82 | 75-125 | 1 | 20 | |
| Chromium | ug/L | ND | 40 | 40 | 38.3 | 38.3 | 93 | 93 | 75-125 | 0 | 20 | |
| Cobalt | ug/L | ND | 40 | 40 | 36.6 | 36.9 | 91 | 92 | 75-125 | 1 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 39.8 | 39.8 | 99 | 99 | 75-125 | 0 | 20 | |
| Molybdenum | ug/L | 6.4 | 40 | 40 | 42.6 | 42.1 | 91 | 89 | 75-125 | 1 | 20 | |
| Selenium | ug/L | ND | 40 | 40 | 39.1 | 36.1 | 98 | 90 | 75-125 | 8 | 20 | |
| Thallium | ug/L | ND | 40 | 40 | 39.2 | 39.4 | 98 | 98 | 75-125 | 1 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

QC Batch: 785064 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399083001, 60399083002, 60399083003

METHOD BLANK: 3130110 Matrix: Water
Associated Lab Samples: 60399083001, 60399083002, 60399083003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | ND | 5.0 | 05/05/22 16:16 | |

LABORATORY CONTROL SAMPLE: 3130111

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1000 | 999 | 100 | 80-120 | |

SAMPLE DUPLICATE: 3130112

| Parameter | Units | 60399081001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 3150 | 2970 | 6 | 10 | |

SAMPLE DUPLICATE: 3130113

| Parameter | Units | 60399083003 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 2240 | 2470 | 10 | 10 | |

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# QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

QC Batch: 786305
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399083001, 60399083002, 60399083003

METHOD BLANK: 3134518 Matrix: Water
Associated Lab Samples: 60399083001, 60399083002, 60399083003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/12/22 09:15 | |
| Fluoride | mg/L | ND | 0.20 | 05/12/22 09:15 | |
| Sulfate | mg/L | ND | 1.0 | 05/12/22 09:15 | |

METHOD BLANK: 3140127 Matrix: Water
Associated Lab Samples: 60399083001, 60399083002, 60399083003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/13/22 09:00 | |
| Fluoride | mg/L | ND | 0.20 | 05/13/22 09:00 | |
| Sulfate | mg/L | ND | 1.0 | 05/13/22 09:00 | |

METHOD BLANK: 3140131 Matrix: Water
Associated Lab Samples: 60399083001, 60399083002, 60399083003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/17/22 08:57 | |
| Fluoride | mg/L | ND | 0.20 | 05/17/22 08:57 | |
| Sulfate | mg/L | ND | 1.0 | 05/17/22 08:57 | |

LABORATORY CONTROL SAMPLE: 3134519

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.8 | 96 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 98 | 80-120 | |

LABORATORY CONTROL SAMPLE: 3140128

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 94 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 99 | 80-120 | |

**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.**

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

LABORATORY CONTROL SAMPLE: 3140132

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.8 | 97 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 5.1 | 101 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3134520 3134521

| Parameter | Units | 60399083003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 20.7 | 25 | 25 | 44.3 | 44.9 | 94 | 97 | 80-120 | 1 | 15 | |
| Fluoride | mg/L | ND | 2.5 | 2.5 | 2.4 | 2.5 | 90 | 91 | 80-120 | 2 | 15 | |
| Sulfate | mg/L | 2150 | 1000 | 1000 | 3230 | 3260 | 107 | 111 | 80-120 | 1 | 15 | |

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

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# QUALIFIERS

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

## 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. |
| H1 | Analysis conducted outside the EPA method holding time. |
| H2 | Extraction or preparation conducted outside EPA method holding time. |
| M1 | Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery. |
| R1 | RPD value was outside control limits. |



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835.100.1 PRPA CCR-Revised Report
Pace Project No.: 60399083

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60399083001** | **ASH-03-CCR** | EPA 3010 | 784546 | EPA 6010 | 784690 |
| **60399083002** | **DUP-01-CCR** | EPA 3010 | 784546 | EPA 6010 | 784690 |
| **60399083003** | **ASH-02-CCR** | EPA 3010 | 784546 | EPA 6010 | 784690 |
| **60399083001** | **ASH-03-CCR** | EPA 3010 | 784543 | EPA 6020 | 784688 |
| **60399083002** | **DUP-01-CCR** | EPA 3010 | 784543 | EPA 6020 | 784688 |
| **60399083003** | **ASH-02-CCR** | EPA 3010 | 784543 | EPA 6020 | 784688 |
| **60399083001** | **ASH-03-CCR** | EPA 7470 | 790199 | EPA 7470 | 790432 |
| **60399083002** | **DUP-01-CCR** | EPA 7470 | 790199 | EPA 7470 | 790432 |
| **60399083003** | **ASH-02-CCR** | EPA 7470 | 790200 | EPA 7470 | 790342 |
| **60399083001** | **ASH-03-CCR** | SM 2540C | 785064 | | |
| **60399083002** | **DUP-01-CCR** | SM 2540C | 785064 | | |
| **60399083003** | **ASH-02-CCR** | SM 2540C | 785064 | | |
| **60399083001** | **ASH-03-CCR** | EPA 9056 | 786305 | | |
| **60399083002** | **DUP-01-CCR** | EPA 9056 | 786305 | | |
| **60399083003** | **ASH-02-CCR** | EPA 9056 | 786305 | | |



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WO# : 60399083

60399083

| DC#_Title: ENV-FRM-LENE-0009_Sample Conc | | |
|---|---|---|
| Revision: 2 | Effective Date: 01/12/2022 | Issued By: Lenexa |

Client Name: AECOM

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

**Tracking #:** 564584933604 Pace Shipping Label Used? Yes ☐ No ☑

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

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

**Thermometer Used:** T301 **Type of Ice:** (Wet) Blue None

**Cooler Temperature (°C):** **As-read** 2.2 **Corr. Factor** -1.0 **Corrected** 1.2

**Date and initials of person examining contents:** PV 5/2/22

Temperature should be above freezing to 6°C

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ☑Yes ☐No ☐N/A<br>($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide)<br>(Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 55192 | | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks:<br>Lead acetate strip turns dark? (Record only) ☐Yes ☐No<br>Potassium iodide test strip turns blue/purple? (Preserve) ☐Yes ☐No | | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Qualtrax Document ID: 30468

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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.

CCR
KS

Page: 1 of 1

**Section A** Required Client Information:

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

**Section B** Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** Invoice Information:

| | |
|---|---|
| Attention: | Accounts Payable |
| Company Name: | AECOM |
| Address: | Same as Section A |
| Pace Quote Reference: | 42700 |
| Pace Project Manager: | Heather Wilson |
| Pace Profile #: | No RLI - 11033, 3 |

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** Required Client Information

Valid Matrix Codes

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

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

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test (Y/N) | 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | | | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. 60399083 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-03-CCR | WT | G | — | — | 4.29.22 | 11:45 | | 3 | 2 | | 1 | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | BP3U | BP1U | | BP1N |
| 2 | DUP-01-CCR | WT | G | — | — | 4.29.22 | — | | 3 | 2 | | 1 | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ↓ | ↓ | | ↓ |
| 3 | ASH-02-CCR | WT | G | — | — | 4.29.22 | 14:30 | | 9 | 6 | | 3 | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | 3BP3U | ↓ | | MS/MSD 3BP1N |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | JL | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *So, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Jack Levy AECOM | 4.29.22 | 1700 | [signature] PASE | 5/2/22 | 0915 | 1-2 | Y | X | Y |
| **B, Ca, Li MS/MSD collected @ASH-02-CCR | | | | | | | | | | |

| SAMPLER NAME AND SIGNATURE | | | Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
|---|---|---|---|---|---|---|
| PRINT Name of SAMPLER: | Jack Levy | | | | | |
| SIGNATURE of SAMPLER: | [signature] | DATE Signed (MM/DD/YY): 04/29/22 | | | | |

*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

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60399083**
Sampling Event: April 29, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: July 12, 2022
Peer Reviewer: Katie Abbott — Date Completed: July 18, 2022

This report contains the final results of the data validation conducted for the water samples collected July 12th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
_____ Data are usable with qualification (noted below).
__X__ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | X | | |
| Holding Times | The samples were analyzed within the method required holding times. | | X[1] | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges.<br>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. | X | | |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• 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%. | X | | |

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| | • 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. | | | |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>Parent Sample: ASH-03-CCR; Field Duplicate: DUP-01-CCR<br>• When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.<br>• 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. | X | | |
| Equipment Blanks | No target analytes reported in the associated equipment blank. | X | | |
| Reporting Limits Met | No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits. | | X[2] | |
| Reporting | No reporting issues were found and further qualification was not considered necessary. | | X[3] | |
| Package Completeness | No results were qualified as unusable and the data are 100% complete. | | X[4] | |

**Comments**

1 – Due to a laboratory scheduling error, samples ASH-02-CCR, ASH-03-CCR, and DUP-01-CCR were analyzed 6-7 days outside the holding time criterion of 28 days for mercury. Therefore, the associated non-detect mercury results for samples ASH-02-CCR, ASH-03-CCR, and DUP-01-CCR were qualified as unusable (R h).

2 – 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.

3 – During review of the data package, it was noted that the chloride results reported for the parent sample, ASH-03-CCR (10x), and associated field duplicate sample, DUP-01-CCR (50x), were inconsistent. The concentrations reported appear to be off by a factor of 5x. The laboratory determined that the dilution factor applied to the field duplicate sample, DUP-01-CCR, was incorrect. A dilution factor of 10x should have been applied to the sample instead of 50x. As the laboratory revised and reissued the data to report the correct dilution factor of 10x for sample DUP-01-CCR, no further action was required, and qualification was not considered necessary.

4 – With the exception of the non-detect mercury results for samples ASH-03-CCR, DUP-01-CCR, and ASH-02-CCR, which were qualified as unusable (R) as the samples were analyzed 6-7 days outside the holding time criterion of 28 days, the results are usable as qualified for the project objective. The data are 94.7% complete.

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
% – Percent
h – Holding Time
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MB – Method Blank
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
R – Unusable
RL – Reporting Limit
RPD – Relative Percent Difference

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

June 09, 2022

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

RE: Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on April 30, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Greensburg

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

**Pace Analytical Services Pennsylvania**
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
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 #: PA014572018-1
New Hampshire/TNI Certification #: 297617
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 #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
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
Wyoming Certification #: 8TMS-L



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## SAMPLE SUMMARY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60399105001** | **ASH-03-CCR** | Water | 04/29/22 11:45 | 04/30/22 09:35 |
| **60399105002** | **DUP-01-CCR** | Water | 04/29/22 08:00 | 04/30/22 09:35 |
| **60399105003** | **ASH-02-CCR** | Water | 04/29/22 14:30 | 04/30/22 09:35 |
| **60399105004** | **ASH-02-CCR MS** | Water | 04/29/22 14:30 | 04/30/22 09:35 |
| **60399105005** | **ASH-02-CCR MSD** | Water | 04/29/22 14:30 | 04/30/22 09:35 |



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## SAMPLE ANALYTE COUNT

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60399105001** | **ASH-03-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60399105002** | **DUP-01-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60399105003** | **ASH-02-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60399105004** | **ASH-02-CCR MS** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| **60399105005** | **ASH-02-CCR MSD** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |

PASI-PA = Pace Analytical Services - Greensburg



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

**Sample: ASH-03-CCR** **Lab ID: 60399105001** Collected: 04/29/22 11:45 Received: 04/30/22 09:35 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.308 ± 0.397 (0.661) C:NA T:86%** | pCi/L | 06/01/22 13:36 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.971 ± 0.428 (0.693) C:75% T:86%** | pCi/L | 05/19/22 12:25 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.28 ± 0.825 (1.35)** | pCi/L | 06/01/22 18:29 | 7440-14-4 | |



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

**Sample: DUP-01-CCR** **Lab ID: 60399105002** Collected: 04/29/22 08:00 Received: 04/30/22 09:35 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.370 ± 0.365 (0.556) C:NA T:90%** | pCi/L | 06/01/22 13:36 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.939 ± 0.401 (0.613) C:71% T:90%** | pCi/L | 05/19/22 12:25 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.31 ± 0.766 (1.17)** | pCi/L | 06/01/22 18:29 | 7440-14-4 | |



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

**Sample: ASH-02-CCR** **Lab ID: 60399105003** Collected: 04/29/22 14:30 Received: 04/30/22 09:35 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | | Pace Analytical Services - Greensburg | | | | |
| Radium-226 | EPA 903.1 | **0.208 ± 0.217 (0.306) C:NA T:89%** | pCi/L | 06/01/22 13:36 | 13982-63-3 | |
| | | Pace Analytical Services - Greensburg | | | | |
| Radium-228 | EPA 904.0 | **0.718 ± 0.370 (0.640) C:78% T:89%** | pCi/L | 05/19/22 12:25 | 15262-20-1 | |
| | | Pace Analytical Services - Greensburg | | | | |
| Total Radium | Total Radium Calculation | **0.926 ± 0.587 (0.946)** | pCi/L | 06/01/22 18:29 | 7440-14-4 | |



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

**Sample: ASH-02-CCR MS** **Lab ID: 60399105004** Collected: 04/29/22 14:30 Received: 04/30/22 09:35 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | | Pace Analytical Services - Greensburg | | | | |
| Radium-226 | EPA 903.1 | **85.15 %REC ± NA (NA) C:NA T:NA%** | pCi/L | 06/01/22 13:36 | 13982-63-3 | |
| | | Pace Analytical Services - Greensburg | | | | |
| Radium-228 | EPA 904.0 | **99.34 %REC ± NA (NA) C:NA T:NA** | pCi/L | 05/19/22 12:26 | 15262-20-1 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

**Sample: ASH-02-CCR MSD** **Lab ID: 60399105005** Collected: 04/29/22 14:30 Received: 04/30/22 09:35 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **72.36 %REC 16.24 RPD ± NA (NA) C:NA T:NA%** | pCi/L | 06/01/22 13:50 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **95.45 %REC 4.00 RPD ± NA (NA) C:NA T:NA** | pCi/L | 05/19/22 15:48 | 15262-20-1 | |

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

QC Batch: 502445
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60399105001, 60399105002, 60399105003, 60399105004, 60399105005

METHOD BLANK: 2432546 Matrix: Water
Associated Lab Samples: 60399105001, 60399105002, 60399105003, 60399105004, 60399105005

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-226 | -0.0439 ± 0.258 (0.576) C:NA T:95% | pCi/L | 06/01/22 13:23 | |

**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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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

QC Batch: 502447 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60399105001, 60399105002, 60399105003, 60399105004, 60399105005

METHOD BLANK: 2432553 Matrix: Water
Associated Lab Samples: 60399105001, 60399105002, 60399105003, 60399105004, 60399105005

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-228 | 0.485 ± 0.354 (0.685) C:70% T:95% | pCi/L | 05/19/22 12:25 | |

**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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# QUALIFIERS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

**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.



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399105

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60399105001** | **ASH-03-CCR** | EPA 903.1 | 502445 | | |
| **60399105002** | **DUP-01-CCR** | EPA 903.1 | 502445 | | |
| **60399105003** | **ASH-02-CCR** | EPA 903.1 | 502445 | | |
| **60399105004** | **ASH-02-CCR MS** | EPA 903.1 | 502445 | | |
| **60399105005** | **ASH-02-CCR MSD** | EPA 903.1 | 502445 | | |
| **60399105001** | **ASH-03-CCR** | EPA 904.0 | 502447 | | |
| **60399105002** | **DUP-01-CCR** | EPA 904.0 | 502447 | | |
| **60399105003** | **ASH-02-CCR** | EPA 904.0 | 502447 | | |
| **60399105004** | **ASH-02-CCR MS** | EPA 904.0 | 502447 | | |
| **60399105005** | **ASH-02-CCR MSD** | EPA 904.0 | 502447 | | |
| **60399105001** | **ASH-03-CCR** | Total Radium Calculation | 508746 | | |
| **60399105002** | **DUP-01-CCR** | Total Radium Calculation | 508746 | | |
| **60399105003** | **ASH-02-CCR** | Total Radium Calculation | 508746 | | |



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# Internal Transfer Chain of Custody

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☐ Samples Pre-Logged into eCOC.

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

**Workorder:** 60399105 **Workorder Name:** 603659991 PRPA CCR
**Owner Received Date:** 4/30/2022 **Results Requested By:** 5/23/2022

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

WO# : 30485575

30485575

| Item | Sample ID | Sample Type | Collect Date/Time | Lab ID | Matrix | Preserved Containers: Other | Total Radium-226 & Total Sum Radium | Total Radium-228 | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-03-CCR | PS | 4/29/2022 11:45 | 60399105001 | Water | 1 | X | X | 001 |
| 2 | DUP-01-CCR | PS | 4/29/2022 08:00 | 60399105002 | Water | 1 | X | X | 002 |
| 3 | ASH-02-CCR | PS | 4/29/2022 14:30 | 60399105003 | Water | 1 | X | X | 003 |
| 4 | ASH-02-CCR MS | PS | 4/29/2022 14:30 | 60399105004 | Water | 1 | X | X | 004 |
| 5 | ASH-02-CCR MSD | PS | 4/29/2022 14:30 | 60399105005 | Water | 1 | X | X | 005 |

| Transfers | Released By | Date/Time | Received By | Date/Time |
|---|---|---|---|---|
| 1 | | | [signature] | 4-30-22 |
| 2 | | | | |
| 3 | | | | |

**Comments**
IR30- Radium QC Sheets Required
9:35

**Cooler Temperature on Receipt** ~ °C | **Custody Seal** (Y) or N | **Received on Ice** Y or (N) | **Samples Intact** (Y) or N

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

Pace Analytical
www.pacelabs.com

# CHAIN-OF-CUSTODY / Analytical Request Document

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

CCR
PA

Page: 1 of 1

**Section A** Required Client Information:

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

**Section B** Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| | |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** Invoice Information:

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

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** Required Client Information

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

Valid Matrix Codes

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

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-03-CCR | WT | G | — | — | 4.29.22 | 11:45 | | 2 | | | 2 | | | | | | ✓ | ✓ | ✓ | N | 001 |
| 2 | DUP-01-CCR | WT | G | — | — | 4.29.22 | — | | 2 | | | 2 | | | | | | ✓ | ✓ | ✓ | N | 002 |
| 3 | ASH-02-CCR | WT | G | — | — | 4.29.22 | #14:30 | | 6 | | | 6 | | | | | | ✓ | ✓ | ✓ | N | MS/MSD 003 |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |

JR

**WO# : 30485575**
PM: MS1 Due Date: 05/23/22
CLIENT: PACE_60_LEKS

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| MS/MSD collected @ ASH-02-CCR | Jack Ley AECOM | 4.29.22 | 1700 | J Andrews | 4-30-22 | 9:35 | |
| | | | | | | | |
| | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Jack Ley

SIGNATURE of SAMPLER: Jack Ley

DATE Signed (MM/DD/YY): 04/29/22

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



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

# Pittsburgh Lab Sample Condition Upon Receipt

Pace Analytical

Client Name: Pace Kansas  Project #

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

Label 2a

Tracking #: 5645 8493 3085  LIMS Login VPIne

Custody Seal on Cooler/Box Present: ☑ yes ☐ no  Seals intact: ☑ yes ☐ no

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

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

Temp should be above freezing to 6°C

pH paper Lot# 10D2811  Date and Initials of person examining contents: 5-3-22 2a

| Comments: | Yes | No | N/A | |
|---|---|---|---|---|
| Chain of Custody Present: | ✓ | | | 1. |
| Chain of Custody Filled Out: | ✓ | | | 2. |
| Chain of Custody Relinquished: | | ✓ | | 3. |
| Sampler Name & Signature on COC: | | ✓ | | 4. |
| Sample Labels match COC: -Includes date/time/ID Matrix: WT | | ✓ | | 5. no time on samples 001, 002 |
| Samples Arrived within Hold Time: | ✓ | | | 6. |
| **Short Hold Time Analysis (<72hr remaining):** | | ✓ | | 7. |
| **Rush Turn Around Time Requested:** | | ✓ | | 8. |
| Sufficient Volume: | ✓ | | | 9. |
| Correct Containers Used: | ✓ | | | 10. |
| -Pace Containers Used: | ✓ | | | |
| Containers Intact: | ✓ | | | 11. |
| Orthophosphate field filtered | | | ✓ | 12. |
| Hex Cr Aqueous sample field filtered | | | ✓ | 13. |
| Organic Samples checked for dechlorination: | | | ✓ | 14. |
| Filtered volume received for Dissolved tests | | | ✓ | 15. |
| **All containers have been checked for preservation.** exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix | ✓ | | | 16. pH <2 |
| All containers meet method preservation requirements. | ✓ | | | Initial when completed 2a  Date/time of preservation  Lot # of added preservative |
| Headspace in VOA Vials ( >6mm): | | | ✓ | 17. |
| Trip Blank Present: | | | ✓ | 18. |
| Trip Blank Custody Seals Present | | | ✓ | |
| **Rad Samples Screened < 0.5 mrem/hr** | ✓ | | | Initial when completed: 2a  Date: 5-3-22  Survey Meter SN: 1563 |

WO#: 30485575

PM: MS1  Due Date: 05/23/22

CLIENT: PACE_60_LEKS

**Client Notification/ Resolution:**

Person Contacted:  Date/Time:  Contacted By:

Comments/ Resolution:

☐ **A check in this box indicates that additional information has been stored in ereports.**

**Note:** Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office ( i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

# Pace Greensburg Lab -Sample Container Count

Pace Analytical®

Client: Pace Kansas

Site: 60399105 | AECOM Greenwood Village, Colorado

Profile Number: 3605

Notes:

| Sample Line Item | Matrix | AG1H | AG1S | AG1T | AG2U | AG3S | AG3U | AG5U | AG5T | BG1U | BG2U | BP1N | BP1U | BP2S | BP2U | BP3C | BP3N | BP3S | BP3U | DG9S | GCUB | VG9H | VG9T | VG9U | VOAK | WGFU | WGKU | ZPLC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | WT | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 2 | " | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 3 | " | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 4 | " | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 5 | WT | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**WO# : 30485575**

PM: MS1 Due Date: 05/23/22

CLIENT: PACE_60_LEKS

Container Codes

## Glass

| | | | |
|---|---|---|---|
| GJN | 1 Gallon Jug with HNO3 | DG9S | 40mL amber VOA vial H2SO4 |
| AG5U | 100mL amber glass unprserved | VG9U | 40mL clear VOA vial |
| AG5T | 100mL amber glass Na Thiosulfate | VG9T | 40mL clear VOA vial Na Thiosul |
| GJN | 1 Gallon Jug | VG9H | 40mL clear VOA vial HCl |
| AG1S | 1L amber glass H2SO4 | JGFU | 4oz amber wide jar |
| AG1H | 1L amber glass HCl | WGFU | 4oz wide jar unpreserved |
| AG1T | 1L amber glass Na Thiosulfate | BG2U | 500mL clear glass unpreserved |
| BG1U | 1L clear glass unpreserved | AG2U | 500mL amber glass unpreserved |
| AG3S | 250mL amber glass H2SO4 | WGKU | 8oz wide jar unpreserved |
| AG3U | 250mL amber glass unpreserved | | |

## Plastic / Misc.

| | |
|---|---|
| GCUB | 1 Gallon Cubitainer |
| 12GN | 1/2 Gallon Cubitainer |
| SP5T | 120mL Coliform Na Thiosulfate |
| BP1N | 1L plastic HNO3 |
| BP1U | 1L plastic unpreserved |
| BP3S | 250mL plastic H2SO4 |
| BP3N | 250mL plastic HNO3 |
| BP3U | 250mL plastic unpreserved |
| BP3C | 250ml plastic NAOH |
| BP2S | 500mL plastic H2SO4 |
| BP2U | 500mL plastic unpreserved |

| | |
|---|---|
| EZI | 5g Encore |
| VOAK | Kit for Volatile Solid |
| I | Wipe/Swab |
| ZPLC | Ziploc Bag |

| | |
|---|---|
| WT | Water |
| SL | Solid |
| OL | Non-aqueous liquid |
| WP | Wipe |

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | RPS |
| Date: | 5/10/2022 |
| Batch ID: | 66556 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2432546 |
| MB concentration: | -0.044 |
| M/B Counting Uncertainty: | 0.258 |
| MB MDC: | 0.576 |
| MB Numerical Performance Indicator: | -0.33 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS66556 | LCSD66556 |
| Count Date: | 6/1/2022 | |
| Spike I.D.: | 21-031 | |
| Spike Concentration (pCi/mL): | 39.891 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.806 | |
| Target Conc. (pCi/L, g, F): | 4.950 | |
| Uncertainty (Calculated): | 0.233 | |
| Result (pCi/L, g, F): | 4.098 | |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 0.840 | |
| Numerical Performance Indicator: | -1.91 | |
| Percent Recovery: | 82.79% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 73% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 4/29/2022 | 4/29/2022 |
| Sample I.D. | 60399072004 | 60399105003 |
| Sample MS I.D. | 60399072005 | 60399105004 |
| Sample MSD I.D. | 60399072006 | 60399105005 |
| Spike I.D.: | 21-031 | 21-031 |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 39.892 | 39.892 |
| Spike Volume Used in MS (mL): | 0.20 | 0.20 |
| Spike Volume Used in MSD (mL): | 0.20 | 0.20 |
| MS Aliquot (L, g, F): | 0.804 | 0.813 |
| MS Target Conc.(pCi/L, g, F): | 9.930 | 9.811 |
| MSD Aliquot (L, g, F): | 0.812 | 0.801 |
| MSD Target Conc. (pCi/L, g, F): | 9.829 | 9.962 |
| MS Spike Uncertainty (calculated): | 0.467 | 0.461 |
| MSD Spike Uncertainty (calculated): | 0.462 | 0.468 |
| Sample Result: | 0.047 | 0.208 |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.159 | 0.216 |
| Sample Matrix Spike Result: | 10.154 | 8.562 |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.357 | 1.189 |
| Sample Matrix Spike Duplicate Result: | 10.962 | 7.416 |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.399 | 1.049 |
| MS Numerical Performance Indicator: | 0.241 | -2.209 |
| MSD Numerical Performance Indicator: | 1.438 | -4.619 |
| MS Percent Recovery: | 101.79% | 85.15% |
| MSD Percent Recovery: | 111.06% | 72.36% |
| MS Status vs Numerical Indicator: | N/A | N/A |
| MSD Status vs Numerical Indicator: | N/A | N/A |
| MS Status vs Recovery: | Pass | Pass |
| MSD Status vs Recovery: | Pass | Pass |
| MS/MSD Upper % Recovery Limits: | 136% | 136% |
| MS/MSD Lower % Recovery Limits: | 71% | 71% |

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

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | 60399072004 | 60399105003 |
| Sample MS I.D. | 60399072005 | 60399105004 |
| Sample MSD I.D. | 60399072006 | 60399105005 |
| Sample Matrix Spike Result: | 10.154 | 8.562 |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.357 | 1.189 |
| Sample Matrix Spike Duplicate Result: | 10.962 | 7.416 |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.399 | 1.049 |
| Duplicate Numerical Performance Indicator: | -0.813 | 1.416 |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 8.71% | 16.24% |
| MS/ MSD Duplicate Status vs Numerical Indicator: | N/A | N/A |
| MS/ MSD Duplicate Status vs RPD: | Pass | Pass |
| % RPD Limit: | 32% | 32% |

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

**Comments:**

CK 6/1/22

SLC 6/1/2022

# Quality Control Sample Performance Assessment

Pace Analytical™
www.pacelabs.com

| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | RPS |
| Date: | 5/10/2022 |
| Batch ID: | 66556 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2432546 |
| MB concentration: | -0.044 |
| M/B Counting Uncertainty: | 0.258 |
| MB MDC: | 0.576 |
| MB Numerical Performance Indicator: | -0.33 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS66556 | LCSD66556 |
| Count Date: | 6/1/2022 | |
| Spike I.D.: | 21-031 | |
| Spike Concentration (pCi/mL): | 39.891 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.806 | |
| Target Conc. (pCi/L, g, F): | 4.950 | |
| Uncertainty (Calculated): | 0.233 | |
| Result (pCi/L, g, F): | 4.098 | |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 0.840 | |
| Numerical Performance Indicator: | -1.91 | |
| Percent Recovery: | 82.79% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 73% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 5/3/2022 | |
| Sample I.D. | 60399336001 | |
| Sample MS I.D. | 60399336002 | |
| Sample MSD I.D. | 60399336003 | |
| Spike I.D.: | 21-031 | |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 39.892 | |
| Spike Volume Used in MS (mL): | 0.20 | 0.20 |
| Spike Volume Used in MSD (mL): | 0.20 | |
| MS Aliquot (L, g, F): | 0.801 | |
| MS Target Conc.(pCi/L, g, F): | 9.956 | |
| MSD Aliquot (L, g, F): | 0.822 | |
| MSD Target Conc. (pCi/L, g, F): | 9.711 | |
| MS Spike Uncertainty (calculated): | 0.468 | |
| MSD Spike Uncertainty (calculated): | 0.456 | |
| Sample Result: | 0.181 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.177 | |
| Sample Matrix Spike Result: | 10.379 | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.387 | |
| Sample Matrix Spike Duplicate Result: | 7.467 | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.082 | |
| MS Numerical Performance Indicator: | 0.322 | |
| MSD Numerical Performance Indicator: | -4.003 | |
| MS Percent Recovery: | 102.43% | |
| MSD Percent Recovery: | 75.03% | |
| MS Status vs Numerical Indicator: | N/A | |
| MSD Status vs Numerical Indicator: | N/A | |
| MS Status vs Recovery: | Pass | |
| MSD Status vs Recovery: | Pass | |
| MS/MSD Upper % Recovery Limits: | 136% | |
| MS/MSD Lower % Recovery Limits: | 71% | |

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

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | 60399336001 | |
| Sample MS I.D. | 60399336002 | |
| Sample MSD I.D. | 60399336003 | |
| Sample Matrix Spike Result: | 10.379 | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.387 | |
| Sample Matrix Spike Duplicate Result: | 7.467 | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.082 | |
| Duplicate Numerical Performance Indicator: | 3.245 | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 30.88% | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | N/A | |
| MS/ MSD Duplicate Status vs RPD: | Pass | |
| % RPD Limit: | 32% | |

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

**Comments:**

Ok
6/1/22

Sue 6/1/2022

# Quality Control Sample Performance Assessment

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| | |
|---|---|
| Test: | Ra-228 |
| Analyst: | JSM |
| Date: | 5/11/2022 |
| Worklist: | 66557 |
| Matrix: | WI |

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2432553 |
| MB concentration: | 0.485 |
| M/B 2 Sigma CSU: | 0.354 |
| MB MDC: | 0.685 |
| MB Numerical Performance Indicator: | 2.68 |
| MB Status vs Numerical Indicator: | Warning |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS66557 | LCSD66557 |
| Count Date: | 5/19/2022 | |
| Spike I.D.: | 22-016 | |
| Decay Corrected Spike Concentration (pCi/mL): | 35.694 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.806 | |
| Target Conc. (pCi/L, g, F): | 4.429 | |
| Uncertainty (Calculated): | 0.217 | |
| Result (pCi/L, g, F): | 5.201 | |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 1.162 | |
| Numerical Performance Indicator: | 1.28 | |
| Percent Recovery: | 117.43% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 60% | |

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

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 4/29/2022 | 5/3/2022 |
| Sample I.D. | 60399072004 | 60399336001 |
| Sample MS I.D. | 60399072005 | 60399336002 |
| Sample MSD I.D. | 60399072006 | 60399336003 |
| Spike I.D.: | 22-016 | 22-016 |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 35.931 | 35.931 |
| Spike Volume Used in MS (mL): | 0.20 | 0.20 |
| Spike Volume Used in MSD (mL): | 0.20 | 0.20 |
| MS Aliquot (L, g, F): | 0.804 | 0.801 |
| MS Target Conc.(pCi/L, g, F): | 8.944 | 8.968 |
| MSD Aliquot (L, g, F): | 0.812 | 0.822 |
| MSD Target Conc. (pCi/L, g, F): | 8.853 | 8.747 |
| MS Spike Uncertainty (calculated): | 0.438 | 0.439 |
| MSD Spike Uncertainty (calculated): | 0.434 | 0.429 |
| Sample Result: | 0.837 | 0.089 |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.421 | 0.321 |
| Sample Matrix Spike Result: | 10.464 | 9.742 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.070 | 1.956 |
| Sample Matrix Spike Duplicate Result: | 11.327 | 10.269 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.257 | 2.057 |
| MS Numerical Performance Indicator: | 0.621 | 0.661 |
| MSD Numerical Performance Indicator: | 1.374 | 1.321 |
| MS Percent Recovery: | 107.64% | 107.63% |
| MSD Percent Recovery: | 118.49% | 116.38% |
| MS Status vs Numerical Indicator: | Pass | Pass |
| MSD Status vs Numerical Indicator: | Pass | Pass |
| MS Status vs Recovery: | Pass | Pass |
| MSD Status vs Recovery: | Pass | Pass |
| MS/MSD Upper % Recovery Limits: | 135% | 135% |
| MS/MSD Lower % Recovery Limits: | 60% | 60% |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | 60399072004 | 60399336001 |
| Sample MS I.D. | 60399072005 | 60399336002 |
| Sample MSD I.D. | 60399072006 | 60399336003 |
| Sample Matrix Spike Result: | 10.464 | 9.742 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.070 | 1.956 |
| Sample Matrix Spike Duplicate Result: | 11.327 | 10.269 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.257 | 2.057 |
| Duplicate Numerical Performance Indicator: | -0.553 | -0.364 |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 9.60% | 7.81% |
| MS/ MSD Duplicate Status vs Numerical Indicator: | Pass | Pass |
| MS/ MSD Duplicate Status vs RPD: | Pass | Pass |
| % RPD Limit: | 36% | 36% |

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

**Comments:**

5/26/22

05/26/22

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-228 |
| Analyst: | JSM |
| Date: | 5/11/2022 |
| Worklist: | 66557 |
| Matrix: | WI |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2432553 |
| MB concentration: | 0.485 |
| M/B 2 Sigma CSU: | 0.354 |
| MB MDC: | 0.685 |
| MB Numerical Performance Indicator: | 2.68 |
| MB Status vs Numerical Indicator: | Warning |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS66557 | LCSD66557 |
| Count Date: | 5/19/2022 | |
| Spike I.D.: | 22-016 | |
| Decay Corrected Spike Concentration (pCi/mL): | 35.694 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.806 | |
| Target Conc. (pCi/L, g, F): | 4.429 | |
| Uncertainty (Calculated): | 0.217 | |
| Result (pCi/L, g, F): | 5.201 | |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 1.162 | |
| Numerical Performance Indicator: | 1.28 | |
| Percent Recovery: | 117.43% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 60% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 4/29/2022 | 4/29/2022 |
| Sample I.D. | 60399072004 | 60399105003 |
| Sample MS I.D. | 60399072005 | 60399105004 |
| Sample MSD I.D. | 60399072006 | 60399105005 |
| Spike I.D.: | 22-016 | 22-016 |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 35.931 | 35.931 |
| Spike Volume Used in MS (mL): | 0.20 | 0.20 |
| Spike Volume Used in MSD (mL): | 0.20 | 0.20 |
| MS Aliquot (L, g, F): | 0.804 | 0.813 |
| MS Target Conc.(pCi/L, g, F): | 8.944 | 8.837 |
| MSD Aliquot (L, g, F): | 0.812 | 0.801 |
| MSD Target Conc. (pCi/L, g, F): | 8.853 | 8.973 |
| MS Spike Uncertainty (calculated): | 0.438 | 0.433 |
| MSD Spike Uncertainty (calculated): | 0.434 | 0.440 |
| Sample Result: | 0.837 | 0.718 |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.421 | 0.370 |
| Sample Matrix Spike Result: | 10.464 | 9.496 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.070 | 1.902 |
| Sample Matrix Spike Duplicate Result: | 11.327 | 9.282 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.257 | 1.862 |
| MS Numerical Performance Indicator: | 0.621 | -0.057 |
| MSD Numerical Performance Indicator: | 1.374 | -0.411 |
| MS Percent Recovery: | 107.64% | 99.34% |
| MSD Percent Recovery: | 118.49% | 95.45% |
| MS Status vs Numerical Indicator: | Pass | Pass |
| MSD Status vs Numerical Indicator: | Pass | Pass |
| MS Status vs Recovery: | Pass | Pass |
| MSD Status vs Recovery: | Pass | Pass |
| MS/MSD Upper % Recovery Limits: | 135% | 135% |
| MS/MSD Lower % Recovery Limits: | 60% | 60% |

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

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | 60399072004 | 60399105003 |
| Sample MS I.D. | 60399072005 | 60399105004 |
| Sample MSD I.D. | 60399072006 | 60399105005 |
| Sample Matrix Spike Result: | 10.464 | 9.496 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.070 | 1.902 |
| Sample Matrix Spike Duplicate Result: | 11.327 | 9.282 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.257 | 1.862 |
| Duplicate Numerical Performance Indicator: | -0.553 | 0.158 |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 9.60% | 4.00% |
| MS/ MSD Duplicate Status vs Numerical Indicator: | Pass | Pass |
| MS/ MSD Duplicate Status vs RPD: | Pass | Pass |
| % RPD Limit: | 36% | 36% |

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

**Comments:** 5/26/22

5/26/22

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60399105**
Sampling Event: April 29, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: July 13, 2022
Peer Reviewer: Katie Abbott — Date Completed: July 18, 2022

This report contains the final results of the data validation conducted for the water samples collected April 29th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | X | | |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• The agreement between parent sample results and laboratory duplicate sample results were evaluated. The duplicate error ratios (DER) met the criterion of a DER ≤2. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>Parent Sample: ASH-03-CCR; Field Duplicate: DUP-01-CCR | X | | |

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td></td><td>• The agreement between parent sample results and field duplicate sample results were evaluated. The DER met the criterion of a DER ≤2.</td><td></td><td></td><td></td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.</td><td>X</td><td></td><td></td></tr>
<tr><td>Detection Limits Mets</td><td>For radiochemical results 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.
<table>
<tr><th>Sample</th><th>Analyte</th><th>Result (pCi/L)</th><th>2 Sigma (σ) Uncertainty</th><th>MDC (pCi/L)</th></tr>
<tr><td>ASH-02-CCR</td><td>Radium-226</td><td>0.208</td><td>± 0.217</td><td>0.306</td></tr>
</table>
± – Plus or Minus<br>pCi/L – Picocuries Per Liter<br>MDC – Minimum Detectable Concentration<br>Ra – Radium</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Tracer and/or Carrier Recovery</td><td>The sample specific recoveries were within the laboratory limits.</td><td>X</td><td></td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – Samples were received intact; however, no cooler temperature was recorded upon receipt at the laboratory. Due to the stability of the radiological parameters, data qualification on the basis of temperature exceedance is not considered necessary.<br><br>2 – For the radium-226 result for sample ASH-02-CCR, the 2 sigma (σ) uncertainty multiplied by 1.65 was greater than the reported minimum detectable concentration (MDC) and was qualified as estimated (J v) indicating the detection limit criteria was not met.</td></tr>
</table>

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
± – Plus or Minus/High or Low Bias
σ – Sigma (Uncertainty)
pCi/L – Picocuries Per Liter
% – Percent
DER – Duplicate Error Ratio
J – Estimated
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MB – Method Blank
MDC – Minimum Detectable Concentration
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
Ra – Radium
RPD – Relative Percent Difference
v – Compound Identification Issue

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June 09, 2022

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

RE: Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on May 03, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Greensburg

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

**Pace Analytical Services Pennsylvania**
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
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 #: PA014572018-1
New Hampshire/TNI Certification #: 297617
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 #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
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
Wyoming Certification #: 8TMS-L



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## SAMPLE SUMMARY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60399207001** | **ASH-07-CCR** | Water | 05/02/22 09:15 | 05/03/22 10:00 |
| **60399207002** | **ASH-04-CCR** | Water | 05/02/22 10:30 | 05/03/22 10:00 |
| **60399207003** | **ASH-05-CCR** | Water | 05/02/22 11:30 | 05/03/22 10:00 |
| **60399207004** | **ASH-08-CCR** | Water | 05/02/22 13:30 | 05/03/22 10:00 |
| **60399207005** | **ERB-02-CCR** | Water | 05/02/22 15:30 | 05/03/22 10:00 |

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60399207001** | **ASH-07-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60399207002** | **ASH-04-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60399207003** | **ASH-05-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60399207004** | **ASH-08-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60399207005** | **ERB-02-CCR** | EPA 903.1 | RPS | 1 | PASI-PA |
| | | EPA 904.0 | JSM | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |

PASI-PA = Pace Analytical Services - Greensburg



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

**Sample: ASH-07-CCR** **Lab ID: 60399207001** Collected: 05/02/22 09:15 Received: 05/03/22 10:00 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.382 ± 0.388 (0.588) C:NA T:101%** | pCi/L | 05/26/22 16:45 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.865 ± 0.446 (0.778) C:76% T:82%** | pCi/L | 05/25/22 11:46 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.25 ± 0.834 (1.37)** | pCi/L | 06/09/22 15:48 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

**Sample: ASH-04-CCR** **Lab ID: 60399207002** Collected: 05/02/22 10:30 Received: 05/03/22 10:00 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.646 ± 0.373 (0.146) C:NA T:93%** | pCi/L | 05/26/22 16:45 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.810 ± 0.401 (0.696) C:77% T:87%** | pCi/L | 05/25/22 11:47 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.46 ± 0.774 (0.842)** | pCi/L | 06/09/22 15:48 | 7440-14-4 | |

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

**Sample: ASH-05-CCR** **Lab ID: 60399207003** Collected: 05/02/22 11:30 Received: 05/03/22 10:00 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.570 ± 0.329 (0.129) C:NA T:102%** | pCi/L | 05/26/22 16:45 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.391 ± 0.362 (0.737) C:74% T:89%** | pCi/L | 05/25/22 11:47 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.961 ± 0.691 (0.866)** | pCi/L | 06/09/22 15:48 | 7440-14-4 | |

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

**Sample: ASH-08-CCR** **Lab ID: 60399207004** Collected: 05/02/22 13:30 Received: 05/03/22 10:00 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **-0.168 ± 0.290 (0.732) C:NA T:94%** | pCi/L | 05/26/22 16:45 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.360 ± 0.343 (0.702) C:82% T:84%** | pCi/L | 05/25/22 11:48 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.360 ± 0.633 (1.43)** | pCi/L | 06/09/22 15:48 | 7440-14-4 | |

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

**Sample: ERB-02-CCR** **Lab ID: 60399207005** Collected: 05/02/22 15:30 Received: 05/03/22 10:00 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.0979 ± 0.224 (0.360) C:NA T:98%** | pCi/L | 05/26/22 16:45 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.548 ± 0.359 (0.679) C:77% T:88%** | pCi/L | 05/25/22 11:48 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.646 ± 0.583 (1.04)** | pCi/L | 06/09/22 15:48 | 7440-14-4 | |

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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

QC Batch: 502461 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60399207001, 60399207002, 60399207003, 60399207004, 60399207005

METHOD BLANK: 2432596 Matrix: Water
Associated Lab Samples: 60399207001, 60399207002, 60399207003, 60399207004, 60399207005

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-228 | 0.295 ± 0.284 (0.578) C:85% T:86% | pCi/L | 05/25/22 11:48 | |

**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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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

QC Batch: 502460 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60399207001, 60399207002, 60399207003, 60399207004, 60399207005

METHOD BLANK: 2432594 Matrix: Water
Associated Lab Samples: 60399207001, 60399207002, 60399207003, 60399207004, 60399207005

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-226 | 0.000 ± 0.247 (0.535) C:NA T:97% | pCi/L | 05/26/22 16:13 | |

**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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# QUALIFIERS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

**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.



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

## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399207

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60399207001** | **ASH-07-CCR** | EPA 903.1 | 502460 | | |
| **60399207002** | **ASH-04-CCR** | EPA 903.1 | 502460 | | |
| **60399207003** | **ASH-05-CCR** | EPA 903.1 | 502460 | | |
| **60399207004** | **ASH-08-CCR** | EPA 903.1 | 502460 | | |
| **60399207005** | **ERB-02-CCR** | EPA 903.1 | 502460 | | |
| **60399207001** | **ASH-07-CCR** | EPA 904.0 | 502461 | | |
| **60399207002** | **ASH-04-CCR** | EPA 904.0 | 502461 | | |
| **60399207003** | **ASH-05-CCR** | EPA 904.0 | 502461 | | |
| **60399207004** | **ASH-08-CCR** | EPA 904.0 | 502461 | | |
| **60399207005** | **ERB-02-CCR** | EPA 904.0 | 502461 | | |
| **60399207001** | **ASH-07-CCR** | Total Radium Calculation | 510603 | | |
| **60399207002** | **ASH-04-CCR** | Total Radium Calculation | 510603 | | |
| **60399207003** | **ASH-05-CCR** | Total Radium Calculation | 510603 | | |
| **60399207004** | **ASH-08-CCR** | Total Radium Calculation | 510603 | | |
| **60399207005** | **ERB-02-CCR** | Total Radium Calculation | 510603 | | |



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# Internal Transfer Chain of Custody

Pace Analytical®
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☐ Samples Pre-Logged into eCOC.

State Of Origin: CO
Cert. Needed: [X] Yes ☐ No
Owner Received Date: 5/3/2022 Results Requested By: 5/24/2022

**Workorder:** 60399207 **Workorder Name:** 60659991 PRPA CCR

**Report To**

Heather Wilson
Pace Analytical Kansas
9608 Loiret Blvd.
Lenexa, KS 66219
Phone 1(913)563-1407

**Subcontract To**

Pace Analytical Pittsburgh
1638 Roseytown Road
Suites 2,3, & 4
Greensburg, PA 15601
Phone (724)850-5600

**Requested Analysis**

WO# : 30486144
30486144

| Item | Sample ID | Sample Type | Collect Date/Time | Lab ID | Matrix | Preserved Containers: Other | Total Radium-226 & Total Sum Radium | Total Radium-228 | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-07-CCR | PS | 5/2/2022 09:15 | 60399207001 | Water | 1 | X | X | 001 |
| 2 | ASH-04-CCR | PS | 5/2/2022 10:30 | 60399207002 | Water | 1 | X | X | 002 |
| 3 | ASH-05-CCR | PS | 5/2/2022 11:30 | 60399207003 | Water | 1 | X | X | 003 |
| 4 | ASH-08-CCR | PS | 5/2/2022 13:30 | 60399207004 | Water | 1 | X | X | 004 |
| 5 | ERB-02-CCR | PS | 5/2/2022 13:30 | 60399207005 | Water | 1 | X | X | 005 |

| Transfers | Released By | Date/Time | Received By | Date/Time |
|---|---|---|---|---|
| 1 | | | [signature] | 5322 |
| 2 | | | | |
| 3 | | | | |

**Comments**

IR30- Radium QC Sheets Required
10:00

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

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

CCR
PA

# CHAIN-OF-CUSTODY / Analytical Request Document

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

Pace Analytical
www.pacelabs.com



**Section A** Required Client Information:

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

**Section B** Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** Invoice Information:

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

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** Required Client Information

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

Valid Matrix Codes

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

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N: Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-07-CCR | WT | G | — | | 5.2.22 | 0915 | | 2 | | | 2 | | | | | | ✓ | ✓ | ✓ | N | |
| 2 | ASH-04-CCR | WT | G | — | | 5.2.22 | 1030 | | 2 | | | 2 | | | | | | ✓ | ✓ | ✓ | N | |
| 3 | ASH-05-CCR | WT | G | — | | 5.2.22 | 1130 | | 2 | | | 2 | | | | | | ✓ | ✓ | ✓ | N | |
| 4 | ASH-08-CCR | WT | G | — | | 5.2.22 | 1330 | | 2 | | | 2 | | | | | | ✓ | ✓ | ✓ | N | |
| 5 | ERB-02-CCR | WT | G | — | | 5.2.22 | 1530 | | 2 | | | 2 | | | | | | ✓ | ✓ | ✓ | N | |
| 6 | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | |

**WO#: 30486144**
**PM: CF1 Due Date: 05/24/22**
**CLIENT: PACE_60_LEKS**

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Jack Levy AECOM | 5-2-22 | 1700 | | 5-3-22 | 10:00 | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Jack Levy

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY): 05/02/22

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

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

# Pittsburgh Lab Sample Condition Upon Receipt

Pace Analytical

Client Name: Pace Kansas  Project # _____

Label 2a
LIMS Login VPInc

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 5645 8493 3111

Custody Seal on Cooler/Box Present: ☑ yes ☐ no  Seals intact: ☑ yes ☐ no

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

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

Temp should be above freezing to 6°C

pH paper Lot# 10D2811  Date and Initials of person examining contents: 5-4-22 2a

| Comments: | Yes | No | N/A | |
|---|---|---|---|---|
| Chain of Custody Present: | ✓ | | | 1. |
| Chain of Custody Filled Out: | ✓ | | | 2. |
| Chain of Custody Relinquished: | | ✓ | | 3. |
| Sampler Name & Signature on COC: | | ✓ | | 4. |
| Sample Labels match COC: | | ✓ | | 5. Time on 005-15:30 |
| -Includes date/time/ID  Matrix: WT | | | | |
| Samples Arrived within Hold Time: | ✓ | | | 6. |
| **Short Hold Time Analysis (<72hr remaining):** | | ✓ | | 7. |
| **Rush Turn Around Time Requested:** | | ✓ | | 8. |
| Sufficient Volume: | ✓ | | | 9. |
| Correct Containers Used: | ✓ | | | 10. |
| -Pace Containers Used: | ✓ | | | |
| Containers Intact: | ✓ | | | 11. |
| Orthophosphate field filtered | | | ✓ | 12. |
| Hex Cr Aqueous sample field filtered | | | ✓ | 13. |
| Organic Samples checked for dechlorination: | | | ✓ | 14. |
| Filtered volume received for Dissolved tests | | | ✓ | 15. |
| **All containers have been checked for preservation.** exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix | ✓ | | | 16. pH<2 |
| All containers meet method preservation requirements. | ✓ | | | Initial when completed 2a  Date/time of preservation |
| | | | | Lot # of added preservative |
| Headspace in VOA Vials ( >6mm): | | | ✓ | 17. |
| Trip Blank Present: | | | ✓ | 18. |
| Trip Blank Custody Seals Present | | | ✓ | |
| **Rad Samples Screened < 0.5 mrem/hr** | ✓ | | | Initial when completed: 2a  Date: 5-4-22  Survey Meter SN: 1563 |

**Client Notification/ Resolution:**

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ **A check in this box indicates that additional information has been stored in ereports.**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office ( i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

WO#: 30486144
PM: CF1  Due Date: 05/24/22
CLIENT: PACE_60_LEKS

# Pace Greensburg Lab -Sample Container Count

Pace Analytical®

ient Pace Kansas

te 60399207 | AECOM Greenwood Village, Colorado

Profile Number 3605

Notes

| ampie Line tem | Matrix | AG1H | AG1S | AG1T | AG2U | AG3S | AG3U | AG5U | AG5T | BG1U | BG2U | BP1N | BP1U | BP2S | BP2U | BP3C | BP3N | BP3S | BP3U | DG9S | GCUB | VG9H | VG9T | VG9U | VOAK | WGFU | WGKU | ZPLC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | WT | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 2 | WT | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 3 | WT | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 4 | WT | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 5 | WT | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**WO# : 30486144**

PM: CF1 Due Date: 05/24/22

CLIENT: PACE_60_LEKS

ontainer Codes

## Glass

| | | | |
|---|---|---|---|
| JN | 1 Gallon Jug with HNO3 | DG9S | 40mL amber VOA vial H2SO4 |
| G5U | 100mL amber glass unprserved | VG9U | 40mL clear VOA vial |
| G5T | 100mL amber glass Na Thiosulfate | VG9T | 40mL clear VOA vial Na Thiosul |
| JN | 1 Gallon Jug | VG9H | 40mL clear VOA vial HCl |
| G1S | 1L amber glass H2SO4 | JGFU | 4oz amber wide jar |
| G1H | 1L amber glass HCl | WGFU | 4oz wide jar unpreserved |
| G1T | 1L amber glass Na Thiosulfate | BG2U | 500mL clear glass unpreserved |
| G1U | 1L clear glass unpreserved | AG2U | 500mL amber glass unpreserve |
| G3S | 250mL amber glass H2SO4 | WGKU | 8oz wide jar unpreserved |
| G3U | 250mL amber glass unpreserved | | |

## Plastic / Misc.

| | |
|---|---|
| GCUB | 1 Gallon Cubitainer |
| 12GN | 1/2 Gallon Cubitainer |
| SP5T | 120mL Coliform Na Thiosulfate |
| BP1N | 1L plastic HNO3 |
| BP1U | 1L plastic unpreserved |
| BP3S | 250mL plastic H2SO4 |
| BP3N | 250mL plastic HNO3 |
| BP3U | 250mL plastic unpreserved |
| BP3C | 250ml plastic NAOH |
| BP2S | 500mL plastic H2SO4 |
| BP2U | 500mL plastic unpreserved |

| | |
|---|---|
| EZI | 5g Encore |
| VOAK | Kit for Volatile Solid |
| I | Wipe/Swab |
| ZPLC | Ziploc Bag |

| | |
|---|---|
| WT | Water |
| SL | Solid |
| OL | Non-aqueous liquid |
| WP | Wipe |

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | RPS |
| Date: | 5/11/2022 |
| Batch ID: | 66560 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2432594 |
| MB concentration: | 0.000 |
| M/B Counting Uncertainty: | 0.247 |
| MB MDC: | 0.535 |
| MB Numerical Performance Indicator: | 0.00 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS66560 | LCSD66560 |
| Count Date: | 5/26/2022 | |
| Spike I.D.: | 21-040 | |
| Spike Concentration (pCi/mL): | 32.431 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.667 | |
| Target Conc. (pCi/L, g, F): | 4.865 | |
| Uncertainty (Calculated): | 0.229 | |
| Result (pCi/L, g, F): | 5.041 | |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 0.969 | |
| Numerical Performance Indicator: | 0.35 | |
| Percent Recovery: | 103.63% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 73% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 4/27/2022 | |
| Sample I.D. | 30485217002 | |
| Sample MS I.D. | 30485217002MS | |
| Sample MSD I.D. | | |
| Spike I.D.: | 21-040 | |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 32.432 | |
| Spike Volume Used in MS (mL): | 0.20 | |
| Spike Volume Used in MSD (mL): | | |
| MS Aliquot (L, g, F): | 0.501 | |
| MS Target Conc.(pCi/L, g, F): | 12.945 | |
| MSD Aliquot (L, g, F): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | 0.608 | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | 1.407 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.623 | |
| Sample Matrix Spike Result: | 10.112 | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.538 | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| MS Numerical Performance Indicator: | -4.702 | |
| MSD Numerical Performance Indicator: | | |
| MS Percent Recovery: | 67.24% | |
| MSD Percent Recovery: | | |
| MS Status vs Numerical Indicator: | N/A | |
| MSD Status vs Numerical Indicator: | | |
| MS Status vs Recovery: | MS Low**** | |
| MSD Status vs Recovery: | | |
| MS/MSD Upper % Recovery Limits: | 136% | |
| MS/MSD Lower % Recovery Limits: | 71% | |

| Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D.: | 30485217001 | Enter Duplicate sample IDs if other than LCS/LCSD in the space below. |
| Duplicate Sample I.D. | 30485217001DUP | |
| Sample Result (pCi/L, g, F): | 2.915 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.820 | |
| Sample Duplicate Result (pCi/L, g, F): | 2.934 | |
| Sample Duplicate Result Counting Uncertainty (pCi/L, g, F): | 0.829 | |
| Are sample and/or duplicate results below RL? | See Below ## | |
| Duplicate Numerical Performance Indicator: | -0.032 | 30485217001 |
| Duplicate RPD: | 0.64% | 30485217001DUP |
| Duplicate Status vs Numerical Indicator: | N/A | |
| Duplicate Status vs RPD: | Pass | |
| % RPD Limit: | 32% | |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

Q5R7122

****If all other QC criteria pass, the batch is reportable. The matrix spike result indicates a possible bias for this sample only and may not be applicable to any other samples in this analytical batch. Reprep the sampl

RPS 5/26/2022

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-228 |
| Analyst: | JSM |
| Date: | 5/11/2022 |
| Worklist: | 66561 |
| Matrix: | W I |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2432596 |
| MB concentration: | 0.295 |
| M/B 2 Sigma CSU: | 0.284 |
| MB MDC: | 0.578 |
| MB Numerical Performance Indicator: | 2.04 |
| MB Status vs Numerical Indicator: | Warning |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS66561 | LCSD66561 |
| Count Date: | 5/25/2022 | |
| Spike I.D.: | 22-016 | |
| Decay Corrected Spike Concentration (pCi/mL): | 35.626 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.811 | |
| Target Conc. (pCi/L, g, F): | 4.390 | |
| Uncertainty (Calculated): | 0.215 | |
| Result (pCi/L, g, F): | 4.340 | |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 1.011 | |
| Numerical Performance Indicator: | -0.09 | |
| Percent Recovery: | 98.86% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 60% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 4/25/2022 | |
| Sample I.D. | 30485217004 | |
| Sample MS I.D. | 30485217004MS | |
| Sample MSD I.D. | | |
| Spike I.D.: | 22-016 | |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 35.978 | |
| Spike Volume Used in MS (mL): | 0.20 | |
| Spike Volume Used in MSD (mL): | | |
| MS Aliquot (L, g, F): | 0.800 | |
| MS Target Conc.(pCi/L, g, F): | 8.990 | |
| MSD Aliquot (L, g, F): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | 0.440 | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | 1.142 | |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.447 | |
| Sample Matrix Spike Result: | 9.723 | |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 1.938 | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | | |
| MS Numerical Performance Indicator: | -0.393 | |
| MSD Numerical Performance Indicator: | | |
| MS Percent Recovery: | 95.46% | |
| MSD Percent Recovery: | | |
| MS Status vs Numerical Indicator: | Pass | |
| MSD Status vs Numerical Indicator: | | |
| MS Status vs Recovery: | Pass | |
| MSD Status vs Recovery: | | |
| MS/MSD Upper % Recovery Limits: | 135% | |
| MS/MSD Lower % Recovery Limits: | 60% | |

| Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D.: | 30485217003 | Enter Duplicate |
| Duplicate Sample I.D. | 30485217003DUP | sample IDs if |
| Sample Result (pCi/L, g, F): | 0.554 | other than |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.312 | LCS/LCSD in |
| Sample Duplicate Result (pCi/L, g, F): | 1.030 | the space below. |
| Sample Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 0.417 | |
| Are sample and/or duplicate results below RL? | See Below ## | |
| Duplicate Numerical Performance Indicator: | -1.791 | 30485217003 |
| Duplicate RPD: | 60.08% | 30485217003DUP |
| Duplicate Status vs Numerical Indicator: | Pass | |
| Duplicate Status vs RPD: | Fail*** | |
| % RPD Limit: | 36% | |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

MU 6/11/22

MU 6/10/22

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60399207**
Sampling Event: May 2, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: July 13, 2022
Peer Reviewer: Katie Abbott — Date Completed: July 18, 2022

This report contains the final results of the data validation conducted for the water samples collected May 2nd, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• The agreement between parent sample results and laboratory duplicate sample results were evaluated. The duplicate error ratios (DER) met the criterion of a DER ≤2. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>• The agreement between parent sample results and field duplicate sample results were evaluated. The DER met the criterion of a DER ≤2. | | | X |

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.</td><td>X</td><td></td><td></td></tr>
<tr><td>Detection Limits Mets</td><td>For radiochemical results 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.
<table>
<tr><th>Sample</th><th>Analyte</th><th>Result (pCi/L)</th><th>2 Sigma (σ) Uncertainty</th><th>MDC (pCi/L)</th></tr>
<tr><td>ASH-07-CCR</td><td>Radium-226</td><td>0.382</td><td>± 0.388</td><td>0.588</td></tr>
<tr><td>ERB-02-CCR</td><td>Radium-226</td><td>0.0979</td><td>± 0.224</td><td>0.360</td></tr>
</table>
± – Plus or Minus pCi/L – Picocuries Per Liter<br>MDC – Minimum Detectable Concentration Ra – Radium</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Tracer and/or Carrier Recovery</td><td>The sample specific recoveries were within the laboratory limits.</td><td>X</td><td></td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – Samples were received intact; however, no cooler temperature was recorded upon receipt at the laboratory. Due to the stability of the radiological parameters, data qualification on the basis of temperature exceedance is not considered necessary.<br><br>2 – The associated results where the 2 sigma (σ) uncertainty multiplied by 1.65 was greater than the reported minimum detectable concentration (MDC) were qualified as estimated (J v) indicating the detection limit criteria was not met.</td></tr>
</table>

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
± – Plus or Minus/High or Low Bias
σ – Sigma (Uncertainty)
pCi/L – Picocuries Per Liter
% – Percent
DER – Duplicate Error Ratio
J – Estimated
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MB – Method Blank
MDC – Minimum Detectable Concentration
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
Ra – Radium
RPD – Relative Percent Difference
v – Compound Identification Issue

**Pace Analytical Services, LLC**
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June 03, 2022

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

RE: Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on May 03, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Kansas City

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

**Pace Analytical Services Kansas**
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 20-020-0
Arkansas Drinking Water
Illinois Certification #: 2000302021-3
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-21-15
Utah Certification #: KS000212019-9
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070



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## SAMPLE SUMMARY

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60399256001** | **ASH-07-CCR** | Water | 05/02/22 09:15 | 05/03/22 08:40 |
| **60399256002** | **ASH-04-CCR** | Water | 05/02/22 10:30 | 05/03/22 08:40 |
| **60399256003** | **ASH-05-CCR** | Water | 05/02/22 11:30 | 05/03/22 08:40 |
| **60399256004** | **ASH-08-CCR** | Water | 05/02/22 13:30 | 05/03/22 08:40 |
| **60399256005** | **ERB-02-CCR** | Water | 05/02/22 15:30 | 05/03/22 08:40 |



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## SAMPLE ANALYTE COUNT

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60399256001** | **ASH-07-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | JLH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | CRN2, KB | 3 | PASI-K |
| **60399256002** | **ASH-04-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | JLH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | KB | 3 | PASI-K |
| **60399256003** | **ASH-05-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | JLH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | KB | 3 | PASI-K |
| **60399256004** | **ASH-08-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | JLH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | KB | 3 | PASI-K |
| **60399256005** | **ERB-02-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | JLH | 1 | PASI-K |
| | | SM 2540C | SK | 1 | PASI-K |
| | | EPA 9056 | KB | 3 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City



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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

**Sample: ASH-07-CCR** **Lab ID: 60399256001** Collected: 05/02/22 09:15 Received: 05/03/22 08:40 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **786** | ug/L | 100 | 1 | 05/04/22 09:02 | 05/06/22 13:33 | 7440-42-8 | |
| Calcium | **426000** | ug/L | 200 | 1 | 05/04/22 09:02 | 05/06/22 13:33 | 7440-70-2 | |
| Lithium | **541** | ug/L | 10.0 | 1 | 05/04/22 09:02 | 05/06/22 13:33 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:12 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:07 | 7440-38-2 | |
| Barium | **14.7** | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:12 | 7440-39-3 | D3 |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:07 | 7440-41-7 | |
| Cadmium | ND | ug/L | 2.5 | 5 | 05/04/22 09:02 | 05/20/22 15:12 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:07 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:07 | 7440-48-4 | |
| Lead | ND | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:12 | 7439-92-1 | D3 |
| Molybdenum | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:07 | 7439-98-7 | |
| Selenium | **164** | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:07 | 7782-49-2 | |
| Thallium | ND | ug/L | 10.0 | 10 | 05/04/22 09:02 | 05/23/22 17:03 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 05/23/22 16:33 | 05/24/22 12:43 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **6660** | mg/L | 200 | 1 | | 05/06/22 12:56 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **2230** | mg/L | 1000 | 1000 | | 05/13/22 01:48 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/13/22 01:20 | 16984-48-8 | |
| Sulfate | **5200** | mg/L | 5000 | 5000 | | 05/13/22 18:03 | 14808-79-8 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

**Sample: ASH-04-CCR** **Lab ID: 60399256002** Collected: 05/02/22 10:30 Received: 05/03/22 08:40 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **606** | ug/L | 100 | 1 | 05/04/22 09:02 | 05/06/22 13:35 | 7440-42-8 | |
| Calcium | **454000** | ug/L | 200 | 1 | 05/04/22 09:02 | 05/06/22 13:35 | 7440-70-2 | |
| Lithium | **376** | ug/L | 10.0 | 1 | 05/04/22 09:02 | 05/06/22 13:35 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:23 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:15 | 7440-38-2 | |
| Barium | **15.1** | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:23 | 7440-39-3 | D3 |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:15 | 7440-41-7 | |
| Cadmium | ND | ug/L | 2.5 | 5 | 05/04/22 09:02 | 05/20/22 15:23 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:15 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:15 | 7440-48-4 | |
| Lead | ND | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:23 | 7439-92-1 | D3 |
| Molybdenum | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:15 | 7439-98-7 | |
| Selenium | **119** | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:15 | 7782-49-2 | |
| Thallium | ND | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:23 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 05/23/22 16:33 | 05/24/22 12:45 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **5760** | mg/L | 143 | 1 | | 05/06/22 12:56 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **186** | mg/L | 50.0 | 50 | | 05/17/22 17:01 | 16887-00-6 | |
| Fluoride | **0.35** | mg/L | 0.20 | 1 | | 05/17/22 16:47 | 16984-48-8 | |
| Sulfate | **3360** | mg/L | 500 | 500 | | 05/18/22 15:53 | 14808-79-8 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

**Sample: ASH-05-CCR** **Lab ID: 60399256003** Collected: 05/02/22 11:30 Received: 05/03/22 08:40 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **873** | ug/L | 100 | 1 | 05/04/22 09:02 | 05/06/22 13:37 | 7440-42-8 | |
| Calcium | **507000** | ug/L | 200 | 1 | 05/04/22 09:02 | 05/06/22 13:37 | 7440-70-2 | |
| Lithium | **323** | ug/L | 10.0 | 1 | 05/04/22 09:02 | 05/06/22 13:37 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7440-38-2 | |
| Barium | **15.5** | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7440-43-9 | |
| Chromium | **1.4** | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7440-48-4 | |
| Lead | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7439-98-7 | |
| Selenium | **25.6** | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:27 | 7782-49-2 | |
| Thallium | ND | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:31 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 05/23/22 16:33 | 05/24/22 12:52 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **4500** | mg/L | 143 | 1 | | 05/06/22 12:56 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **234** | mg/L | 50.0 | 50 | | 05/17/22 17:43 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/17/22 17:29 | 16984-48-8 | |
| Sulfate | **2630** | mg/L | 400 | 400 | | 05/18/22 16:07 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

**Sample: ASH-08-CCR** **Lab ID: 60399256004** Collected: 05/02/22 13:30 Received: 05/03/22 08:40 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **904** | ug/L | 100 | 1 | 05/04/22 09:02 | 05/06/22 13:39 | 7440-42-8 | |
| Calcium | **447000** | ug/L | 200 | 1 | 05/04/22 09:02 | 05/06/22 13:39 | 7440-70-2 | |
| Lithium | **314** | ug/L | 10.0 | 1 | 05/04/22 09:02 | 05/06/22 13:39 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7440-38-2 | |
| Barium | **12.9** | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7440-43-9 | |
| Chromium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7440-48-4 | |
| Lead | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7439-98-7 | |
| Selenium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:35 | 7782-49-2 | |
| Thallium | ND | ug/L | 5.0 | 5 | 05/04/22 09:02 | 05/20/22 15:43 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 05/23/22 16:33 | 05/24/22 12:54 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **4460** | mg/L | 125 | 1 | | 05/06/22 12:56 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **26.3** | mg/L | 5.0 | 5 | | 05/23/22 12:47 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/17/22 18:10 | 16984-48-8 | |
| Sulfate | **2620** | mg/L | 400 | 400 | | 05/18/22 16:22 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

**Sample: ERB-02-CCR** **Lab ID: 60399256005** Collected: 05/02/22 15:30 Received: 05/03/22 08:40 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | ND | ug/L | 100 | 1 | 05/04/22 09:02 | 05/06/22 13:41 | 7440-42-8 | |
| Calcium | ND | ug/L | 200 | 1 | 05/04/22 09:02 | 05/06/22 13:41 | 7440-70-2 | |
| Lithium | ND | ug/L | 10.0 | 1 | 05/04/22 09:02 | 05/06/22 13:41 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-38-2 | |
| Barium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-43-9 | |
| Chromium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-48-4 | |
| Lead | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7439-98-7 | |
| Selenium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7782-49-2 | |
| Thallium | ND | ug/L | 1.0 | 1 | 05/04/22 09:02 | 05/20/22 15:46 | 7440-28-0 | |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 05/23/22 16:33 | 05/24/22 12:56 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | ND | mg/L | 5.0 | 1 | | 05/06/22 12:57 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | ND | mg/L | 1.0 | 1 | | 05/17/22 18:38 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 05/17/22 18:38 | 16984-48-8 | |
| Sulfate | ND | mg/L | 1.0 | 1 | | 05/18/22 16:36 | 14808-79-8 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

QC Batch: 788306 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

METHOD BLANK: 3142354 Matrix: Water
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 05/24/22 12:24 | |

LABORATORY CONTROL SAMPLE: 3142355

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Mercury | ug/L | 5 | 4.6 | 93 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3142356 3142357

| Parameter | Units | 60399270003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | <0.12 | 5 | 5 | 4.4 | 4.5 | 88 | 89 | 75-125 | 2 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

QC Batch: 784854
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

METHOD BLANK: 3129168 Matrix: Water
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Boron | ug/L | ND | 100 | 05/06/22 13:04 | |
| Calcium | ug/L | ND | 200 | 05/06/22 13:04 | |
| Lithium | ug/L | ND | 10.0 | 05/06/22 13:04 | |

LABORATORY CONTROL SAMPLE: 3129169

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Boron | ug/L | 1000 | 969 | 97 | 80-120 | |
| Calcium | ug/L | 10000 | 10200 | 102 | 80-120 | |
| Lithium | ug/L | 1000 | 1010 | 101 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3129170 3129171

| Parameter | Units | 60399275002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | ND | 1000 | 1000 | 976 | 984 | 95 | 96 | 75-125 | 1 | 20 | |
| Calcium | ug/L | 13800 | 10000 | 10000 | 23700 | 23700 | 98 | 99 | 75-125 | 0 | 20 | |
| Lithium | ug/L | ND | 1000 | 1000 | 1010 | 1010 | 100 | 100 | 75-125 | 0 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

QC Batch: 784853
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

METHOD BLANK: 3129164 Matrix: Water
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Arsenic | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Barium | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Beryllium | ug/L | ND | 0.50 | 05/20/22 13:45 | |
| Cadmium | ug/L | ND | 0.50 | 05/20/22 13:45 | |
| Chromium | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Cobalt | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Lead | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Molybdenum | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Selenium | ug/L | ND | 1.0 | 05/20/22 13:45 | |
| Thallium | ug/L | ND | 1.0 | 05/20/22 13:45 | |

LABORATORY CONTROL SAMPLE: 3129165

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 40 | 37.7 | 94 | 80-120 | |
| Arsenic | ug/L | 40 | 39.8 | 99 | 80-120 | |
| Barium | ug/L | 40 | 39.6 | 99 | 80-120 | |
| Beryllium | ug/L | 40 | 40.5 | 101 | 80-120 | |
| Cadmium | ug/L | 40 | 40.1 | 100 | 80-120 | |
| Chromium | ug/L | 40 | 40.6 | 101 | 80-120 | |
| Cobalt | ug/L | 40 | 39.8 | 100 | 80-120 | |
| Lead | ug/L | 40 | 39.7 | 99 | 80-120 | |
| Molybdenum | ug/L | 40 | 40.2 | 100 | 80-120 | |
| Selenium | ug/L | 40 | 39.3 | 98 | 80-120 | |
| Thallium | ug/L | 40 | 37.9 | 95 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3129166 3129167

| Parameter | Units | 60399218001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 25.0 | 33.5 | 62 | 84 | 75-125 | 29 | 20 | M1,R1 |
| Arsenic | ug/L | ND | 40 | 40 | 33.0 | 33.6 | 81 | 82 | 75-125 | 2 | 20 | |
| Barium | ug/L | 10.5 | 40 | 40 | 44.3 | 51.2 | 84 | 102 | 75-125 | 14 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 32.4 | 32.8 | 81 | 82 | 75-125 | 1 | 20 | |
| Cadmium | ug/L | ND | 40 | 40 | 22.6 | 33.3 | 56 | 83 | 75-125 | 38 | 20 | M1,R1 |
| Chromium | ug/L | ND | 40 | 40 | 35.7 | 36.6 | 88 | 90 | 75-125 | 3 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3129166 3129167

| Parameter | Units | 60399218001 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 | 31.7 | 31.9 | 78 | 78 | 75-125 | 1 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 33.8 | 36.5 | 84 | 91 | 75-125 | 8 | 20 | |
| Molybdenum | ug/L | ND | 40 | 40 | 28.6 | 29.6 | 69 | 72 | 75-125 | 3 | 20 | M1 |
| Selenium | ug/L | 150 | 40 | 40 | 194 | 194 | 111 | 111 | 75-125 | 0 | 20 | |
| Thallium | ug/L | ND | 40 | 40 | 43.3 | 42.5 | 108 | 106 | 75-125 | 2 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

QC Batch: 785324 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

METHOD BLANK: 3131197 Matrix: Water
Associated Lab Samples: 60399256001, 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | ND | 5.0 | 05/06/22 12:55 | |

LABORATORY CONTROL SAMPLE: 3131198

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

SAMPLE DUPLICATE: 3131199

| Parameter | Units | 60399193001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 3920 | 4020 | 3 | 10 | |

SAMPLE DUPLICATE: 3131200

| Parameter | Units | 60399270003 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 615 | 594 | 3 | 10 | |

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# QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

QC Batch: 786305
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399256001

METHOD BLANK: 3134518 Matrix: Water
Associated Lab Samples: 60399256001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/12/22 09:15 | |
| Fluoride | mg/L | ND | 0.20 | 05/12/22 09:15 | |
| Sulfate | mg/L | ND | 1.0 | 05/12/22 09:15 | |

METHOD BLANK: 3140127 Matrix: Water
Associated Lab Samples: 60399256001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/13/22 09:00 | |
| Fluoride | mg/L | ND | 0.20 | 05/13/22 09:00 | |
| Sulfate | mg/L | ND | 1.0 | 05/13/22 09:00 | |

METHOD BLANK: 3140131 Matrix: Water
Associated Lab Samples: 60399256001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/17/22 08:57 | |
| Fluoride | mg/L | ND | 0.20 | 05/17/22 08:57 | |
| Sulfate | mg/L | ND | 1.0 | 05/17/22 08:57 | |

LABORATORY CONTROL SAMPLE: 3134519

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.8 | 96 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 98 | 80-120 | |

LABORATORY CONTROL SAMPLE: 3140128

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 94 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 99 | 80-120 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

LABORATORY CONTROL SAMPLE: 3140132

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.8 | 97 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 5.1 | 101 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3134520 3134521

| Parameter | Units | 60399083003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 20.7 | 25 | 25 | 44.3 | 44.9 | 94 | 97 | 80-120 | 1 | 15 | |
| Fluoride | mg/L | ND | 2.5 | 2.5 | 2.4 | 2.5 | 90 | 91 | 80-120 | 2 | 15 | |
| Sulfate | mg/L | 2150 | 1000 | 1000 | 3230 | 3260 | 107 | 111 | 80-120 | 1 | 15 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

QC Batch: 787050 Analysis Method: EPA 9056
QC Batch Method: EPA 9056 Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60399256002, 60399256003, 60399256004, 60399256005

METHOD BLANK: 3137436 Matrix: Water
Associated Lab Samples: 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/17/22 15:52 | |
| Fluoride | mg/L | ND | 0.20 | 05/17/22 15:52 | |
| Sulfate | mg/L | ND | 1.0 | 05/17/22 15:52 | |

METHOD BLANK: 3141542 Matrix: Water
Associated Lab Samples: 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/18/22 15:25 | |
| Fluoride | mg/L | ND | 0.20 | 05/18/22 15:25 | |
| Sulfate | mg/L | ND | 1.0 | 05/18/22 15:25 | |

METHOD BLANK: 3141559 Matrix: Water
Associated Lab Samples: 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/19/22 16:24 | |
| Fluoride | mg/L | ND | 0.20 | 05/19/22 16:24 | |
| Sulfate | mg/L | ND | 1.0 | 05/19/22 16:24 | |

METHOD BLANK: 3142273 Matrix: Water
Associated Lab Samples: 60399256002, 60399256003, 60399256004, 60399256005

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 05/23/22 12:06 | |
| Fluoride | mg/L | ND | 0.20 | 05/23/22 12:06 | |
| Sulfate | mg/L | ND | 1.0 | 05/23/22 12:06 | |

LABORATORY CONTROL SAMPLE: 3137437

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 94 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.6 | 105 | 80-120 | |

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## QUALITY CONTROL DATA

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

LABORATORY CONTROL SAMPLE: 3141543

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 95 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.1 | 84 | 80-120 | |
| Sulfate | mg/L | 5 | 5.2 | 104 | 80-120 | |

LABORATORY CONTROL SAMPLE: 3141560

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.8 | 96 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 101 | 80-120 | |
| Sulfate | mg/L | 5 | 5.0 | 100 | 80-120 | |

LABORATORY CONTROL SAMPLE: 3142274

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.6 | 93 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.5 | 102 | 80-120 | |
| Sulfate | mg/L | 5 | 5.1 | 101 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3138393 3138394

| Parameter | Units | 60400168001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 17.6 | 100 | 100 | 107 | 108 | 89 | 91 | 80-120 | 2 | 15 | |
| Fluoride | mg/L | 4.8 | 2.5 | 2.5 | 7.1 | 7.0 | 93 | 91 | 80-120 | 1 | 15 | |
| Sulfate | mg/L | 72.2 | 100 | 100 | 168 | 168 | 95 | 96 | 80-120 | 0 | 15 | M1 |

MATRIX SPIKE SAMPLE: 3138396

| Parameter | Units | 60400168002 Result | Spike Conc. | MS Result | MS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 24.0 | 25 | 47.0 | 92 | 80-120 | |
| Fluoride | mg/L | 2.0 | 2.5 | 4.6 | 104 | 80-120 | |
| Sulfate | mg/L | 41.4 | 25 | 66.3 | 100 | 80-120 | |

SAMPLE DUPLICATE: 3138395

| Parameter | Units | 60400168001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 17.6 | 17.6 | 0 | 15 | |
| Fluoride | mg/L | 4.8 | 4.8 | 0 | 15 | |
| Sulfate | mg/L | 72.2 | 72.2 | 0 | 15 | |

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

## REPORT OF LABORATORY ANALYSIS

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

# QUALIFIERS

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

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



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835.100.1 PRPA CCR
Pace Project No.: 60399256

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60399256001** | **ASH-07-CCR** | EPA 3010 | 784854 | EPA 6010 | 784981 |
| **60399256002** | **ASH-04-CCR** | EPA 3010 | 784854 | EPA 6010 | 784981 |
| **60399256003** | **ASH-05-CCR** | EPA 3010 | 784854 | EPA 6010 | 784981 |
| **60399256004** | **ASH-08-CCR** | EPA 3010 | 784854 | EPA 6010 | 784981 |
| **60399256005** | **ERB-02-CCR** | EPA 3010 | 784854 | EPA 6010 | 784981 |
| **60399256001** | **ASH-07-CCR** | EPA 3010 | 784853 | EPA 6020 | 784979 |
| **60399256002** | **ASH-04-CCR** | EPA 3010 | 784853 | EPA 6020 | 784979 |
| **60399256003** | **ASH-05-CCR** | EPA 3010 | 784853 | EPA 6020 | 784979 |
| **60399256004** | **ASH-08-CCR** | EPA 3010 | 784853 | EPA 6020 | 784979 |
| **60399256005** | **ERB-02-CCR** | EPA 3010 | 784853 | EPA 6020 | 784979 |
| **60399256001** | **ASH-07-CCR** | EPA 7470 | 788306 | EPA 7470 | 788390 |
| **60399256002** | **ASH-04-CCR** | EPA 7470 | 788306 | EPA 7470 | 788390 |
| **60399256003** | **ASH-05-CCR** | EPA 7470 | 788306 | EPA 7470 | 788390 |
| **60399256004** | **ASH-08-CCR** | EPA 7470 | 788306 | EPA 7470 | 788390 |
| **60399256005** | **ERB-02-CCR** | EPA 7470 | 788306 | EPA 7470 | 788390 |
| **60399256001** | **ASH-07-CCR** | SM 2540C | 785324 | | |
| **60399256002** | **ASH-04-CCR** | SM 2540C | 785324 | | |
| **60399256003** | **ASH-05-CCR** | SM 2540C | 785324 | | |
| **60399256004** | **ASH-08-CCR** | SM 2540C | 785324 | | |
| **60399256005** | **ERB-02-CCR** | SM 2540C | 785324 | | |
| **60399256001** | **ASH-07-CCR** | EPA 9056 | 786305 | | |
| **60399256002** | **ASH-04-CCR** | EPA 9056 | 787050 | | |
| **60399256003** | **ASH-05-CCR** | EPA 9056 | 787050 | | |
| **60399256004** | **ASH-08-CCR** | EPA 9056 | 787050 | | |
| **60399256005** | **ERB-02-CCR** | EPA 9056 | 787050 | | |



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WO#: 60399256

60399256

| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-LENE-0009_Sample Cond. | | |
|---|---|---|---|
| | Revision: 2 | Effective Date: 01/12/2022 | Issued By: Lenexa |

Client Name: AECOM

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

**Tracking #:** 564584933578 Pace Shipping Label Used? Yes ☐ No ☑

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

**Packing Material:** Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ Zip'd

**Thermometer Used:** T301 **Type of Ice:** (Wet) Blue None

**Cooler Temperature (°C):** **As-read** 3.9 **Corr. Factor** -1.0 **Corrected** 2.9

**Date and initials of person examining contents:** 05 032022 KG

Temperature should be above freezing to 6°C

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 55192 | ☑Yes ☐No ☐N/A | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks: Lead acetate strip turns dark? (Record only) | ☐Yes ☐No | |
| Potassium iodide test strip turns blue/purple? (Preserve) | ☐Yes ☐No | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Pace Analytical
www.pacelabs.com

# CHAIN-OF-CUSTODY / Analytical Request Document

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

CCR
KS

**Section A** Required Client Information:

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

**Section B** Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** Invoice Information:

| | |
|---|---|
| Attention: | Accounts Payable |
| Company Name: | AECOM |
| Address: | Same as Section A |
| Pace Quote Reference: | 42700 |
| Pace Project Manager: | Heather Wilson |
| Pace Profile #: | No RLI - 11033, 3 |

Page: 1 of 1

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Section D** Required Client information

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

Valid Matrix Codes

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

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N: 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-07-CCR | WT | G | — | | 5.2.22 | 0915 | | 3 | 2 | | 1 | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | N | 60399756 |
| 2 | ASH-04-CCR | WT | G | — | | 5.2.22 | 1030 | | 3 | 2 | | 1 | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | N | |
| 3 | ASH-05 CCR | WT | G | — | | 5.2.22 | 1130 | | 3 | 2 | | 1 | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | N | |
| 4 | ASH-08-CCR | WT | G | — | | 5.2.22 | 1330 | | 3 | 2 | | 1 | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | N | |
| 5 | ERB-02-CCR | WT | G | — | | 5.2.22 | 1530 | | 3 | 2 | | 1 | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | N | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | |

JL

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS: Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Jack Ley AECOM | 5.2.22 | 1700 | | 5/3/22 | 0840 | 2.9 | Y | Y | Y |
| **B, Ca, Li | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Jack Ley

SIGNATURE of SAMPLER: Jack Ley

DATE Signed (MM/DD/YY): 05/02/22

*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.

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60399256**
Sampling Event: May 2, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: July 12, 2022
Peer Reviewer: Katie Abbott — Date Completed: July 18, 2022

This report contains the final results of the data validation conducted for the water samples collected May 2nd, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

__X__ Data are usable without qualification.
_____ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | X | | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• 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%.<br>• 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. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below: | | | X |

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| | • When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.<br>• 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. | | | |
| Equipment Blanks | No target analytes reported in the associated equipment blank. | X | | |
| Reporting Limits Met | No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits. | | X[1] | |
| Reporting | No reporting issues were found and further qualification was not considered necessary. | X | | |
| Package Completeness | No results were qualified as unusable and the data are 100% complete. | X | | |
| **Comments** | | | | |
| 1 – 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. | | | | |

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
% – Percent
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MB – Method Blank
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
RL – Reporting Limit
RPD – Relative Percent Difference

# October 2022

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

November 16, 2022

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

RE: Project: 60684835 PRPA CCR
Pace Project No.: 60413310

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 19, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Kansas City

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

Sincerely,

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

Enclosures

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



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# CERTIFICATIONS

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

**Pace Analytical Services Kansas**
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Illinois Certification #: 2000302021-3
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 #: T104704407-21-15
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070



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## SAMPLE SUMMARY

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413310001** | **ASH-01-CCR** | Water | 10/18/22 10:30 | 10/19/22 07:20 |
| **60413310002** | **ASH-03-CCR** | Water | 10/18/22 14:35 | 10/19/22 07:20 |
| **60413310003** | **ASH-06-CCR** | Water | 10/18/22 12:30 | 10/19/22 07:20 |

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413310001** | **ASH-01-CCR** | EPA 6010 | JDS | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | TML | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |
| **60413310002** | **ASH-03-CCR** | EPA 6010 | JDS | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | TML | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |
| **60413310003** | **ASH-06-CCR** | EPA 6010 | JDS | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | TML | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City



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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

**Sample: ASH-01-CCR** **Lab ID: 60413310001** Collected: 10/18/22 10:30 Received: 10/19/22 07:20 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **434** | ug/L | 100 | 1 | 11/03/22 09:46 | 11/04/22 16:29 | 7440-42-8 | |
| Calcium | **345000** | ug/L | 200 | 1 | 11/03/22 09:46 | 11/04/22 16:29 | 7440-70-2 | M1 |
| Lithium | **427** | ug/L | 10.0 | 1 | 11/03/22 09:46 | 11/04/22 16:29 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 20:25 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 20:25 | 7440-38-2 | |
| Barium | **10.4** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:27 | 7440-39-3 | |
| Beryllium | ND | ug/L | 1.5 | 3 | 11/03/22 09:46 | 11/15/22 20:27 | 7440-41-7 | D3 |
| Cadmium | ND | ug/L | 0.50 | 1 | 11/03/22 09:46 | 11/09/22 20:25 | 7440-43-9 | |
| Chromium | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 20:25 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 20:25 | 7440-48-4 | |
| Lead | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:27 | 7439-92-1 | D3 |
| Molybdenum | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 20:25 | 7439-98-7 | |
| Selenium | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 20:25 | 7782-49-2 | |
| Thallium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:27 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/04/22 14:00 | 11/08/22 10:33 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **2150** | mg/L | 66.7 | 1 | | 10/25/22 10:48 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **20.1** | mg/L | 2.0 | 2 | | 10/28/22 19:15 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 10/28/22 19:00 | 16984-48-8 | |
| Sulfate | **2060** | mg/L | 400 | 400 | | 10/28/22 19:29 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

**Sample: ASH-03-CCR** **Lab ID: 60413310002** Collected: 10/18/22 14:35 Received: 10/19/22 07:20 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **680** | ug/L | 100 | 1 | 11/03/22 09:46 | 11/04/22 16:36 | 7440-42-8 | |
| Calcium | **406000** | ug/L | 200 | 1 | 11/03/22 09:46 | 11/04/22 16:36 | 7440-70-2 | |
| Lithium | **399** | ug/L | 10.0 | 1 | 11/03/22 09:46 | 11/04/22 16:36 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7440-36-0 | D3 |
| Arsenic | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7440-38-2 | D3 |
| Barium | **9.4** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7440-39-3 | |
| Beryllium | ND | ug/L | 1.5 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7440-41-7 | D3 |
| Cadmium | ND | ug/L | 1.5 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 20:37 | 7440-47-3 | R1 |
| Cobalt | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7439-92-1 | D3 |
| Molybdenum | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7439-98-7 | D3 |
| Selenium | **142** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7782-49-2 | M1 |
| Thallium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 20:34 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/04/22 14:00 | 11/08/22 10:35 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **4530** | mg/L | 100 | 1 | | 10/25/22 10:48 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **128** | mg/L | 10.0 | 10 | | 10/28/22 20:28 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 10/28/22 19:44 | 16984-48-8 | |
| Sulfate | **3110** | mg/L | 400 | 400 | | 10/28/22 20:42 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

**Sample: ASH-06-CCR** **Lab ID: 60413310003** Collected: 10/18/22 12:30 Received: 10/19/22 07:20 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **278** | ug/L | 100 | 1 | 11/03/22 09:46 | 11/04/22 16:38 | 7440-42-8 | |
| Calcium | **23500** | ug/L | 200 | 1 | 11/03/22 09:46 | 11/04/22 16:38 | 7440-70-2 | |
| Lithium | **54.5** | ug/L | 10.0 | 1 | 11/03/22 09:46 | 11/04/22 16:38 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 21:04 | 7440-36-0 | |
| Arsenic | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7440-38-2 | D3 |
| Barium | **47.9** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7440-39-3 | |
| Beryllium | ND | ug/L | 1.5 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7440-41-7 | D3 |
| Cadmium | ND | ug/L | 0.50 | 1 | 11/03/22 09:46 | 11/09/22 21:04 | 7440-43-9 | |
| Chromium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7440-47-3 | D3 |
| Cobalt | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7439-92-1 | D3 |
| Molybdenum | **12.3** | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 21:04 | 7439-98-7 | |
| Selenium | **32.7** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7782-49-2 | |
| Thallium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:00 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/04/22 14:00 | 11/08/22 10:38 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **544** | mg/L | 10.0 | 1 | | 10/25/22 10:48 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **8.4** | mg/L | 1.0 | 1 | | 10/28/22 20:57 | 16887-00-6 | |
| Fluoride | **0.60** | mg/L | 0.20 | 1 | | 10/28/22 20:57 | 16984-48-8 | |
| Sulfate | **65.6** | mg/L | 10.0 | 10 | | 10/28/22 21:12 | 14808-79-8 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

QC Batch: 816671
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413310001, 60413310002, 60413310003

METHOD BLANK: 3248310 Matrix: Water
Associated Lab Samples: 60413310001, 60413310002, 60413310003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 11/08/22 10:19 | |

LABORATORY CONTROL SAMPLE: 3248311

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Mercury | ug/L | 5 | 5.6 | 111 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3248312 3248313

| Parameter | Units | 60413307001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 5.2 | 5.1 | 105 | 102 | 75-125 | 3 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

QC Batch: 816338
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413310001, 60413310002, 60413310003

METHOD BLANK: 3246686 Matrix: Water
Associated Lab Samples: 60413310001, 60413310002, 60413310003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Boron | ug/L | ND | 100 | 11/04/22 16:21 | |
| Calcium | ug/L | ND | 200 | 11/04/22 16:21 | |
| Lithium | ug/L | ND | 10.0 | 11/04/22 16:21 | |

LABORATORY CONTROL SAMPLE: 3246687

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Boron | ug/L | 1000 | 904 | 90 | 80-120 | |
| Calcium | ug/L | 10000 | 9660 | 97 | 80-120 | |
| Lithium | ug/L | 1000 | 918 | 92 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246688 3246689

| Parameter | Units | 60413310001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | 434 | 1000 | 1000 | 1310 | 1340 | 88 | 91 | 75-125 | 2 | 20 | |
| Calcium | ug/L | 345000 | 10000 | 10000 | 345000 | 344000 | 2 | -3 | 75-125 | 0 | 20 | M1 |
| Lithium | ug/L | 427 | 1000 | 1000 | 1450 | 1470 | 102 | 104 | 75-125 | 1 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

QC Batch: 816339
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413310001, 60413310002, 60413310003

METHOD BLANK: 3246698 Matrix: Water
Associated Lab Samples: 60413310001, 60413310002, 60413310003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Arsenic | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Barium | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Beryllium | ug/L | ND | 0.50 | 11/15/22 20:22 | |
| Cadmium | ug/L | ND | 0.50 | 11/15/22 20:22 | |
| Chromium | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Cobalt | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Lead | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Molybdenum | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Selenium | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Thallium | ug/L | ND | 1.0 | 11/15/22 20:22 | |

LABORATORY CONTROL SAMPLE: 3246699

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 40 | 41.9 | 105 | 80-120 | |
| Arsenic | ug/L | 40 | 40.4 | 101 | 80-120 | |
| Barium | ug/L | 40 | 43.2 | 108 | 80-120 | |
| Beryllium | ug/L | 40 | 44.9 | 112 | 80-120 | |
| Cadmium | ug/L | 40 | 42.7 | 107 | 80-120 | |
| Chromium | ug/L | 40 | 40.7 | 102 | 80-120 | |
| Cobalt | ug/L | 40 | 40.5 | 101 | 80-120 | |
| Lead | ug/L | 40 | 42.5 | 106 | 80-120 | |
| Molybdenum | ug/L | 40 | 43.3 | 108 | 80-120 | |
| Selenium | ug/L | 40 | 42.9 | 107 | 80-120 | |
| Thallium | ug/L | 40 | 41.2 | 103 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246700 3246701

| Parameter | Units | 60413310002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 36.3 | 37.4 | 91 | 93 | 75-125 | 3 | 20 | |
| Arsenic | ug/L | ND | 40 | 40 | 43.0 | 44.0 | 106 | 109 | 75-125 | 2 | 20 | |
| Barium | ug/L | 9.4 | 40 | 40 | 55.6 | 56.0 | 116 | 117 | 75-125 | 1 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 43.1 | 41.4 | 108 | 104 | 75-125 | 4 | 20 | |
| Cadmium | ug/L | ND | 40 | 40 | 34.3 | 35.5 | 86 | 89 | 75-125 | 3 | 20 | |
| Chromium | ug/L | ND | 40 | 40 | 35.2 | 44.6 | 88 | 111 | 75-125 | 24 | 20 | R1 |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246700 3246701

| Parameter | Units | 60413310002 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 | 42.0 | 42.6 | 104 | 106 | 75-125 | 2 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 42.6 | 43.2 | 106 | 108 | 75-125 | 1 | 20 | |
| Molybdenum | ug/L | ND | 40 | 40 | 43.7 | 45.2 | 107 | 111 | 75-125 | 3 | 20 | |
| Selenium | ug/L | 142 | 40 | 40 | 196 | 198 | 135 | 140 | 75-125 | 1 | 20 | M1 |
| Thallium | ug/L | ND | 40 | 40 | 42.3 | 43.0 | 106 | 108 | 75-125 | 2 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

QC Batch: 814499
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413310001, 60413310002, 60413310003

METHOD BLANK: 3239207 Matrix: Water
Associated Lab Samples: 60413310001, 60413310002, 60413310003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | ND | 5.0 | 10/25/22 10:47 | |

LABORATORY CONTROL SAMPLE: 3239208

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1000 | 884 | 88 | 80-120 | |

SAMPLE DUPLICATE: 3239209

| Parameter | Units | 60413307001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 2630 | 2720 | 3 | 10 | |

SAMPLE DUPLICATE: 3239210

| Parameter | Units | 60413477004 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 467 | 467 | 0 | 10 | |

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# QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

QC Batch: 815092
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413310001, 60413310002, 60413310003

METHOD BLANK: 3241646 Matrix: Water
Associated Lab Samples: 60413310001, 60413310002, 60413310003

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 10/28/22 16:35 | |
| Fluoride | mg/L | ND | 0.20 | 10/28/22 16:35 | |
| Sulfate | mg/L | ND | 1.0 | 10/28/22 16:35 | |

LABORATORY CONTROL SAMPLE: 3241647

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 94 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.4 | 94 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 97 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3241648 3241649

| Parameter | Units | 60413701002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 174 | 250 | 250 | 397 | 396 | 89 | 89 | 80-120 | 0 | 15 | |
| Fluoride | mg/L | 0.22 | 2.5 | 2.5 | 3.4 | 3.3 | 126 | 124 | 80-120 | 1 | 15 | M1 |
| Sulfate | mg/L | 329 | 250 | 250 | 591 | 594 | 105 | 106 | 80-120 | 1 | 15 | |

SAMPLE DUPLICATE: 3241650

| Parameter | Units | 60413701002 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 174 | 167 | 4 | 15 | |
| Fluoride | mg/L | 0.22 | 0.21 | 5 | 15 | |
| Sulfate | mg/L | 329 | 327 | 1 | 15 | |

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# QUALIFIERS

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

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



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835 PRPA CCR
Pace Project No.: 60413310

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413310001** | **ASH-01-CCR** | EPA 3010 | 816338 | EPA 6010 | 816357 |
| **60413310002** | **ASH-03-CCR** | EPA 3010 | 816338 | EPA 6010 | 816357 |
| **60413310003** | **ASH-06-CCR** | EPA 3010 | 816338 | EPA 6010 | 816357 |
| **60413310001** | **ASH-01-CCR** | EPA 3010 | 816339 | EPA 6020 | 816358 |
| **60413310002** | **ASH-03-CCR** | EPA 3010 | 816339 | EPA 6020 | 816358 |
| **60413310003** | **ASH-06-CCR** | EPA 3010 | 816339 | EPA 6020 | 816358 |
| **60413310001** | **ASH-01-CCR** | EPA 7470 | 816671 | EPA 7470 | 816757 |
| **60413310002** | **ASH-03-CCR** | EPA 7470 | 816671 | EPA 7470 | 816757 |
| **60413310003** | **ASH-06-CCR** | EPA 7470 | 816671 | EPA 7470 | 816757 |
| **60413310001** | **ASH-01-CCR** | SM 2540C | 814499 | | |
| **60413310002** | **ASH-03-CCR** | SM 2540C | 814499 | | |
| **60413310003** | **ASH-06-CCR** | SM 2540C | 814499 | | |
| **60413310001** | **ASH-01-CCR** | EPA 9056 | 815092 | | |
| **60413310002** | **ASH-03-CCR** | EPA 9056 | 815092 | | |
| **60413310003** | **ASH-06-CCR** | EPA 9056 | 815092 | | |



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WO# : 60413310

60413310

| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-LENE-0009_Sample C | |
|---|---|---|
| | Revision: 2 | Effective Date: 01/12/2022 |

Client Name: AECOM

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

**Tracking #:** 609107906530 Pace Shipping Label Used? Yes ☐ No ☑

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

**Packing Material:** Bubble Wrap ☐ Bubble Bags ☑ Foam ☐ None ☐ Other ☐ Zip

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

**Cooler Temperature (°C):** **As-read** 7.5 **Corr. Factor** 0.0 **Corrected** 7.5

**Date and initials of person examining contents:** 10-19-2022 MO

Temperature should be above freezing to 6°C

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 55192 | ☑Yes ☐No ☐N/A | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks: Lead acetate strip turns dark? (Record only) | ☐Yes ☐No | |
| Potassium iodide test strip turns blue/purple? (Preserve) | ☐Yes ☐No | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

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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.

Page: 1 of 1

**Section A** — **Required** Client Information:

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

**Section B** — **Required** Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** — Invoice Information:

| | |
|---|---|
| Attention: | Accounts Payable |
| Company Name: | AECOM |
| Address: | Same as Section A |
| Pace Quote Reference: | 42700 |
| Pace Project Manager: | Heather Wilson |
| Pace Profile #: | No RLI - 11033, 3 |

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Section D** — **Required** Client Information

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

**Valid Matrix Codes**

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

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-01-CCR | WT | G | 10/18/22 | 1030 | | | | 3 | X | | X | | | | | | X | X | X | X | X | | |
| 2 | ASH-03-CCR | WT | G | 10/18/22 | 1435 | | | | 3 | X | | X | | | | | | X | X | X | X | X | | |
| 3 | ~~ASH-06-CCR~~ | | | ~~10/18/22~~ | | | | | | | | | | | | | | | | | | | | | |
| 4 | ASH-06-CCR | WT | G | 10/18/22 | 1230 | | | | 3 | X | | X | | | | | | X | X | X | X | X | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | |

Requested Analysis Filtered (Y/N)

Pace Project No./ Lab I.D.: 60411310

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Drew Woodward AECOM | 10/18/22 | 16:44 | | 10-19-22 | 0720 | 3.5 | Y | Y | Y |
| **B, Ca, Li | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Drew Woodward

SIGNATURE of SAMPLER: DW

DATE Signed (MM/DD/YY): 10/18/2022

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



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

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413310**
Sampling Event: October 18, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 7, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 20, 2022

This report contains the final results of the data validation conducted for the water samples collected October 18th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | X | | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges.<br>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. | | X[1] | |

| Analyte | MS/MSD (%) | Limits (%) | RPD (%) | Limits (%) |
|---|---|---|---|---|
| **ASH-03-CCR** | | | | |
| Chromium | 88/111 | 75-125 | **24** | 20 |
| Selenium | **135/140** | 75-125 | 1 | 20 |

% – Percent
MS/MSD – Matrix Spike/ Matrix Spike Duplicate
RPD – Relative Percent Difference
**Bold indicates a value that is outside of acceptance limits.**

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td>Laboratory Duplicate</td><td>The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<ul><li>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%.</li><li>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.</li></ul></td><td></td><td></td><td>X</td></tr>
<tr><td>Field Duplicate</td><td>The field duplicate sample results satisfied the evaluation criteria below:<ul><li>When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.</li><li>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.</li></ul></td><td></td><td></td><td>X</td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.<table><tr><th>Analyte</th><th>Concentration</th></tr><tr><td colspan="2">60413923</td></tr><tr><td colspan="2">ERB-2-CCR</td></tr><tr><td>TDS</td><td>10.5 mg/L</td></tr><tr><td colspan="2">60414572</td></tr><tr><td colspan="2">ERB-1-CCR</td></tr><tr><td>TDS</td><td>5.5 mg/L</td></tr></table>mg/L – Milligrams per Liter<br>TDS – Total Dissolved Solids</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Reporting Limits Met</td><td>No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits.</td><td></td><td>X[3]</td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – As the RPD was outside the control limits, the chromium result for sample ASH-03-CCR was qualified as estimated (UJ ld).<br><br>As the potential bias was considered to be high, the associated detected selenium result for sample ASH-03-CCR was qualified as estimated (J+ m).<br><br>2 – As the TDS sample results were reported at concentrations >5x the concentration of the blank contamination, qualification was not considered necessary.</td></tr>
</table>

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| 3 – 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. | | | | |

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
% – Percent
J+ – Estimated Concentration, High Bias
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
ld – Laboratory Duplicate RPD
m – Matrix Spike Recovery
mg/L – Milligrams per Liter
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
RL – Reporting Limit
RPD – Relative Percent Difference
TDS – Total Dissolved Solids
UJ – Estimated, Non-detect

**Pace Analytical Services, LLC**
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November 09, 2022

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

RE: Project: 60684835 PRPA CCR
Pace Project No.: 60413434

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 19, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Greensburg

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

**Pace Analytical Services Pennsylvania**
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
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 #: PA014572018-1
New Hampshire/TNI Certification #: 297617
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 #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
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
Wyoming Certification #: 8TMS-L



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## SAMPLE SUMMARY

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413434001** | **ASH-01-CCR** | Water | 10/18/22 10:30 | 10/19/22 10:55 |
| **60413434002** | **ASH-03-CCR** | Water | 10/18/22 14:35 | 10/19/22 10:55 |
| **60413434003** | **ASH-06-CCR** | Water | 10/18/22 12:30 | 10/19/22 10:55 |



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## SAMPLE ANALYTE COUNT

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413434001** | **ASH-01-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60413434002** | **ASH-03-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60413434003** | **ASH-06-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |

PASI-PA = Pace Analytical Services - Greensburg



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

**Sample: ASH-01-CCR** **Lab ID: 60413434001** Collected: 10/18/22 10:30 Received: 10/19/22 10:55 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.109 ± 0.337 (0.652) C:NA T:96%** | pCi/L | 11/03/22 13:24 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **1.03 ± 0.465 (0.782) C:75% T:82%** | pCi/L | 11/02/22 12:19 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.14 ± 0.802 (1.43)** | pCi/L | 11/04/22 14:45 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

**Sample: ASH-03-CCR** **Lab ID: 60413434002** Collected: 10/18/22 14:35 Received: 10/19/22 10:55 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.147 ± 0.372 (0.689) C:NA T:98%** | pCi/L | 11/03/22 13:24 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.867 ± 0.399 (0.672) C:76% T:92%** | pCi/L | 11/02/22 12:19 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.01 ± 0.771 (1.36)** | pCi/L | 11/04/22 14:45 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

**Sample: ASH-06-CCR** **Lab ID: 60413434003** Collected: 10/18/22 12:30 Received: 10/19/22 10:55 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **-0.109 ± 0.402 (0.868) C:NA T:90%** | pCi/L | 11/03/22 13:24 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.254 ± 0.383 (0.827) C:76% T:81%** | pCi/L | 11/02/22 12:19 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.254 ± 0.785 (1.70)** | pCi/L | 11/04/22 14:45 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

QC Batch: 541401
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413434001, 60413434002, 60413434003

METHOD BLANK: 2627541
Matrix: Water
Associated Lab Samples: 60413434001, 60413434002, 60413434003

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-228 | 0.453 ± 0.282 (0.520) C:80% T:100% | pCi/L | 11/02/22 12:21 | |

**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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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

QC Batch: 541400
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413434001, 60413434002, 60413434003

METHOD BLANK: 2627539 Matrix: Water
Associated Lab Samples: 60413434001, 60413434002, 60413434003

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-226 | 0.212 ± 0.251 (0.394) C:NA T:95% | pCi/L | 11/03/22 13:24 | |

**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.**

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# QUALIFIERS

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

**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.

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

## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835 PRPA CCR
Pace Project No.: 60413434

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413434001** | **ASH-01-CCR** | EPA 903.1 | 541400 | | |
| **60413434002** | **ASH-03-CCR** | EPA 903.1 | 541400 | | |
| **60413434003** | **ASH-06-CCR** | EPA 903.1 | 541400 | | |
| **60413434001** | **ASH-01-CCR** | EPA 904.0 | 541401 | | |
| **60413434002** | **ASH-03-CCR** | EPA 904.0 | 541401 | | |
| **60413434003** | **ASH-06-CCR** | EPA 904.0 | 541401 | | |
| **60413434001** | **ASH-01-CCR** | Total Radium Calculation | 544834 | | |
| **60413434002** | **ASH-03-CCR** | Total Radium Calculation | 544834 | | |
| **60413434003** | **ASH-06-CCR** | Total Radium Calculation | 544834 | | |



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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.

Page: 1 of 1

| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | |
|---|---|---|---|---|---|
| Company: | AECOM | Report To: | Vasanta Kaliuri | Attention: | Accounts Payable |
| Address: | 6200 South Quebec St | Copy To: | Brian Rothmeyer | Company Name: | AECOM |
| | Greenwood Village, CO 80111 | | | Address: | Same as Section A |
| Email To: | brian.rothmeyer@aecom.com | Purchase Order No.: | 136205 | Pace Quote Reference: | 42700 |
| Phone: | (303) 740-2614 Fax: | Project Name: | 60659991 PRPA CCR | Pace Project Manager: | Heather Wilson |
| Requested Due Date/TAT: | | Project Number: | 60659991 | Pace Profile #: | 11033, 3 |

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Requested Analysis Filtered (Y/N)**

| ITEM # | Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE | Valid Matrix Codes: MATRIX / CODE | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED: COMPOSITE START DATE | COMPOSITE START TIME | COMPOSITE END/GRAB DATE | COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Y/N | Analysis Test: Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-01-CCR | DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS | WT | G | 10/18/22 | 1030 | — | — | | 2 | | | X | | | | | | | X | X | X | | |
| 2 | ASH-03-CCR | | WT | G | 10/18/22 | 1435 | — | — | | 2 | | | X | | | | | | | X | X | X | | |
| 3 | ASH-06-CCR | | WT | G | 10/18/22 | 1230 | — | — | | 2 | | | X | | | | | | | X | X | X | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Drew Woodward AECOM | 10/18/22 | 16:30 | | 10/19/22 | 1055 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Drew Woodward

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 10/18/2022

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



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

# Internal Transfer Chain of Custody

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[X] Samples Pre-Logged into eCOC.

State Of Origin: CO
Cert. Needed: [ ] Yes [X] No

**Workorder:** 60413434 **Workorder Name:** 60684835 PRPA CCR

**Owner Received Date:** 10/19/2022 **Results Requested By:** 11/9/2022

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

| Item | Sample ID | Sample Type | Collect Date/Time | Lab ID | Matrix | Preserved Containers: Other | Requested Analysis: Radium-226 & Total Sum Radium | Requested Analysis: Radium-228 | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-01-CCR | PS | 10/18/2022 10:30 | 60413434001 | Water | 2 | X | X | |
| 2 | ASH-03-CCR | PS | 10/18/2022 14:35 | 60413434002 | Water | 2 | X | X | |
| 3 | ASH-06-CCR | PS | 10/18/2022 12:30 | 60413434003 | Water | 2 | X | X | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |

| Transfers | Released By | Date/Time | Received By | Date/Time |
|---|---|---|---|---|
| 1 | | | [signature] | 10/19/22 10 |
| 2 | | | | |
| 3 | | | | |

**Comments**

IR30- Radium QC Sheets Required

55

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

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

WO# : 30531515

30531515

| | DC#_Title: ENV-FRM-GBUR-0088 v02_Sample Condition Upon Receipt-Pittsburgh |
|---|---|
| Pace ANALYTICAL SERVICES | Effective Date: 10/03/2022 |

**Client Name:** AECOM **Project #:**

**Courier:** ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

**Tracking Number:** 6091 0790 6747

| | |
|---|---|
| Examined By | PS |
| Labeled By | PS |
| Temped By | — |

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

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

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

Temp should be above freezing to 6°C

| Comments: | Yes | No | NA | pH paper Lot# 10D222 / D.P.D. Residual Chlorine Lot # |
|---|---|---|---|---|
| Chain of Custody Present | ✓ | | | 1. |
| Chain of Custody Filled Out: | ✓ | | | 2. |
| -Were client corrections present on COC | ✓ | | | |
| Chain of Custody Relinquished | ✓ | | | 3. |
| Sampler Name & Signature on COC: | | ✓ | | 4. |
| Sample Labels match COC: | ✓ | | | 5. |
| -Includes date/time/ID Matrix: | WT | | | |
| Samples Arrived within Hold Time: | ✓ | | | 6. |
| **Short Hold Time Analysis (<72hr remaining):** | | ✓ | | 7. |
| **Rush Turn Around Time Requested:** | | ✓ | | 8. |
| Sufficient Volume: | ✓ | | | 9. |
| Correct Containers Used: | ✓ | | | 10. |
| -Pace Containers Used | ✓ | | | |
| Containers Intact: | ✓ | | | 11. |
| Orthophosphate field filtered: | | | ✓ | 12. |
| Hex Cr Aqueous samples field filtered: | | | ✓ | 13. |
| Organic Samples checked for dechlorination | | | ✓ | 14: |
| Filtered volume received for dissolved tests: | | | ✓ | 15: |
| **All containers checked for preservation:** exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix | ✓ | | | 16. pH<2 |
| **All containers meet method preservation requirements:** | ✓ | | | Initial when completed: PS Date/Time of Preservation: Lot# of added Preservative: |
| Headspace in VOA Vials (>6mm): | | | ✓ | 17. |
| Trip Blank Present: | | ✓ | | 18. |
| Trip Blank Custody Seals Present | | ✓ | | |
| **Rad Samples Screened <0.5 mrem/hr.** | ✓ | | | Initial when completed: PS Date: 10/20/22 Survey Meter SN: 1563 |

**Comments:**

WO#: 30531515
PM: MAR Due Date: 11/09/22
CLIENT: PACE_60_LEKS

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.

Qualtrax ID: 55680

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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.

Page: 1 of 1

**Section A** Required Client Information:

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

**Section B** Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** Invoice Information:

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

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Requested Analysis Filtered (Y/N)**

Section D Required Client Information

Valid Matrix Codes

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

| ITEM # | SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-01-CCR | WT | G | 10/18/22 | 1030 | — | — | | 2 | | | X | | | | | | | X | X | X | | |
| 2 | ASH-03-CCR | WT | G | 10/18/22 | 1435 | — | — | | 2 | | | X | | | | | | | X | X | X | | |
| 3 | ASH-06-CCR | WT | G | 10/18/22 | 1230 | — | — | | 2 | | | X | | | | | | | X | X | X | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |

WO#: 30531515
Due Date: 11/09/22
PM: MAR
CLIENT: PACE_GO_LEKS

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Drew Woodward AECOM | 10/18/22 | 16:30 | | 10/19/22 | 1055 | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Drew Woodward

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY): 10/18/2022

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



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

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | GDH |
| Date: | 10/24/2022 |
| Batch ID: | 69467 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2627539 |
| MB concentration: | 0.212 |
| M/B Counting Uncertainty: | 0.249 |
| MB MDC: | 0.394 |
| MB Numerical Performance Indicator: | 1.67 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS69467 | LCSD69467 |
| Count Date: | 11/3/2022 | |
| Spike I.D.: | 21-040 | |
| Spike Concentration (pCi/mL): | 32.424 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.652 | |
| Target Conc. (pCi/L, g, F): | 4.970 | |
| Uncertainty (Calculated): | 0.234 | |
| Result (pCi/L, g, F): | 4.195 | |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 0.865 | |
| Numerical Performance Indicator: | -1.70 | |
| Percent Recovery: | 84.40% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 73% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/17/2022 | |
| Sample I.D. | 30531434001 | |
| Sample MS I.D. | 30531434001MS | |
| Sample MSD I.D. | | |
| Spike I.D.: | 21-040 | |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 32.425 | |
| Spike Volume Used in MS (mL): | 0.20 | |
| Spike Volume Used in MSD (mL): | | |
| MS Aliquot (L, g, F): | 0.655 | |
| MS Target Conc.(pCi/L, g, F): | 9.905 | |
| MSD Aliquot (L, g, F): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | 0.466 | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | 0.193 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.189 | |
| Sample Matrix Spike Result: | 8.699 | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.356 | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| MS Numerical Performance Indicator: | -1.896 | |
| MSD Numerical Performance Indicator: | | |
| MS Percent Recovery: | 85.87% | |
| MSD Percent Recovery: | | |
| MS Status vs Numerical Indicator: | N/A | |
| MSD Status vs Numerical Indicator: | | |
| MS Status vs Recovery: | Pass | |
| MSD Status vs Recovery: | | |
| MS/MSD Upper % Recovery Limits: | 136% | |
| MS/MSD Lower % Recovery Limits: | 71% | |

| Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D.: | 30531430001 | Enter Duplicate sample IDs if other than LCS/LCSD in the space below. |
| Duplicate Sample I.D. | 30531430001DUP | |
| Sample Result (pCi/L, g, F): | 0.869 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.413 | |
| Sample Duplicate Result (pCi/L, g, F): | 0.765 | |
| Sample Duplicate Result Counting Uncertainty (pCi/L, g, F): | 0.428 | |
| Are sample and/or duplicate results below RL? | See Below ## | |
| Duplicate Numerical Performance Indicator: | 0.343 | 30531430001 |
| Duplicate RPD: | 12.76% | 30531430001DUP |
| Duplicate Status vs Numerical Indicator: | N/A | |
| Duplicate Status vs RPD: | Pass | |
| % RPD Limit: | 32% | |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

JDR 11/3/22 GDH 11/4/22

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

Test: Ra-228
Analyst: VAL
Date: 10/26/2022
Worklist: 69468
Matrix: WT

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2627541 |
| MB concentration: | 0.453 |
| M/B 2 Sigma CSU: | 0.282 |
| MB MDC: | 0.520 |
| MB Numerical Performance Indicator: | 3.14 |
| MB Status vs Numerical Indicator: | Fail* |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS69468 | LCSD69468 |
| Count Date: | 11/2/2022 | |
| Spike I.D.: | 22-029 | |
| Decay Corrected Spike Concentration (pCi/mL): | 19.684 | |
| Volume Used (mL): | 0.20 | |
| Aliquot Volume (L, g, F): | 0.807 | |
| Target Conc. (pCi/L, g, F): | 4.881 | |
| Uncertainty (Calculated): | 0.351 | |
| Result (pCi/L, g, F): | 4.371 | |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 1.010 | |
| Numerical Performance Indicator: | -0.94 | |
| Percent Recovery: | 89.54% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 60% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/18/2022 | |
| Sample I.D. | 30530769001 | |
| Sample MS I.D. | 30530769001MS | |
| Sample MSD I.D. | | |
| Spike I.D.: | 22-029 | |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 19.783 | |
| Spike Volume Used in MS (mL): | 0.40 | |
| Spike Volume Used in MSD (mL): | | |
| MS Aliquot (L, g, F): | 0.817 | |
| MS Target Conc.(pCi/L, g, F): | 9.682 | |
| MSD Aliquot (L, g, F): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | 0.697 | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | 0.610 | |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.365 | |
| Sample Matrix Spike Result: | 8.075 | |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 1.641 | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | | |
| MS Numerical Performance Indicator: | -2.388 | |
| MSD Numerical Performance Indicator: | | |
| MS Percent Recovery: | 77.10% | |
| MSD Percent Recovery: | | |
| MS Status vs Numerical Indicator: | Warning | |
| MSD Status vs Numerical Indicator: | | |
| MS Status vs Recovery: | Pass | |
| MSD Status vs Recovery: | | |
| MS/MSD Upper % Recovery Limits: | 135% | |
| MS/MSD Lower % Recovery Limits: | 60% | |

| Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D.: | 30531436001 | Enter Duplicate |
| Duplicate Sample I.D. | 30531436001DUP | sample IDs if |
| Sample Result (pCi/L, g, F): | 0.519 | other than |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.322 | LCS/LCSD in |
| Sample Duplicate Result (pCi/L, g, F): | 0.635 | the space below. |
| Sample Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 0.384 | |
| Are sample and/or duplicate results below RL? | See Below ## | |
| Duplicate Numerical Performance Indicator: | -0.455 | 30531436001 |
| Duplicate RPD: | 20.15% | 30531436001DUP |
| Duplicate Status vs Numerical Indicator: | Pass | |
| Duplicate Status vs RPD: | Pass | |
| % RPD Limit: | 36% | |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

~~*If the lowest activity sample in this batch is greater than ten times the blank value, the blank is acceptable; otherwise this batch must be re-prepped~~

VAL 11/3/22

MB activity < MDC, Pass
VAL 11/3/22

VAL
11/3/22

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413434**
Sampling Event: October 18, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 8, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 22, 2022

This report contains the final results of the data validation conducted for the water samples collected October 18th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

__X__ Data are usable without qualification.
_____ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• The agreement between parent sample results and laboratory duplicate sample results were evaluated. The duplicate error ratios (DER) met the criterion of a DER ≤2. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>• The agreement between parent sample results and field duplicate sample results were evaluated. The DER met the criterion of a DER ≤2. | | | X |

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Equipment Blanks | No target analytes reported in the associated equipment blank. | X | | |
| Detection Limits Mets | For radiochemical results 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. | X | | |
| Tracer and/or Carrier Recovery | The sample specific recoveries were within the laboratory limits. | X | | |
| Reporting | No reporting issues were found and further qualification was not considered necessary. | X | | |
| Package Completeness | No results were qualified as unusable and the data are 100% complete. | X | | |
| **Comments** | | | | |
| 1 – During review of the data package, it was noted that the cooler temperatures upon receipt were 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. | | | | |

< – Less Than
≤ – Less Than or Equal To
σ – Sigma (Uncertainty)
% – Percent
DER – Duplicate Error Ratio
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MDC – Minimum Detectable Concentration
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable

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November 16, 2022

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

RE: Project: 60684835 PRPA CCR
Pace Project No.: 60413450

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 20, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Kansas City

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

**Pace Analytical Services Kansas**
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Illinois Certification #: 2000302021-3
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 #: T104704407-21-15
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070



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## SAMPLE SUMMARY

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413450001** | **ASH-02-CCR** | Water | 10/19/22 09:35 | 10/20/22 09:20 |
| **60413450002** | **ASH-08-CCR** | Water | 10/19/22 11:35 | 10/20/22 09:20 |

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413450001** | **ASH-02-CCR** | EPA 6010 | JDS | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | TML | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |
| **60413450002** | **ASH-08-CCR** | EPA 6010 | JDS | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | TML | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City



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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

**Sample: ASH-02-CCR** **Lab ID: 60413450001** Collected: 10/19/22 09:35 Received: 10/20/22 09:20 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **1740** | ug/L | 100 | 1 | 11/03/22 09:46 | 11/04/22 16:39 | 7440-42-8 | |
| Calcium | **153000** | ug/L | 200 | 1 | 11/03/22 09:46 | 11/04/22 16:39 | 7440-70-2 | |
| Lithium | **300** | ug/L | 10.0 | 1 | 11/03/22 09:46 | 11/04/22 16:39 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-36-0 | D3 |
| Arsenic | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-38-2 | D3 |
| Barium | **20.0** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-39-3 | |
| Beryllium | ND | ug/L | 1.5 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-41-7 | D3 |
| Cadmium | ND | ug/L | 1.5 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-47-3 | D3 |
| Cobalt | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7439-92-1 | D3 |
| Molybdenum | **6.9** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7439-98-7 | D3 |
| Selenium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7782-49-2 | D3 |
| Thallium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:07 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/07/22 07:51 | 11/07/22 10:38 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **3490** | mg/L | 100 | 1 | | 10/26/22 16:18 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **24.8** | mg/L | 5.0 | 5 | | 10/28/22 21:41 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 10/28/22 21:26 | 16984-48-8 | |
| Sulfate | **2000** | mg/L | 200 | 200 | | 10/28/22 21:56 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

**Sample: ASH-08-CCR** **Lab ID: 60413450002** Collected: 10/19/22 11:35 Received: 10/20/22 09:20 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **818** | ug/L | 100 | 1 | 11/03/22 09:46 | 11/04/22 16:41 | 7440-42-8 | |
| Calcium | **400000** | ug/L | 200 | 1 | 11/03/22 09:46 | 11/04/22 16:41 | 7440-70-2 | |
| Lithium | **306** | ug/L | 10.0 | 1 | 11/03/22 09:46 | 11/04/22 16:41 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 21:24 | 7440-36-0 | |
| Arsenic | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7440-38-2 | D3 |
| Barium | **15.9** | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7440-39-3 | |
| Beryllium | ND | ug/L | 1.5 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7440-41-7 | D3 |
| Cadmium | ND | ug/L | 0.50 | 1 | 11/03/22 09:46 | 11/09/22 21:24 | 7440-43-9 | |
| Chromium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7440-47-3 | D3 |
| Cobalt | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7439-92-1 | D3 |
| Molybdenum | ND | ug/L | 1.0 | 1 | 11/03/22 09:46 | 11/09/22 21:24 | 7439-98-7 | |
| Selenium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7782-49-2 | D3 |
| Thallium | ND | ug/L | 3.0 | 3 | 11/03/22 09:46 | 11/15/22 21:20 | 7440-28-0 | D3 |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/07/22 07:51 | 11/07/22 10:41 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **4470** | mg/L | 100 | 1 | | 10/26/22 16:18 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **31.5** | mg/L | 5.0 | 5 | | 10/28/22 22:25 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 10/28/22 22:10 | 16984-48-8 | |
| Sulfate | **2540** | mg/L | 400 | 400 | | 10/28/22 22:39 | 14808-79-8 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

QC Batch: 816846
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413450001, 60413450002

METHOD BLANK: 3248938 Matrix: Water
Associated Lab Samples: 60413450001, 60413450002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 11/07/22 10:22 | |

LABORATORY CONTROL SAMPLE: 3248939

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Mercury | ug/L | 5 | 5.1 | 102 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3248940 3248941

| Parameter | Units | 60413447001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 4.7 | 4.9 | 94 | 98 | 75-125 | 3 | 20 | |

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# QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

QC Batch: 816338
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413450001, 60413450002

METHOD BLANK: 3246686 Matrix: Water
Associated Lab Samples: 60413450001, 60413450002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Boron | ug/L | ND | 100 | 11/04/22 16:21 | |
| Calcium | ug/L | ND | 200 | 11/04/22 16:21 | |
| Lithium | ug/L | ND | 10.0 | 11/04/22 16:21 | |

LABORATORY CONTROL SAMPLE: 3246687

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Boron | ug/L | 1000 | 904 | 90 | 80-120 | |
| Calcium | ug/L | 10000 | 9660 | 97 | 80-120 | |
| Lithium | ug/L | 1000 | 918 | 92 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246688 3246689

| Parameter | Units | 60413310001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | 434 | 1000 | 1000 | 1310 | 1340 | 88 | 91 | 75-125 | 2 | 20 | |
| Calcium | ug/L | 345000 | 10000 | 10000 | 345000 | 344000 | 2 | -3 | 75-125 | 0 | 20 | M1 |
| Lithium | ug/L | 427 | 1000 | 1000 | 1450 | 1470 | 102 | 104 | 75-125 | 1 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

QC Batch: 816339
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413450001, 60413450002

METHOD BLANK: 3246698 Matrix: Water
Associated Lab Samples: 60413450001, 60413450002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Arsenic | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Barium | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Beryllium | ug/L | ND | 0.50 | 11/15/22 20:22 | |
| Cadmium | ug/L | ND | 0.50 | 11/15/22 20:22 | |
| Chromium | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Cobalt | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Lead | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Molybdenum | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Selenium | ug/L | ND | 1.0 | 11/15/22 20:22 | |
| Thallium | ug/L | ND | 1.0 | 11/15/22 20:22 | |

LABORATORY CONTROL SAMPLE: 3246699

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 40 | 41.9 | 105 | 80-120 | |
| Arsenic | ug/L | 40 | 40.4 | 101 | 80-120 | |
| Barium | ug/L | 40 | 43.2 | 108 | 80-120 | |
| Beryllium | ug/L | 40 | 44.9 | 112 | 80-120 | |
| Cadmium | ug/L | 40 | 42.7 | 107 | 80-120 | |
| Chromium | ug/L | 40 | 40.7 | 102 | 80-120 | |
| Cobalt | ug/L | 40 | 40.5 | 101 | 80-120 | |
| Lead | ug/L | 40 | 42.5 | 106 | 80-120 | |
| Molybdenum | ug/L | 40 | 43.3 | 108 | 80-120 | |
| Selenium | ug/L | 40 | 42.9 | 107 | 80-120 | |
| Thallium | ug/L | 40 | 41.2 | 103 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246700 3246701

| Parameter | Units | 60413310002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 36.3 | 37.4 | 91 | 93 | 75-125 | 3 | 20 | |
| Arsenic | ug/L | ND | 40 | 40 | 43.0 | 44.0 | 106 | 109 | 75-125 | 2 | 20 | |
| Barium | ug/L | 9.4 | 40 | 40 | 55.6 | 56.0 | 116 | 117 | 75-125 | 1 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 43.1 | 41.4 | 108 | 104 | 75-125 | 4 | 20 | |
| Cadmium | ug/L | ND | 40 | 40 | 34.3 | 35.5 | 86 | 89 | 75-125 | 3 | 20 | |
| Chromium | ug/L | ND | 40 | 40 | 35.2 | 44.6 | 88 | 111 | 75-125 | 24 | 20 | R1 |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3246700 3246701

| Parameter | Units | 60413310002 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 | 42.0 | 42.6 | 104 | 106 | 75-125 | 2 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 42.6 | 43.2 | 106 | 108 | 75-125 | 1 | 20 | |
| Molybdenum | ug/L | ND | 40 | 40 | 43.7 | 45.2 | 107 | 111 | 75-125 | 3 | 20 | |
| Selenium | ug/L | 142 | 40 | 40 | 196 | 198 | 135 | 140 | 75-125 | 1 | 20 | M1 |
| Thallium | ug/L | ND | 40 | 40 | 42.3 | 43.0 | 106 | 108 | 75-125 | 2 | 20 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

QC Batch: 814748
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413450001, 60413450002

METHOD BLANK: 3240236 Matrix: Water
Associated Lab Samples: 60413450001, 60413450002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | ND | 5.0 | 10/26/22 16:18 | |

LABORATORY CONTROL SAMPLE: 3240237

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1000 | 977 | 98 | 80-120 | |

SAMPLE DUPLICATE: 3240238

| Parameter | Units | 60413473006 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 352 | 352 | 0 | 10 | |

SAMPLE DUPLICATE: 3240239

| Parameter | Units | 60413480003 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1160 | 1170 | 1 | 10 | |

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# QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

QC Batch: 815092
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413450001, 60413450002

METHOD BLANK: 3241646 Matrix: Water
Associated Lab Samples: 60413450001, 60413450002

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 10/28/22 16:35 | |
| Fluoride | mg/L | ND | 0.20 | 10/28/22 16:35 | |
| Sulfate | mg/L | ND | 1.0 | 10/28/22 16:35 | |

LABORATORY CONTROL SAMPLE: 3241647

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 94 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.4 | 94 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 97 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3241648 3241649

| Parameter | Units | 60413701002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 174 | 250 | 250 | 397 | 396 | 89 | 89 | 80-120 | 0 | 15 | |
| Fluoride | mg/L | 0.22 | 2.5 | 2.5 | 3.4 | 3.3 | 126 | 124 | 80-120 | 1 | 15 | M1 |
| Sulfate | mg/L | 329 | 250 | 250 | 591 | 594 | 105 | 106 | 80-120 | 1 | 15 | |

SAMPLE DUPLICATE: 3241650

| Parameter | Units | 60413701002 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 174 | 167 | 4 | 15 | |
| Fluoride | mg/L | 0.22 | 0.21 | 5 | 15 | |
| Sulfate | mg/L | 329 | 327 | 1 | 15 | |

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

## REPORT OF LABORATORY ANALYSIS

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Lenexa, KS 66219
(913)599-5665

# QUALIFIERS

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

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



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835 PRPA CCR
Pace Project No.: 60413450

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413450001** | **ASH-02-CCR** | EPA 3010 | 816338 | EPA 6010 | 816357 |
| **60413450002** | **ASH-08-CCR** | EPA 3010 | 816338 | EPA 6010 | 816357 |
| **60413450001** | **ASH-02-CCR** | EPA 3010 | 816339 | EPA 6020 | 816358 |
| **60413450002** | **ASH-08-CCR** | EPA 3010 | 816339 | EPA 6020 | 816358 |
| **60413450001** | **ASH-02-CCR** | EPA 7470 | 816846 | EPA 7470 | 816908 |
| **60413450002** | **ASH-08-CCR** | EPA 7470 | 816846 | EPA 7470 | 816908 |
| **60413450001** | **ASH-02-CCR** | SM 2540C | 814748 | | |
| **60413450002** | **ASH-08-CCR** | SM 2540C | 814748 | | |
| **60413450001** | **ASH-02-CCR** | EPA 9056 | 815092 | | |
| **60413450002** | **ASH-08-CCR** | EPA 9056 | 815092 | | |



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WO# : 60413450

60413450

| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-LENE-0009_Sampl | | |
|---|---|---|---|
| | Revision: 2 | Effective Date: 01/12/2022 | Issued By: Lenexa |

Client Name: AECOM

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

**Tracking #:** 609107906872 Pace Shipping Label Used? Yes ☐ No ☑

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

**Packing Material:** Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ Ice pic

**Thermometer Used:** 7299 **Type of Ice:** (Wet) Blue None

**Cooler Temperature (°C):** **As-read** 0.4 **Corr. Factor** 0.0 **Corrected** 0.4

**Date and initials of person examining contents:** 10-20-2021 GC

Temperature should be above freezing to 6°C

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 55192 | ☑Yes ☐No ☐N/A | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks: Lead acetate strip turns dark? (Record only) | ☐Yes ☐No | |
| Potassium iodide test strip turns blue/purple? (Preserve) | ☐Yes ☐No | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Qualtrax Document ID: 30468

Page 1 of 1

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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.

Page: / of /

| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | |
|---|---|---|---|---|---|
| Company: | AECOM | Report To: | Vasanta Kalluri | Attention: | Accounts Payable |
| Address: | 6200 South Quebec St | Copy To: | Brian Rothmeyer | Company Name: | AECOM |
| | Greenwood Village, CO 80111 | | | Address: | Same as Section A |
| Email To: | brian.rothmeyer@aecom.com | Purchase Order No.: | 136205 | Pace Quote Reference: | 42700 |
| Phone: | (303) 740-2614 Fax: | Project Name: | 60659991 PRPA CCR | Pace Project Manager: | Heather Wilson |
| Requested Due Date/TAT: | | Project Number: | 60659991 | Pace Profile #: | No RLI - 11033, 3 |

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Requested Analysis Filtered (Y/N)**

Section D Required Client Information

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

Valid Matrix Codes

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

| ITEM # | Section D: SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED: COMPOSITE START DATE | COLLECTED: COMPOSITE START TIME | COLLECTED: COMPOSITE END/GRAB DATE | COLLECTED: COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-02-CCR | WT | G | 10/19/22 | 0935 | — | — | | 3 | X | | X | | | | | | X | X | X | X | X | | 60413450 |
| 2 | ASH-08-CCR | WT | G | 10/19/22 | 1135 | — | — | | 3 | X | | X | | | | | | X | X | X | X | X | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Drew Woodward AECOM | ~~10/19/22~~ | 13:10 | | 10-20-22 | 0920 | 5.4 | Y | Y | Y |
| **B, Ca, Li | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

**SAMPLER NAME AND SIGNATURE**

PRINT Name of SAMPLER: Drew Woodward

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 10/19/2022

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



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

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413450**
Sampling Event: October 19, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 7, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 20, 2022

This report contains the final results of the data validation conducted for the water samples collected October 19th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

__X__ Data are usable without qualification.
_____ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | X | | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• 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%.<br>• 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. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below: | | | X |

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td></td><td>• When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.<br>• 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.</td><td></td><td></td><td></td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.<table><tr><th>Analyte</th><th>Concentration</th></tr><tr><td colspan="2">60413923</td></tr><tr><td colspan="2">ERB-2-CCR</td></tr><tr><td>TDS</td><td>10.5 mg/L</td></tr><tr><td colspan="2">60414572</td></tr><tr><td colspan="2">ERB-1-CCR</td></tr><tr><td>TDS</td><td>5.5 mg/L</td></tr></table>mg/L – Milligrams per Liter<br>TDS – Total Dissolved Solids</td><td></td><td>X[1]</td><td></td></tr>
<tr><td>Reporting Limits Met</td><td>No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits.</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – As the TDS sample results were reported at concentrations >5x the concentration of the blank contamination, qualification was not considered necessary.<br><br>2 – 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.</td></tr>
</table>

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
% – Percent
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
mg/L – Milligrams per Liter
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
RL – Reporting Limit
RPD – Relative Percent Difference
TDS – Total Dissolved Solid

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November 09, 2022

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

RE: Project: 60684835 PRPA CCR
Pace Project No.: 60413496

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 20, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Greensburg

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

**Pace Analytical Services Pennsylvania**
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
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 #: PA014572018-1
New Hampshire/TNI Certification #: 297617
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 #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
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
Wyoming Certification #: 8TMS-L



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## SAMPLE SUMMARY

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413496001** | **ASH-02-CCR** | Water | 10/19/22 09:35 | 10/20/22 15:00 |
| **60413496002** | **ASH-08-CCR** | Water | 10/19/22 11:35 | 10/20/22 15:00 |

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## SAMPLE ANALYTE COUNT

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413496001** | **ASH-02-CCR** | EPA 903.1 | JDZ | 1 | PASI-PA |
| | | EPA 904.0 | JJS1 | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60413496002** | **ASH-08-CCR** | EPA 903.1 | JDZ | 1 | PASI-PA |
| | | EPA 904.0 | JJS1 | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |

PASI-PA = Pace Analytical Services - Greensburg



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

**Sample: ASH-02-CCR** **Lab ID: 60413496001** Collected: 10/19/22 09:35 Received: 10/20/22 15:00 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **-0.310 ± 0.373 (1.01) C:NA T:85%** | pCi/L | 10/31/22 16:12 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.410 ± 0.652 (1.41) C:75% T:69%** | pCi/L | 10/28/22 19:34 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.410 ± 1.03 (2.42)** | pCi/L | 11/04/22 14:47 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

**Sample: ASH-08-CCR** **Lab ID: 60413496002** Collected: 10/19/22 11:35 Received: 10/20/22 15:00 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.513 ± 0.595 (0.960) C:NA T:91%** | pCi/L | 10/31/22 16:12 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **1.13 ± 0.559 (0.946) C:73% T:86%** | pCi/L | 10/28/22 18:52 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.64 ± 1.15 (1.91)** | pCi/L | 11/04/22 14:47 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

QC Batch: 541976
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413496001, 60413496002

METHOD BLANK: 2630386
Matrix: Water
Associated Lab Samples: 60413496001, 60413496002

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-228 | 0.570 ± 0.410 (0.803) C:77% T:85% | pCi/L | 10/28/22 15:40 | |

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

## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

QC Batch: 541975
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413496001, 60413496002

METHOD BLANK: 2630384
Matrix: Water
Associated Lab Samples: 60413496001, 60413496002

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-226 | 0.110 ± 0.265 (0.512) C:NA T:95% | pCi/L | 10/31/22 15:39 | |

**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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# QUALIFIERS

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

**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.



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Lenexa, KS 66219
(913)599-5665

## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835 PRPA CCR
Pace Project No.: 60413496

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413496001** | **ASH-02-CCR** | EPA 903.1 | 541975 | | |
| **60413496002** | **ASH-08-CCR** | EPA 903.1 | 541975 | | |
| **60413496001** | **ASH-02-CCR** | EPA 904.0 | 541976 | | |
| **60413496002** | **ASH-08-CCR** | EPA 904.0 | 541976 | | |
| **60413496001** | **ASH-02-CCR** | Total Radium Calculation | 544839 | | |
| **60413496002** | **ASH-08-CCR** | Total Radium Calculation | 544839 | | |



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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.

Page: / of /

**Section A** Required Client Information:

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

**Section B** Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| | |
| Purchase Order No.: | 136205 |
| Project Name: | 60659991 PRPA CCR |
| Project Number: | 60659991 |

**Section C** Invoice Information:

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

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: CO

**Section D** Required Client Information

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

**Valid Matrix Codes**

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

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED: COMPOSITE START DATE | COLLECTED: COMPOSITE START TIME | COLLECTED: COMPOSITE END/GRAB DATE | COLLECTED: COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-02-CCR | WT | G | 10/19/22 | 0935 | | | | 2 | | | X | | | | | | | X | X | X | | |
| 2 | ASH-08-CCR | WT | G | 10/19/22 | 1135 | | | | 2 | | | X | | | | | | | X | X | X | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Drew Woodward AECOM | 10/19/22 | 13:10 | | 10-20-22 | 15:00 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Drew Woodward

SIGNATURE of SAMPLER: _____ DATE Signed (MM/DD/YY): 10/19/2022

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



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

# Internal Transfer Chain of Custody

Pace Analytical®
www.pacelabs.com

[X] Samples Pre-Logged into eCOC.

**State Of Origin:** CO
**Cert. Needed:** [ ] Yes [X] No

**Workorder:** 60413496 **Workorder Name:** 60684835 PRPA CCR **Owner Received Date:** 10/20/2022 **Results Requested By:** 11/10/2022

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

Requested Analysis

| Item | Sample ID | Sample Type | Collect Date/Time | Lab ID | Matrix | Preserved Containers: Other | | | | | | Total Radium-226 & Total Sum Radium | Total Radium-228 | | | | | | | | | | | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-02-CCR | PS | 10/19/2022 09:35 | 60413496001 | Water | 2 | | | | | | X | X | | | | | | | | | | | |
| 2 | ASH-08-CCR | PS | 10/19/2022 11:35 | 60413496002 | Water | 2 | | | | | | X | X | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | |

| Transfers | Released By | Date/Time | Received By | Date/Time |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | [signature] | 10/20/22 |
| 3 | | | | |

**Comments**

IR30- Radium QC Sheets Required

1500

| Cooler Temperature on Receipt ___°C | Custody Seal Y or (N) | Received on Ice Y or (N) | Samples Intact (Y) or N |
|---|---|---|---|

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

WO#: 30531808
30531808

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www.pacelabs.com

# CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: | of |

| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | |
|---|---|---|---|---|---|
| Company: | AECOM | Report To: | Vasanta Kalluri | Attention: | Accounts Payable |
| Address: | 6200 South Quebec St | Copy To: | Brian Rothmeyer | Company Name: | AECOM |
| | Greenwood Village, CO 80111 | | | Address: | Same as Section A |
| Email To: | brian.rothmeyer@aecom.com | Purchase Order No.: | 136205 | Pace Quote Reference: | 42700 |
| Phone: | (303) 740-2614 Fax: | Project Name: | 60659991 PRPA CCR | Pace Project Manager: | Heather Wilson |
| Requested Due Date/TAT: | | Project Number: | 60659991 | Pace Profile #: | 11033, 3 |

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER

☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: CO

Requested Analysis Filtered (Y/N)

Section D Required Client Information

Valid Matrix Codes

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

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

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-02-CCR | WT | G | 10/19/22 | 0935 | | | | 2 | | | X | | | | | | X | X | X | | 001 |
| 2 | ASH-08-CCR | WT | G | 10/19/22 | 1135 | | | | 2 | | | X | | | | | | X | X | X | | 002 |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
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| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |

**WO# : 30531808**

PM: MAR Due Date: 11/10/22

CLIENT: PACE_60_LEKS

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Drew Woodward AECOM | 10/19/22 | 13:10 | | 10-20-22 | 15:20 | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Drew Woodward

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 10/19/2022

Temp in °C: 1 | Received on Ice (Y/N): Y | Custody Sealed Cooler (Y/N): Y | Samples Intact (Y/N): Y



*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 v02_Sample Condition Upon Receipt-Pittsburgh |
|---|---|
| Pace ANALYTICAL SERVICES | Effective Date: 10/03/2022 |

**Client Name:** AECOM **Project #:**

**Courier:** ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

**Tracking Number:** 6091 0790 6736

Examined By PS
Labeled By PS
Temped By —

**Custody Seal on Cooler/Box Present:** ☑ Yes ☐ No **Seals Intact:** ☑ Yes ☐ No PS 10/20/22

**Thermometer Used:** — **Type of Ice:** Wet Blue ~~None~~

**Cooler Temperature:** Observed Temp — °C Correction Factor: — °C Final Temp: — °C
Temp should be above freezing to 6°C

| Comments: | Yes | No | NA | pH paper Lot# 1002221 / D.P.D. Residual Chlorine Lot # — |
|---|---|---|---|---|
| Chain of Custody Present | ✓ | | | 1. |
| Chain of Custody Filled Out: | ✓ | | | 2. |
| -Were client corrections present on COC | | ✓ | | |
| Chain of Custody Relinquished | ✓ | | | 3. |
| Sampler Name & Signature on COC: | | ✓ | | 4. |
| Sample Labels match COC: | ✓ | | | 5. |
| -Includes date/time/ID | | | | |
| Matrix: | WT | | | |
| Samples Arrived within Hold Time: | ✓ | | | 6. |
| **Short Hold Time Analysis (<72hr remaining):** | | ✓ | | 7. |
| **Rush Turn Around Time Requested:** | | ✓ | | 8. |
| Sufficient Volume: | ✓ | | | 9. |
| Correct Containers Used: | ✓ | | | 10. |
| -Pace Containers Used | ✓ | | | |
| Containers Intact: | ✓ | | | 11. |
| Orthophosphate field filtered: | | | ✓ | 12. |
| Hex Cr Aqueous samples field filtered: | | | ✓ | 13. |
| Organic Samples checked for dechlorination | | | ✓ | 14: |
| Filtered volume received for dissolved tests: | | | ✓ | 15: |
| **All containers checked for preservation:** | ✓ | | | 16. |
| exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix | | | | PHC2 |
| **All containers meet method preservation requirements:** | ✓ | | | Initial when completed PS / Date/Time of Preservation / Lot# of added Preservative |
| Headspace in VOA Vials (>6mm): | | | ✓ | 17. |
| Trip Blank Present: | | ✓ | | 18. |
| Trip Blank Custody Seals Present | | ✓ | | |
| **Rad Samples Screened <0.5 mrem/hr.** | ✓ | | | Initial when completed PS / Date: 10/20/22 / Survey Meter SN: 1563 |

**Comments:**

WO#: 30531808
Due Date: 11/10/22
PM: MAR
CLIENT: PACE_60_LEKS

**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.

Qualtrax ID: 55680

# Quality Control Sample Performance Assessment

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| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | JDZ |
| Date: | 10/25/2022 |
| Batch ID: | 69533 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2630384 |
| MB concentration: | 0.110 |
| M/B Counting Uncertainty: | 0.265 |
| MB MDC: | 0.512 |
| MB Numerical Performance Indicator: | 0.82 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS69533 | LCSD69533 |
| Count Date: | 10/31/2022 | |
| Spike I.D.: | 21-040 | |
| Spike Concentration (pCi/mL): | 32.424 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.651 | |
| Target Conc. (pCi/L, g, F): | 4.980 | |
| Uncertainty (Calculated): | 0.234 | |
| Result (pCi/L, g, F): | 4.854 | |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 1.123 | |
| Numerical Performance Indicator: | -0.22 | |
| Percent Recovery: | 97.46% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 73% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/14/2022 | |
| Sample I.D. | 30531574001 | |
| Sample MS I.D. | 30531574001MS | |
| Sample MSD I.D. | | |
| Spike I.D.: | 21-040 | |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 32.425 | |
| Spike Volume Used in MS (mL): | 0.20 | |
| Spike Volume Used in MSD (mL): | | |
| MS Aliquot (L, g, F): | 0.651 | |
| MS Target Conc.(pCi/L, g, F): | 9.961 | |
| MSD Aliquot (L, g, F): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | 0.468 | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | 0.512 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.375 | |
| Sample Matrix Spike Result: | 12.305 | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.597 | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| MS Numerical Performance Indicator: | 2.104 | |
| MSD Numerical Performance Indicator: | | |
| MS Percent Recovery: | 118.39% | |
| MSD Percent Recovery: | | |
| MS Status vs Numerical Indicator: | N/A | |
| MSD Status vs Numerical Indicator: | | |
| MS Status vs Recovery: | Pass | |
| MSD Status vs Recovery: | | |
| MS/MSD Upper % Recovery Limits: | 136% | |
| MS/MSD Lower % Recovery Limits: | 71% | |

| Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D.: | 30531782002 | Enter Duplicate sample IDs if other than LCS/LCSD in the space below. |
| Duplicate Sample I.D. | 30531782002DUP | |
| Sample Result (pCi/L, g, F): | 0.821 | |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.537 | |
| Sample Duplicate Result (pCi/L, g, F): | 0.569 | |
| Sample Duplicate Result Counting Uncertainty (pCi/L, g, F): | 0.522 | |
| Are sample and/or duplicate results below RL? | See Below ## | |
| Duplicate Numerical Performance Indicator: | 0.659 | 30531782002 |
| Duplicate RPD: | 36.22% | 30531782002DUP |
| Duplicate Status vs Numerical Indicator: | N/A | |
| Duplicate Status vs RPD: | Fail*** | |
| % RPD Limit: | 32% | |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

~~***Batch must be re-prepped due to unacceptable precision.~~ results < MDC, NA 10/31/22
< 5x MDC, NI, 2 acceptable

CLM 10/31/22

GDH 10/31/22

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-228 |
| Analyst: | JJS1 |
| Date: | 10/26/2022 |
| Worklist: | 69534 |
| Matrix: | WT |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2630386 |
| MB concentration: | 0.570 |
| M/B 2 Sigma CSU: | 0.410 |
| MB MDC: | 0.803 |
| MB Numerical Performance Indicator: | 2.73 |
| MB Status vs Numerical Indicator: | Warning |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS69534 | LCSD69534 |
| Count Date: | 10/28/2022 | |
| Spike I.D.: | 22-029 | |
| Decay Corrected Spike Concentration (pCi/mL): | 19.716 | |
| Volume Used (mL): | 0.20 | |
| Aliquot Volume (L, g, F): | 0.810 | |
| Target Conc. (pCi/L, g, F): | 4.868 | |
| Uncertainty (Calculated): | 0.350 | |
| Result (pCi/L, g, F): | 4.049 | |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 0.957 | |
| Numerical Performance Indicator: | -1.57 | |
| Percent Recovery: | 83.18% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 60% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/19/2022 | |
| Sample I.D. | 30532065001 | |
| Sample MS I.D. | 30532065001MS | |
| Sample MSD I.D. | | |
| Spike I.D.: | 22-029 | |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 19.776 | |
| Spike Volume Used in MS (mL): | 0.40 | |
| Spike Volume Used in MSD (mL): | | |
| MS Aliquot (L, g, F): | 0.808 | |
| MS Target Conc.(pCi/L, g, F): | 9.788 | |
| MSD Aliquot (L, g, F): | | |
| MSD Target Conc. (pCi/L, g, F): | | |
| MS Spike Uncertainty (calculated): | 0.705 | |
| MSD Spike Uncertainty (calculated): | | |
| Sample Result: | 0.252 | |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.388 | |
| Sample Matrix Spike Result: | 10.074 | |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.017 | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | | |
| MS Numerical Performance Indicator: | 0.031 | |
| MSD Numerical Performance Indicator: | | |
| MS Percent Recovery: | 100.35% | |
| MSD Percent Recovery: | | |
| MS Status vs Numerical Indicator: | Pass | |
| MSD Status vs Numerical Indicator: | | |
| MS Status vs Recovery: | Pass | |
| MSD Status vs Recovery: | | |
| MS/MSD Upper % Recovery Limits: | 135% | |
| MS/MSD Lower % Recovery Limits: | 60% | |

| Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D.: | 30531658001 | Enter Duplicate sample IDs if other than LCS/LCSD in the space below. |
| Duplicate Sample I.D. | 30531658001DUP | |
| Sample Result (pCi/L, g, F): | 0.303 | |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.372 | |
| Sample Duplicate Result (pCi/L, g, F): | -0.113 | |
| Sample Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 0.292 | |
| Are sample and/or duplicate results below RL? | See Below ## | |
| Duplicate Numerical Performance Indicator: | 1.720 | 30531658001 |
| Duplicate RPD: | 436.79% | 30531658001DUP |
| Duplicate Status vs Numerical Indicator: | Pass | |
| Duplicate Status vs RPD: | Fail*** | |
| % RPD Limit: | 36% | |

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | | |
| Sample MS I.D. | | |
| Sample MSD I.D. | | |
| Sample Matrix Spike Result: | | |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | | |
| Sample Matrix Spike Duplicate Result: | | |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | | |
| Duplicate Numerical Performance Indicator: | | |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | | |
| MS/ MSD Duplicate Status vs Numerical Indicator: | | |
| MS/ MSD Duplicate Status vs RPD: | | |
| % RPD Limit: | | |

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

**Comments:**

VAL 10/31/22 JWW 10.31.22

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413496**
Sampling Event: October 19, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 8, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 22, 2022

This report contains the final results of the data validation conducted for the water samples collected October 19th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• The agreement between parent sample results and laboratory duplicate sample results were evaluated. The duplicate error ratios (DER) met the criterion of a DER ≤2. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>• The agreement between parent sample results and field duplicate sample results were evaluated. The DER met the criterion of a DER ≤2. | | | X |

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.</td><td>X</td><td></td><td></td></tr>
<tr><td>Detection Limits Mets</td><td>For radiochemical results 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.
<table>
<tr><th>Sample</th><th>Analyte</th><th>Result (pCi/L)</th><th>2 Sigma (σ) Uncertainty</th><th>MDC (pCi/L)</th></tr>
<tr><td>ASH-08-CCR</td><td>Radium-226</td><td>0.513</td><td>± 0.595</td><td>0.960</td></tr>
</table>
± – Plus or Minus<br>pCi/L – Picocuries Per Liter<br>MDC – Minimum Detectable Concentration</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Tracer and/or Carrier Recovery</td><td>The sample specific recoveries were within the laboratory limits.</td><td>X</td><td></td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – During review of the data package, it was noted that the cooler temperatures upon receipt were 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.<br><br>2 – For the total radium-226 result for sample ASH-08-CCR, the 2 sigma (σ) uncertainty multiplied by 1.65 was greater than the reported minimum detectable concentration (MDC) and was qualified as estimated (J v) indicating the detection limit criteria was not met.</td></tr>
</table>

< – Less Than
≤ – Less Than or Equal To
σ – Sigma (Uncertainty)
% – Percent
± – Plus or Minus
DER – Duplicate Error Ratio
J – Estimated Concentration, Indeterminate Bias
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MDC – Minimum Detectable Concentration
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
pCi/L – Picocuries Per Liter
v – Compound Identification Issue

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November 07, 2022

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

RE: Project: 60684835 PRPA CCR
Pace Project No.: 60413551

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 21, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Greensburg

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**Pace Analytical Services Pennsylvania**
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
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 #: PA014572018-1
New Hampshire/TNI Certification #: 297617
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 #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
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
Wyoming Certification #: 8TMS-L



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## SAMPLE SUMMARY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413551001** | **ASH-05-CCR** | Water | 10/20/22 10:00 | 10/21/22 10:20 |
| **60413551002** | **DUP-01-CCR** | Water | 10/20/22 00:00 | 10/21/22 10:20 |
| **60413551003** | **ASH-04-CCR** | Water | 10/20/22 14:00 | 10/21/22 10:20 |
| **60413551004** | **ASH-04-CCR MS** | Water | 10/20/22 14:00 | 10/21/22 10:20 |
| **60413551005** | **ASH-04-CCR MSD** | Water | 10/20/22 14:00 | 10/21/22 10:20 |
| **60413551006** | **ERB-01-CCR** | Water | 10/20/22 16:00 | 10/21/22 10:20 |



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## SAMPLE ANALYTE COUNT

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413551001** | **ASH-05-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60413551002** | **DUP-01-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60413551003** | **ASH-04-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |
| **60413551004** | **ASH-04-CCR MS** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| **60413551005** | **ASH-04-CCR MSD** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| **60413551006** | **ERB-01-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |

PASI-PA = Pace Analytical Services - Greensburg



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**Sample: ASH-05-CCR** **Lab ID: 60413551001** Collected: 10/20/22 10:00 Received: 10/21/22 10:20 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.178 ± 0.308 (0.550) C:NA T:95%** | pCi/L | 11/03/22 14:48 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.607 ± 0.357 (0.649) C:80% T:88%** | pCi/L | 11/03/22 13:01 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.785 ± 0.665 (1.20)** | pCi/L | 11/04/22 14:47 | 7440-14-4 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**Sample: DUP-01-CCR** **Lab ID: 60413551002** Collected: 10/20/22 00:00 Received: 10/21/22 10:20 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.618 ± 0.559 (0.824) C:NA T:90%** | pCi/L | 11/03/22 14:48 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.661 ± 0.452 (0.888) C:79% T:88%** | pCi/L | 11/03/22 13:01 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **1.28 ± 1.01 (1.71)** | pCi/L | 11/04/22 14:47 | 7440-14-4 | |

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**Sample: ASH-04-CCR** **Lab ID: 60413551003** Collected: 10/20/22 14:00 Received: 10/21/22 10:20 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.443 ± 0.379 (0.514) C:NA T:92%** | pCi/L | 11/03/22 15:03 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **1.87 ± 0.609 (0.837) C:73% T:87%** | pCi/L | 11/03/22 13:01 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **2.31 ± 0.988 (1.35)** | pCi/L | 11/04/22 14:47 | 7440-14-4 | |

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**Sample: ASH-04-CCR MS** **Lab ID: 60413551004** Collected: 10/20/22 14:00 Received: 10/21/22 10:20 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **101.32 %REC ± NA (NA) C:NA T:NA** | pCi/L | 11/03/22 15:03 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **70.95 %REC ± NA (NA) C:NA T:NA** | pCi/L | 11/03/22 13:01 | 15262-20-1 | |

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**Sample: ASH-04-CCR MSD** **Lab ID: 60413551005** Collected: 10/20/22 14:00 Received: 10/21/22 10:20 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **79.10 %REC 24.63RPD ± NA (NA) C:NA T:NA** | pCi/L | 11/03/22 15:03 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **80.69 %REC 12.85 RPD ± NA (NA) C:NA T:NA** | pCi/L | 11/03/22 13:01 | 15262-20-1 | |

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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**Sample: ERB-01-CCR** **Lab ID: 60413551006** Collected: 10/20/22 16:00 Received: 10/21/22 10:20 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.131 ± 0.316 (0.610) C:NA T:93%** | pCi/L | 11/03/22 15:03 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.214 ± 0.383 (0.838) C:72% T:87%** | pCi/L | 11/03/22 13:02 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.345 ± 0.699 (1.45)** | pCi/L | 11/04/22 14:47 | 7440-14-4 | |



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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

QC Batch: 541958
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413551001, 60413551002, 60413551003, 60413551004, 60413551005, 60413551006

METHOD BLANK: 2630332 Matrix: Water
Associated Lab Samples: 60413551001, 60413551002, 60413551003, 60413551004, 60413551005, 60413551006

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-226 | 0.000 ± 0.221 (0.357) C:NA T:95% | pCi/L | 11/03/22 14:25 | |

**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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## QUALITY CONTROL - RADIOCHEMISTRY

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

QC Batch: 541961
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413551001, 60413551002, 60413551003, 60413551004, 60413551005, 60413551006

METHOD BLANK: 2630344 Matrix: Water
Associated Lab Samples: 60413551001, 60413551002, 60413551003, 60413551004, 60413551005, 60413551006

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-228 | 0.855 ± 0.353 (0.530) C:76% T:90% | pCi/L | 11/03/22 12:59 | |

**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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# QUALIFIERS

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

**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.



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835 PRPA CCR
Pace Project No.: 60413551

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413551001** | **ASH-05-CCR** | EPA 903.1 | 541958 | | |
| **60413551002** | **DUP-01-CCR** | EPA 903.1 | 541958 | | |
| **60413551003** | **ASH-04-CCR** | EPA 903.1 | 541958 | | |
| **60413551004** | **ASH-04-CCR MS** | EPA 903.1 | 541958 | | |
| **60413551005** | **ASH-04-CCR MSD** | EPA 903.1 | 541958 | | |
| **60413551006** | **ERB-01-CCR** | EPA 903.1 | 541958 | | |
| **60413551001** | **ASH-05-CCR** | EPA 904.0 | 541961 | | |
| **60413551002** | **DUP-01-CCR** | EPA 904.0 | 541961 | | |
| **60413551003** | **ASH-04-CCR** | EPA 904.0 | 541961 | | |
| **60413551004** | **ASH-04-CCR MS** | EPA 904.0 | 541961 | | |
| **60413551005** | **ASH-04-CCR MSD** | EPA 904.0 | 541961 | | |
| **60413551006** | **ERB-01-CCR** | EPA 904.0 | 541961 | | |
| **60413551001** | **ASH-05-CCR** | Total Radium Calculation | 544839 | | |
| **60413551002** | **DUP-01-CCR** | Total Radium Calculation | 544839 | | |
| **60413551003** | **ASH-04-CCR** | Total Radium Calculation | 544839 | | |
| **60413551006** | **ERB-01-CCR** | Total Radium Calculation | 544839 | | |



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CCR
Pitt

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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.

Page: | of

**Section A** — Required Client Information:

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

**Section B** — Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | ~~136205~~ 145279 |
| Project Name: | ~~60659991~~ PRPA CCR 606848835 |
| Project Number: | ~~60659991~~ 606848835 |

**Section C** — Invoice Information:

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

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** — Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-05-CCR | WT | G | — | — | 10.20.22 | 10:00 | | 2 | | | X | | | | | | X | X | X | | |
| 2 | DUP-01-CCR | WT | G | — | — | 10.20.22 | — | | 2 | | | X | | | | | | X | X | X | | |
| 3 | ASH-04-CCR | WT | G | — | — | 10.20.22 | 14:00 | | 6 | | | X | | | | | | X | X | X | | MS / MSD |
| 4 | ERB-01-CCR | WT | G | — | — | 10.20.22 | 16:00 | | 2 | | | X | | | | | | X | X | X | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | |

HNO3 10-20

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Wes Weichert / AECOM | 10.20.22 | 17:00 | | 10-21-22 | 630 | |

**SAMPLER NAME AND SIGNATURE**

PRINT Name of SAMPLER: Wes Weichert

SIGNATURE of SAMPLER: Wes Weichert

DATE Signed (MM/DD/YY): 10/20/22

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



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

# Internal Transfer Chain of Custody

Pace Analytical®
www.pacelabs.com

[X] Samples Pre-Logged into eCOC.

**State Of Origin:** CO
**Cert. Needed:** [ ] Yes [X] No

**Workorder:** 60413551 **Workorder Name:** 60684835 PRPA CCR
**Owner Received Date:** 10/21/2022 **Results Requested By:** 11/11/2022

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

| Item | Sample ID | Sample Type | Collect Date/Time | Lab ID | Matrix | Preserved Containers: Other | Requested Analysis: Total Radium-226 & Total Sum Radium | Total Radium-226 | Total Radium-228 | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-05-CCR | PS | 10/20/2022 10:00 | 60413551001 | Water | 2 | X | X | X | |
| 2 | DUP-01-CCR | PS | 10/20/2022 00:00 | 60413551002 | Water | 2 | X | X | X | |
| 3 | ASH-04-CCR | PS | 10/20/2022 14:00 | 60413551003 | Water | 2 | X | X | X | |
| 4 | ASH-04-CCR MS | PS | 10/20/2022 14:00 | 60413551004 | Water | 2 | | X | X | |
| 5 | ASH-04-CCR MSD | PS | 10/20/2022 14:00 | 60413551005 | Water | 2 | | X | X | |
| 6 | ERB-01-CCR | PS | 10/20/2022 16:00 | 60413551006 | Water | 2 | X | X | X | |

| Transfers | Released By | Date/Time | Received By | Date/Time |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | Rwp No. 1K | 10/21/22 1020 |
| 3 | | | | |

**Comments:** IR30- Radium QC Sheets Required

**Cooler Temperature on Receipt** ~ °C | **Custody Seal** Y or (N) | **Received on Ice** Y or (N) | **Samples Intact** (Y) or N

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

WO# : 30531925
30531925

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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.

CCR
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Page: 1 of 1

**Section A** — Required Client Information:

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

**Section B** — Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | ~~136205~~ 145279 |
| Project Name: | ~~60659991~~ PRPA CCR 606848 35 |
| Project Number: | ~~60659991~~ 60684835 |

**Section C** — Invoice Information:

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

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** — Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-05-CCR | WT | G | — | — | 10.20.22 | 10:00 | | 2 | | | X | | | | | | X | X | X | | |
| 2 | DUP-01-CCR | WT | G | — | — | 10.20.22 | — | | 2 | | | X | | | | | | X | X | X | | |
| 3 | ASH-04-CCR | WT | G | — | — | 10.20.22 | 14.00 | | 6 | | | X | | | | | | X | X | X | | MS / MSD |
| 4 | ERB-01-CCR | WT | G | — | — | 10.20.22 | 16:00 | | 2 | | | X | | | | | | X | X | X | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | |

WIW 10-20

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Wes Weichert / AECOM | 10.20.22 | 17:00 | | 10-21-22 | 630 | |

**WO# : 30531925**

PM: MAR Due Date: 11/11/22

CLIENT: PACE_60_LEKS

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Wes Weichert

SIGNATURE of SAMPLER: Wes Weichert

DATE Signed (MM/DD/YY): 10/20/22

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



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

| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-GBUR-0088 v02_Sample Condition Upon Receipt-Pittsburgh |
|---|---|
| | Effective Date: 10/03/2022 |

**Client Name:** AECOM **Project #:**

**Courier:** ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

**Tracking Number:** 6091 0790 6449 / 6091 0790 6450 6091 0790 6460

| | |
|---|---|
| Examined By | PS |
| Labeled By | PS |
| Temped By | — |

**Custody Seal on Cooler/Box Present:** ☐ Yes ☑ ~~No~~ **Seals Intact:** ☐ Yes ☐ ~~No~~

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

**Cooler Temperature:** Observed Temp ____ °C Correction Factor: ____ °C Final Temp: ____ °C

Temp should be above freezing to 6°C

| Comments: | Yes | No | NA | pH paper Lot# 1002221 / D.P.D. Residual Chlorine Lot # — |
|---|---|---|---|---|
| Chain of Custody Present | ✓ | | | 1. |
| Chain of Custody Filled Out: | ✓ | | | 2. |
| -Were client corrections present on COC | | ✓ | | |
| Chain of Custody Relinquished | ✓ | | | 3. |
| Sampler Name & Signature on COC: | ✓ | | | 4. |
| Sample Labels match COC: -Includes date/time/ID Matrix: WT | ✓ | | | 5. |
| Samples Arrived within Hold Time: | ✓ | | | 6. |
| **Short Hold Time Analysis (<72hr remaining):** | | ✓ | | 7. |
| **Rush Turn Around Time Requested:** PS | ✓ | ✓ | | 8. |
| Sufficient Volume: 10/21/22 | ✓ | | | 9. |
| Correct Containers Used: | ✓ | | | 10. |
| -Pace Containers Used | ✓ | | | |
| Containers Intact: | ✓ | | | 11. |
| Orthophosphate field filtered: | | | ✓ | 12. |
| Hex Cr Aqueous samples field filtered: | | | ✓ | 13. |
| Organic Samples checked for dechlorination | | | ✓ | 14: |
| Filtered volume received for dissolved tests: | | | ✓ | 15: |
| **All containers checked for preservation:** exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix | ✓ | | | 16. pH<2 |
| **All containers meet method preservation requirements:** | ✓ | | | Initial when completed PS / Date/Time of Preservation / Lot# of added Preservative |
| Headspace in VOA Vials (>6mm): | | | ✓ | 17. |
| Trip Blank Present: | | ✓ | | 18. |
| Trip Blank Custody Seals Present | | ✓ | | |
| **Rad Samples Screened <0.5 mrem/hr.** | ✓ | | | Initial when completed PS / Date: 10/21/22 / Survey Meter SN: 1563 |

**Comments:**

WO#: 30531925
PM: MAR Due Date: 11/11/22
CLIENT: PACE_60_LEKS

**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.

Qualtrax ID: 55680

# Quality Control Sample Performance Assessment

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| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | GDH |
| Date: | 10/26/2022 |
| Batch ID: | 69527 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2630332 |
| MB concentration: | 0.000 |
| M/B Counting Uncertainty: | 0.134 |
| MB MDC: | 0.357 |
| MB Numerical Performance Indicator: | 0.00 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS69527 | LCSD69527 |
| Count Date: | 11/3/2022 | |
| Spike I.D.: | 21-040 | |
| Spike Concentration (pCi/mL): | 32.424 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.656 | |
| Target Conc. (pCi/L, g, F): | 4.944 | |
| Uncertainty (Calculated): | 0.232 | |
| Result (pCi/L, g, F): | 4.657 | |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 0.945 | |
| Numerical Performance Indicator: | -0.58 | |
| Percent Recovery: | 94.19% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 73% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/20/2022 | 10/20/2022 |
| Sample I.D. | 60413548003 | 60413551003 |
| Sample MS I.D. | 60413548004 | 60413551004 |
| Sample MSD I.D. | 60413548005 | 60413551005 |
| Spike I.D.: | 21-040 | 21-040 |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 32.425 | 32.425 |
| Spike Volume Used in MS (mL): | 0.20 | 0.20 |
| Spike Volume Used in MSD (mL): | 0.20 | 0.20 |
| MS Aliquot (L, g, F): | 0.650 | 0.655 |
| MS Target Conc.(pCi/L, g, F): | 9.976 | 9.902 |
| MSD Aliquot (L, g, F): | 0.655 | 0.655 |
| MSD Target Conc. (pCi/L, g, F): | 9.904 | 9.903 |
| MS Spike Uncertainty (calculated): | 0.469 | 0.465 |
| MSD Spike Uncertainty (calculated): | 0.465 | 0.465 |
| Sample Result: | 0.625 | 0.443 |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.350 | 0.376 |
| Sample Matrix Spike Result: | 12.111 | 10.476 |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.535 | 1.497 |
| Sample Matrix Spike Duplicate Result: | 11.348 | 8.276 |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.517 | 1.244 |
| MS Numerical Performance Indicator: | 1.801 | 0.159 |
| MSD Numerical Performance Indicator: | 0.987 | -2.938 |
| MS Percent Recovery: | 115.14% | 101.32% |
| MSD Percent Recovery: | 108.26% | 79.10% |
| MS Status vs Numerical Indicator: | N/A | N/A |
| MSD Status vs Numerical Indicator: | N/A | N/A |
| MS Status vs Recovery: | Pass | Pass |
| MSD Status vs Recovery: | Pass | Pass |
| MS/MSD Upper % Recovery Limits: | 136% | 136% |
| MS/MSD Lower % Recovery Limits: | 71% | 71% |

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

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | 60413548003 | 60413551003 |
| Sample MS I.D. | 60413548004 | 60413551004 |
| Sample MSD I.D. | 60413548005 | 60413551005 |
| Sample Matrix Spike Result: | 12.111 | 10.476 |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.535 | 1.497 |
| Sample Matrix Spike Duplicate Result: | 11.348 | 8.276 |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.517 | 1.244 |
| Duplicate Numerical Performance Indicator: | 0.694 | 2.214 |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 6.15% | 24.63% |
| MS/ MSD Duplicate Status vs Numerical Indicator: | N/A | N/A |
| MS/ MSD Duplicate Status vs RPD: | Pass | Pass |
| % RPD Limit: | 32% | 32% |

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

**Comments:**

GDH 11/3/22

SDS 11/3/22

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-228 |
| Analyst: | VAL |
| Date: | 10/27/2022 |
| Worklist: | 69528 |
| Matrix: | WT |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2630344 |
| MB concentration: | 0.855 |
| M/B 2 Sigma CSU: | 0.353 |
| MB MDC: | 0.530 |
| MB Numerical Performance Indicator: | 4.74 |
| MB Status vs Numerical Indicator: | Fail* |
| MB Status vs. MDC: | See Comment* |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS69528 | LCSD69528 |
| Count Date: | 11/3/2022 | |
| Spike I.D.: | 22-029 | |
| Decay Corrected Spike Concentration (pCi/mL): | 19.678 | |
| Volume Used (mL): | 0.20 | |
| Aliquot Volume (L, g, F): | 0.652 | |
| Target Conc. (pCi/L, g, F): | 6.039 | |
| Uncertainty (Calculated): | 0.435 | |
| Result (pCi/L, g, F): | 6.864 | |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 1.528 | |
| Numerical Performance Indicator: | 1.02 | |
| Percent Recovery: | 113.65% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 60% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/20/2022 | 10/20/2022 |
| Sample I.D. | 60413548003 | 60413551003 |
| Sample MS I.D. | 60413548004 | 60413551004 |
| Sample MSD I.D. | 60413548005 | 60413551005 |
| Spike I.D.: | 22-029 | 22-029 |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 19.768 | 19.768 |
| Spike Volume Used in MS (mL): | 0.40 | 0.40 |
| Spike Volume Used in MSD (mL): | 0.40 | 0.40 |
| MS Aliquot (L, g, F): | 0.804 | 0.814 |
| MS Target Conc.(pCi/L, g, F): | 9.836 | 9.718 |
| MSD Aliquot (L, g, F): | 0.802 | 0.803 |
| MSD Target Conc. (pCi/L, g, F): | 9.859 | 9.853 |
| MS Spike Uncertainty (calculated): | 0.708 | 0.700 |
| MSD Spike Uncertainty (calculated): | 0.710 | 0.709 |
| Sample Result: | -0.100 | 1.875 |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.504 | 0.609 |
| Sample Matrix Spike Result: | 10.321 | 8.770 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.032 | 1.805 |
| Sample Matrix Spike Duplicate Result: | 12.013 | 9.826 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.343 | 2.020 |
| MS Numerical Performance Indicator: | 0.519 | -2.726 |
| MSD Numerical Performance Indicator: | 1.767 | -1.675 |
| MS Percent Recovery: | 105.95% | 70.95% |
| MSD Percent Recovery: | 122.86% | 80.69% |
| MS Status vs Numerical Indicator: | Pass | Warning |
| MSD Status vs Numerical Indicator: | Pass | Pass |
| MS Status vs Recovery: | Pass | Pass |
| MSD Status vs Recovery: | Pass | Pass |
| MS/MSD Upper % Recovery Limits: | 135% | 135% |
| MS/MSD Lower % Recovery Limits: | 60% | 60% |

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

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | 60413548003 | 60413551003 |
| Sample MS I.D. | 60413548004 | 60413551004 |
| Sample MSD I.D. | 60413548005 | 60413551005 |
| Sample Matrix Spike Result: | 10.321 | 8.770 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.032 | 1.805 |
| Sample Matrix Spike Duplicate Result: | 12.013 | 9.826 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.343 | 2.020 |
| Duplicate Numerical Performance Indicator: | -1.069 | -0.764 |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 14.78% | 12.85% |
| MS/ MSD Duplicate Status vs Numerical Indicator: | Pass | Pass |
| MS/ MSD Duplicate Status vs RPD: | Pass | Pass |
| % RPD Limit: | 36% | 36% |

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

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

VAL
11/4/22

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413551**
Sampling Event: October 20, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 9, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 22, 2022

This report contains the final results of the data validation conducted for the water samples collected October 20th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? Yes | No | NA |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | | | |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB.<br>**Analyte** / **Concentration**<br>**MB 2630344**<br>Radium-228 / 0.855 ± 0.353 pCi/L<br>± – Plus or Minus<br>pCi/L – Picocuries Per Liter<br>MB – Method Blank | | X[2] | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | X | | |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• The agreement between parent sample results and laboratory duplicate sample results were evaluated. The duplicate error ratios (DER) met the criterion of a DER ≤2. | | | X |

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>**Parent Sample**: ASH-05-CCR; **Field Duplicate**: DUP-01-CCR<br>• The agreement between parent sample results and field duplicate sample results were evaluated. The DER met the criterion of a DER ≤2. | X | | |
| Equipment Blanks | No target analytes reported in the associated equipment blank. | X | | |
| Detection Limits Mets | For radiochemical results 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. | X | | |
| Tracer and/or Carrier Recovery | The sample specific recoveries were within the laboratory limits. | X | | |
| Reporting | No reporting issues were found and further qualification was not considered necessary. | X | | |
| Package Completeness | No results were qualified as unusable and the data are 100% complete. | X | | |

**Comments**

1 – During review of the data package, it was noted that the cooler temperatures upon receipt were 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.

2 – The associated total radium-228 result for sample ASH-04-CCR was reported at a concentration greater than the minimum detectable concentration (MDC) and reported at a concentration less than 5x the concentration of the blank contamination; therefore, the result was qualified as estimated (J+ bl) to reflect the potential high bias.

< – Less Than
≤ – Less Than or Equal To
σ – Sigma (Uncertainty)
% – Percent
bl – Method Blank Contamination
DER – Duplicate Error Ratio
J+ – Estimated Concentration, High Bias
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MDC – Minimum Detectable Concentration
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
pCi/L – Picocuries Per Liter

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November 18, 2022

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

RE: Project: PRPA CCR 60684835
Pace Project No.: 60413701

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 22, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Kansas City

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

Sincerely,

Heather M. Wilson

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

Enclosures

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



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## CERTIFICATIONS

Project: PRPA CCR 60684835
Pace Project No.: 60413701

**Pace Analytical Services Kansas**

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Illinois Certification #: 2000302021-3
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 #: T104704407-21-15
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070



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## SAMPLE SUMMARY

Project: PRPA CCR 60684835
Pace Project No.: 60413701

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413701001** | **ASH-07-CCR** | Water | 10/21/22 10:00 | 10/22/22 11:25 |



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## SAMPLE ANALYTE COUNT

Project: PRPA CCR 60684835
Pace Project No.: 60413701

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413701001** | **ASH-07-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| | | EPA 7470 | ALH | 1 | PASI-K |
| | | SM 2540C | TML | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City



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## ANALYTICAL RESULTS

Project: PRPA CCR 60684835
Pace Project No.: 60413701

**Sample: ASH-07-CCR** **Lab ID: 60413701001** Collected: 10/21/22 10:00 Received: 10/22/22 11:25 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **810** | ug/L | 100 | 1 | 11/07/22 14:34 | 11/11/22 09:59 | 7440-42-8 | |
| Calcium | **410000** | ug/L | 200 | 1 | 11/07/22 14:34 | 11/11/22 09:59 | 7440-70-2 | |
| Lithium | **538** | ug/L | 10.0 | 1 | 11/07/22 14:34 | 11/11/22 09:59 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 5.0 | 5 | 11/07/22 14:34 | 11/17/22 11:36 | 7440-36-0 | D3 |
| Arsenic | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7440-38-2 | |
| Barium | **11.5** | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7440-41-7 | |
| Cadmium | ND | ug/L | 2.5 | 5 | 11/07/22 14:34 | 11/17/22 11:36 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7440-48-4 | |
| Lead | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 16:57 | 7439-98-7 | D3 |
| Selenium | **81.7** | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7782-49-2 | |
| Thallium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 09:56 | 7440-28-0 | |
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/10/22 13:07 | 11/11/22 09:26 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **6630** | mg/L | 167 | 1 | | 10/28/22 12:20 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056 | | | | | | | |
| | Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **277** | mg/L | 200 | 200 | | 10/28/22 23:38 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 10/28/22 23:23 | 16984-48-8 | |
| Sulfate | **4290** | mg/L | 1000 | 1000 | | 10/28/22 23:52 | 14808-79-8 | |

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## QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413701

QC Batch: 817614
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413701001

METHOD BLANK: 3251638 Matrix: Water
Associated Lab Samples: 60413701001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 11/11/22 09:22 | |

LABORATORY CONTROL SAMPLE: 3251639

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Mercury | ug/L | 5 | 5.0 | 100 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3251640 3251642

| Parameter | Units | 60413701002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 5.2 | 5.0 | 103 | 99 | 75-125 | 4 | 20 | |

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# QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413701

QC Batch: 816990
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413701001

METHOD BLANK: 3249441 Matrix: Water
Associated Lab Samples: 60413701001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Boron | ug/L | ND | 100 | 11/11/22 09:55 | |
| Calcium | ug/L | ND | 200 | 11/11/22 09:55 | |
| Lithium | ug/L | ND | 10.0 | 11/11/22 09:55 | |

LABORATORY CONTROL SAMPLE: 3249442

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Boron | ug/L | 1000 | 931 | 93 | 80-120 | |
| Calcium | ug/L | 10000 | 9800 | 98 | 80-120 | |
| Lithium | ug/L | 1000 | 958 | 96 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3249443 3249444

| Parameter | Units | 60413701002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | 214 | 1000 | 1000 | 1180 | 1170 | 97 | 95 | 75-125 | 1 | 20 | |
| Calcium | ug/L | 89000 | 10000 | 10000 | 101000 | 99400 | 116 | 104 | 75-125 | 1 | 20 | |
| Lithium | ug/L | 84.3 | 1000 | 1000 | 1080 | 1080 | 100 | 99 | 75-125 | 0 | 20 | |

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# QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413701

QC Batch: 816992
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City

Associated Lab Samples: 60413701001

METHOD BLANK: 3249445 Matrix: Water
Associated Lab Samples: 60413701001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Arsenic | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Barium | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Beryllium | ug/L | ND | 0.50 | 11/17/22 09:24 | |
| Cadmium | ug/L | ND | 0.50 | 11/17/22 09:24 | |
| Chromium | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Cobalt | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Lead | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Molybdenum | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Selenium | ug/L | ND | 1.0 | 11/17/22 09:24 | |
| Thallium | ug/L | ND | 1.0 | 11/17/22 09:24 | |

LABORATORY CONTROL SAMPLE: 3249446

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 40 | 40.3 | 101 | 80-120 | |
| Arsenic | ug/L | 40 | 41.0 | 102 | 80-120 | |
| Barium | ug/L | 40 | 40.7 | 102 | 80-120 | |
| Beryllium | ug/L | 40 | 41.9 | 105 | 80-120 | |
| Cadmium | ug/L | 40 | 42.2 | 105 | 80-120 | |
| Chromium | ug/L | 40 | 40.8 | 102 | 80-120 | |
| Cobalt | ug/L | 40 | 36.7 | 92 | 80-120 | |
| Lead | ug/L | 40 | 39.9 | 100 | 80-120 | |
| Molybdenum | ug/L | 40 | 42.4 | 106 | 80-120 | |
| Selenium | ug/L | 40 | 43.1 | 108 | 80-120 | |
| Thallium | ug/L | 40 | 40.7 | 102 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3249447 3249448

| Parameter | Units | 60413701002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 38.3 | 37.8 | 95 | 94 | 75-125 | 1 | 20 | |
| Arsenic | ug/L | 1.1 | 40 | 40 | 38.5 | 38.3 | 93 | 93 | 75-125 | 1 | 20 | |
| Barium | ug/L | 29.5 | 40 | 40 | 67.8 | 67.5 | 96 | 95 | 75-125 | 0 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 36.5 | 37.6 | 91 | 94 | 75-125 | 3 | 20 | |
| Cadmium | ug/L | ND | 40 | 40 | 34.8 | 34.3 | 87 | 86 | 75-125 | 1 | 20 | |
| Chromium | ug/L | ND | 40 | 40 | 39.0 | 38.6 | 95 | 94 | 75-125 | 1 | 20 | |

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## QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413701

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3249447 3249448

| Parameter | Units | 60413701002 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 | 32.3 | 32.2 | 80 | 80 | 75-125 | 0 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 36.2 | 36.1 | 90 | 90 | 75-125 | 0 | 20 | |
| Molybdenum | ug/L | 6.1 | 40 | 40 | 43.2 | 43.2 | 93 | 93 | 75-125 | 0 | 20 | |
| Selenium | ug/L | 3.1 | 40 | 40 | 40.1 | 40.0 | 92 | 92 | 75-125 | 0 | 20 | |
| Thallium | ug/L | ND | 40 | 40 | 37.7 | 37.3 | 94 | 93 | 75-125 | 1 | 20 | |

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## QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413701

QC Batch: 815261
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413701001

METHOD BLANK: 3242370 Matrix: Water
Associated Lab Samples: 60413701001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | ND | 5.0 | 10/28/22 12:20 | |

LABORATORY CONTROL SAMPLE: 3242371

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1000 | 1010 | 101 | 80-120 | |

SAMPLE DUPLICATE: 3242372

| Parameter | Units | 60413645003 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 879 | 877 | 0 | 10 | |

SAMPLE DUPLICATE: 3242373

| Parameter | Units | 60413701002 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 877 | 904 | 3 | 10 | |

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# QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413701

QC Batch: 815092
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City

Associated Lab Samples: 60413701001

METHOD BLANK: 3241646 Matrix: Water
Associated Lab Samples: 60413701001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 10/28/22 16:35 | |
| Fluoride | mg/L | ND | 0.20 | 10/28/22 16:35 | |
| Sulfate | mg/L | ND | 1.0 | 10/28/22 16:35 | |

LABORATORY CONTROL SAMPLE: 3241647

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.7 | 94 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.4 | 94 | 80-120 | |
| Sulfate | mg/L | 5 | 4.9 | 97 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3241648 3241649

| Parameter | Units | 60413701002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 174 | 250 | 250 | 397 | 396 | 89 | 89 | 80-120 | 0 | 15 | |
| Fluoride | mg/L | 0.22 | 2.5 | 2.5 | 3.4 | 3.3 | 126 | 124 | 80-120 | 1 | 15 | M1 |
| Sulfate | mg/L | 329 | 250 | 250 | 591 | 594 | 105 | 106 | 80-120 | 1 | 15 | |

SAMPLE DUPLICATE: 3241650

| Parameter | Units | 60413701002 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 174 | 167 | 4 | 15 | |
| Fluoride | mg/L | 0.22 | 0.21 | 5 | 15 | |
| Sulfate | mg/L | 329 | 327 | 1 | 15 | |

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# QUALIFIERS

Project: PRPA CCR 60684835
Pace Project No.: 60413701

## 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. |
| M1 | Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery. |



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

## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: PRPA CCR 60684835
Pace Project No.: 60413701

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413701001** | **ASH-07-CCR** | EPA 3010 | 816990 | EPA 6010 | 817051 |
| **60413701001** | **ASH-07-CCR** | EPA 3010 | 816992 | EPA 6020 | 817052 |
| **60413701001** | **ASH-07-CCR** | EPA 7470 | 817614 | EPA 7470 | 817817 |
| **60413701001** | **ASH-07-CCR** | SM 2540C | 815261 | | |
| **60413701001** | **ASH-07-CCR** | EPA 9056 | 815092 | | |



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WO# : 60413701

60413701

| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-LENE-0009_Samp | | |
|---|---|---|---|
| | Revision: 2 | Effective Date: 01/12/2022 | Issued By: Lenexa |

Client Name: Aecom

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

**Tracking #:** 6091 0740 7049 Pace Shipping Label Used? Yes ☐ No ☑

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

**Packing Material:** Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☐

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

**Cooler Temperature (°C):** **As-read** 3.4 **Corr. Factor** 0.0 **Corrected** 3.4

**Date and initials of person examining contents:** AF 10/24

Temperature should be above freezing to 6°C

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 6204001 | ☑Yes ☐No ☐N/A | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks: Lead acetate strip turns dark? (Record only) | ☐Yes ☐No | |
| Potassium iodide test strip turns blue/purple? (Preserve) | ☐Yes ☐No | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Pace Analytical
www.paceanalytical.com

# CHAIN-OF-CUSTODY / Analytical Request Document

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

CCR KS
ASH

Page: 1 of 1

**Section A** — Required Client Information:

| | |
|---|---|
| Company: | AECOM |
| Address: | 6200 South Quebec St |
| | Greenwood Village, CO 80111 |
| Email To: | brian.rothmeyer@aecom.com |
| Phone: (303) 740-2614 | Fax: |
| Requested Due Date/TAT: | 15 day |

**Section B** — Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | ~~130205~~ 145279 |
| Project Name: | ~~60659991~~ PRPA CCR 60684835 |
| Project Number: | ~~60659991~~ 60684835 |

**Section C** — Invoice Information:

| | |
|---|---|
| Attention: | Accounts Payable |
| Company Name: | AECOM |
| Address: | Same as Section A |
| Pace Quote Reference: | 42700 |
| Pace Project Manager: | Heather Wilson |
| Pace Profile #: | No RLI - 11033, 3 |

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** — Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-07-CCR | WT | G | — | — | 10.21.22 | 10:00 | | 3 | X | | X | | | | | | X | X | X | X | X | | 60413701 |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | |
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| 12 | | | | | | | | | | | | | | | | | | | | | | | | |

WW 10.21

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS: Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|
| b, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Wes Weichert AECOM | 10.21.22 | 16:00 | | 10/22/22 | 1125 | 3.4 | Y | Y | |
| , Ca, Li | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Wes Weichert

SIGNATURE of SAMPLER: Wes Weichert

DATE Signed (MM/DD/YY): 10/21/22



*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.

Pace Analytical
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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.

CCR KS
BAT

Page: 1 of 1

| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | |
|---|---|---|---|---|---|
| Company: | AECOM | Report To: | Vasanta Kalluri | Attention: | Accounts Payable |
| Address: | 6200 South Quebec St | Copy To: | Brian Rothmeyer | Company Name: | AECOM |
| | Greenwood Village, CO 80111 | | | Address: | Same as Section A |
| Email To: | brian.rothmeyer@aecom.com | Purchase Order No.: | ~~430205~~ 145279 | Pace Quote Reference: | 42700 |
| Phone: | (303) 740-2614 Fax: | Project Name: | ~~60059994~~ PRPA CCR 60684835 | Pace Project Manager: | Heather Wilson |
| Requested Due Date/TAT: | | Project Number: | ~~60059994~~ 60684835 | Pace Profile #: | No RLI - 11033, 3 |

**REGULATORY AGENCY**

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

**Site Location STATE:** CO

**Requested Analysis Filtered (Y/N)**

Section D Required Client Information

Valid Matrix Codes

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

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

| ITEM # | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED: COMPOSITE START DATE | COMPOSITE START TIME | COMPOSITE END/GRAB DATE | COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | WT | G | — | — | 10.21.22 | 12:00 | | 9 | X | | X | | | | | | X | X | X | X | X | | MS/MSD 60413701 |
| 2 | WT | G | — | — | 10.21.22 | — | | 3 | X | | X | | | | | | X | X | X | X | X | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
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WW
10-21

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| b, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Wes Weichert AECOM | 10.21.22 | 16:00 | | 10/22/22 | 1125 | 3.4 | Y | Y | |
| l, Ca, Li | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

**SAMPLER NAME AND SIGNATURE**

PRINT Name of SAMPLER: Wes Weichert

SIGNATURE of SAMPLER: Wes Weichert

DATE Signed (MM/DD/YY): 10/21/22

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

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

Client: Aecom Profile # 11033-3

Site: 60684835 Notes

| COC Line Item | Matrix | VG9H | DG9H | DG9Q | VG9U | DG9U | DG9M | DG9B | BG1U | AG1H | AG1U | AG2U | AG3S | AG4U | AG5U | JGFU | WGKU | WGDU | BP1U | BP2U | BP3U | BP1N | BP3N | BP3F | BP3S | BP3C | BP3Z | WPDU | ZPLC | Other | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | WT | | | | | | | | | | | | | | | | | | 1 | | 1 | 1 | | | | | | | | | | |
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| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Container Codes

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

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

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

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

Work Order Number: 60413701

Client: Aecom

Profile # 11033-3

Site: 60684835

Notes

| COC Line Item | Matrix | VG9H | DG9H | DG9Q | VG9U | DG9U | DG9M | DG9B | BG1U | AG1H | AG1U | AG2U | AG3S | AG4U | AG5U | JGFU | WGKU | WGDU | BP1U | BP2U | BP3U | BP1N | BP3N | BP3F | BP3S | BP3C | BP3Z | WPDU | ZPLC | Other | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | WT | | | | | | | | | | | | | | | | | | 3 | | 3 | 3 | | | | | | | | | | |
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| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Container Codes

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

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

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

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

Work Order Number: 60413701

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413701**
Sampling Event: October 21, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 7, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 20, 2022

This report contains the final results of the data validation conducted for the water samples collected October 21st, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

__X__ Data are usable without qualification.
_____ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | X | | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• 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%.<br>• 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. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below: | | | X |

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td></td><td>• When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.<br>• 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.</td><td></td><td></td><td></td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.<table><tr><th>Analyte</th><th>Concentration</th></tr><tr><td colspan="2">60413923</td></tr><tr><td colspan="2">ERB-2-CCR</td></tr><tr><td>TDS</td><td>10.5 mg/L</td></tr><tr><td colspan="2">60414572</td></tr><tr><td colspan="2">ERB-1-CCR</td></tr><tr><td>TDS</td><td>5.5 mg/L</td></tr></table>mg/L – Milligrams per Liter<br>TDS – Total Dissolved Solids</td><td></td><td>X[1]</td><td></td></tr>
<tr><td>Reporting Limits Met</td><td>No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits.</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – As the TDS sample results were reported at concentrations >5x the concentration of the blank contamination, qualification was not considered necessary.<br><br>2 – 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.</td></tr>
</table>

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
% – Percent
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
mg/L – Milligrams per Liter
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
RL – Reporting Limit
RPD – Relative Percent Difference
TDS – Total Dissolved Solid

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

November 15, 2022

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

RE: Project: PRPA CCR 60684835
Pace Project No.: 60413738

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 22, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Greensburg

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

Sincerely,

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

Enclosures

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



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## CERTIFICATIONS

Project: PRPA CCR 60684835
Pace Project No.: 60413738

**Pace Analytical Services Pennsylvania**
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
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 #: PA014572018-1
New Hampshire/TNI Certification #: 297617
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 #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
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
Wyoming Certification #: 8TMS-L



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## SAMPLE SUMMARY

Project: PRPA CCR 60684835
Pace Project No.: 60413738

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413738001** | **ASH-07-CCR** | Water | 10/21/22 10:00 | 10/22/22 09:45 |



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## SAMPLE ANALYTE COUNT

Project: PRPA CCR 60684835
Pace Project No.: 60413738

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413738001** | **ASH-07-CCR** | EPA 903.1 | GDH | 1 | PASI-PA |
| | | EPA 904.0 | VAL | 1 | PASI-PA |
| | | Total Radium Calculation | JAL | 1 | PASI-PA |

PASI-PA = Pace Analytical Services - Greensburg



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## ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: PRPA CCR 60684835
Pace Project No.: 60413738

**Sample: ASH-07-CCR** **Lab ID: 60413738001** Collected: 10/21/22 10:00 Received: 10/22/22 09:45 Matrix: Water
PWS: Site ID: Sample Type:

| Parameters | Method | Act ± Unc (MDC) Carr Trac | Units | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-226 | EPA 903.1 | **0.391 ± 0.445 (0.702) C:NA T:93%** | pCi/L | 11/07/22 15:15 | 13982-63-3 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Radium-228 | EPA 904.0 | **0.505 ± 0.289 (0.506) C:84% T:87%** | pCi/L | 11/08/22 12:45 | 15262-20-1 | |
| | Pace Analytical Services - Greensburg | | | | | |
| Total Radium | Total Radium Calculation | **0.896 ± 0.734 (1.21)** | pCi/L | 11/09/22 15:55 | 7440-14-4 | |



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## QUALITY CONTROL - RADIOCHEMISTRY

Project: PRPA CCR 60684835
Pace Project No.: 60413738

QC Batch: 542533
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413738001

METHOD BLANK: 2632953 Matrix: Water
Associated Lab Samples: 60413738001

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-228 | 0.335 ± 0.296 (0.596) C:83% T:87% | pCi/L | 11/08/22 12:45 | |

**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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## QUALITY CONTROL - RADIOCHEMISTRY

Project: PRPA CCR 60684835
Pace Project No.: 60413738

QC Batch: 542532
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 60413738001

METHOD BLANK: 2632952 Matrix: Water
Associated Lab Samples: 60413738001

| Parameter | Act ± Unc (MDC) Carr Trac | Units | Analyzed | Qualifiers |
|---|---|---|---|---|
| Radium-226 | 0.117 ± 0.324 (0.629) C:NA T:95% | pCi/L | 11/07/22 15:15 | |

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

## REPORT OF LABORATORY ANALYSIS

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# QUALIFIERS

Project: PRPA CCR 60684835
Pace Project No.: 60413738

**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.



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: PRPA CCR 60684835
Pace Project No.: 60413738

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413738001** | **ASH-07-CCR** | EPA 903.1 | 542532 | | |
| **60413738001** | **ASH-07-CCR** | EPA 904.0 | 542533 | | |
| **60413738001** | **ASH-07-CCR** | Total Radium Calculation | 545857 | | |



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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.

CCR PA ASH

Page: 1 of 1

**Section A** — Required Client Information:

| | |
|---|---|
| Company: | AECOM |
| Address: | 6200 South Quebec St<br>Greenwood Village, CO 80111 |
| Email To: | brian.rothmeyer@aecom.com |
| Phone: (303) 740-2614 | Fax: |
| Requested Due Date/TAT: | 15 day |

**Section B** — Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | ~~436205~~ 145279 |
| Project Name: | ~~60659991~~ PRPA CCR 60684835 |
| Project Number: | ~~60659991~~ 60684835 |

**Section C** — Invoice Information:

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

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** — Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

| # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-07-CCR | WT | G | — | — | 10.21.22 | 10:00 | | 2 | | | X | | | | | | X | X | X | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | MW | | | | | | | | | | | | | | | | | |
| 5 | | | | | | 10.21 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Wes Weichert AECOM | 10.21.22 | 16:00 | | | | |
| | | | | [signature] | 10/22/22 | 9:45 | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Wes Weichert

SIGNATURE of SAMPLER: Wes Weichert DATE Signed (MM/DD/YY): 10/21/22

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



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

# Internal Transfer Chain of Custody

Pace Analytical®
www.pacelabs.com

☐ Samples Pre-Logged into eCOC.

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

**Workorder:** 60413738 **Workorder Name:** PRPA CCR 60684835
**Owner Received Date:** 10/22/2022 **Results Requested By:** 11/14/2022

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

| Item | Sample ID | Sample Type | Collect Date/Time | Lab ID | Matrix | Preserved Containers: Other | Requested Analysis: Total Radium-226 & Total Sum Radium | Requested Analysis: Total Radium-228 | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-07-CCR | PS | 10/21/2022 10:00 | 60413738001 | Water | 2 | X | X | 001 |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |

| Transfers | Released By | Date/Time | Received By | Date/Time |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | [signature] | 10/22/22 945 |
| 3 | | | | |

**Comments**
IR30- Radium QC Sheets Required

**Cooler Temperature on Receipt** — °C | **Custody Seal** Y or (N) | **Received on Ice** Y or (N) | **Samples Intact** (Y) or N

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

**WO# : 30532444**
30532444

| | DC#_Title: ENV-FRM-GBUR-0088 v02_Sample Condition Upon Receipt-Pittsburgh |
|---|---|
| Pace ANALYTICAL SERVICES | Effective Date: 10/03/2022 |

**Client Name:** AECOM **Project #:**

**Courier:** ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

**Tracking Number:** 6091 0790 6471 / 7944 4844 3020

| | |
|---|---|
| Examined By | PS |
| Labeled By | PS |
| Temped By | — |

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

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

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

Temp should be above freezing to 6°C

| pH paper Lot# | D.P.D. Residual Chlorine Lot # |
|---|---|
| 10022221 | — |

| Comments: | Yes | No | NA | |
|---|---|---|---|---|
| Chain of Custody Present | ✓ | | | 1. |
| Chain of Custody Filled Out: | ✓ | | | 2. |
| -Were client corrections present on COC | | ✓ | | |
| Chain of Custody Relinquished | ✓ | | | 3. |
| Sampler Name & Signature on COC: | | ✓ | | 4. |
| Sample Labels match COC: | ✓ | | | 5. |
| -Includes date/time/ID | | | | |
| Matrix: | WT | | | |
| Samples Arrived within Hold Time: | ✓ | | | 6. |
| **Short Hold Time Analysis (<72hr remaining):** | | ✓ | | 7. |
| **Rush Turn Around Time Requested:** | | ✓ | | 8. |
| Sufficient Volume: | ✓ | | | 9. |
| Correct Containers Used: | ✓ | | | 10. |
| -Pace Containers Used | ✓ | | | |
| Containers Intact: | ✓ | | | 11. |
| Orthophosphate field filtered: | | | ✓ | 12. |
| Hex Cr Aqueous samples field filtered: | | | ✓ | 13. |
| Organic Samples checked for dechlorination | | | ✓ | 14: |
| Filtered volume received for dissolved tests: | | | ✓ | 15: |
| **All containers checked for preservation:** exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix | ✓ | | | 16. pH<2 |
| **All containers meet method preservation requirements:** | ✓ | | | Initial when completed: PS; Date/Time of Preservation: ; Lot# of added Preservative: |
| Headspace in VOA Vials (>6mm): | | | ✓ | 17. |
| Trip Blank Present: | | ✓ | | 18. |
| Trip Blank Custody Seals Present | | ✓ | | |
| **Rad Samples Screened <0.5 mrem/hr.** | ✓ | | | Initial when completed: PS; Date: 10/25/22; Survey Meter SN: 1563 |

**Comments:**

WO#:30532444 Due Date: 11/14/22 PM: MAR CLIENT: PACE_60_LEKS

**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.

Qualtrax ID: 55680

Pace Analytical
www.pacelabs.com

# CHAIN-OF-CUSTODY / Analytical Request Document

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

CCR PA ASH



**Section A**
Required Client Information:

Company: AECOM
Address: 6200 South Quebec St
Greenwood Village, CO 80111
Email To: brian.rothmeyer@aecom.com
Phone: (303) 740-2614 Fax:
Requested Due Date/TAT: 15 day

**Section B**
Required Project Information:

Report To: Vasanta Kalluri
Copy To: Brian Rothmeyer
Purchase Order No.: ~~436205~~ 145279
Project Name: ~~60659991~~ PRPA CCR 60684835
Project Number: ~~60659991~~ 60684835

**Section C**
Invoice Information:

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

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER

**WO#: 30532444**

**PM: MAR Due Date: 11/14/22**

**CLIENT: PACE_60_LEKS**

Requested A

**Section D**
Required Client Information

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

Valid Matrix Codes

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

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | Radium-226 | Radium-228 | Total Radium | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-07-CCR | WT | G | — | — | 10.21.22 | 10:00 | | 2 | | | X | | | | | | X | X | X | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | TW | | | | | | | | | | | | | | | | | |
| 5 | | | | | | 10.21 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| | Wes Weichert AECOM | 10.21.22 | 16:00 | | | | |
| | | | | | | | |
| | | | | Rhys Keller | 10/22/22 | 945 | |
| | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Wes Weichert

SIGNATURE of SAMPLER: Wes Weichert

DATE Signed (MM/DD/YY): 10/21/22

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



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

# Quality Control Sample Performance Assessment

Pace Analytical™ www.pacelabs.com

| | |
|---|---|
| Test: | Ra-228 |
| Analyst: | VAL |
| Date: | 11/2/2022 |
| Worklist: | 69581 |
| Matrix: | WT |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| Method Blank Assessment | |
|---|---|
| MB Sample ID | 2632953 |
| MB concentration: | 0.335 |
| M/B 2 Sigma CSU: | 0.296 |
| MB MDC: | 0.596 |
| MB Numerical Performance Indicator: | 2.22 |
| MB Status vs Numerical Indicator: | Warning |
| MB Status vs. MDC: | Pass |

| Laboratory Control Sample Assessment | LCSD (Y or N)? | N |
|---|---|---|
| | LCS69581 | LCSD69581 |
| Count Date: | 11/8/2022 | |
| Spike I.D.: | 22-029 | |
| Decay Corrected Spike Concentration (pCi/mL): | 19.644 | |
| Volume Used (mL): | 0.20 | |
| Aliquot Volume (L, g, F): | 0.802 | |
| Target Conc. (pCi/L, g, F): | 4.900 | |
| Uncertainty (Calculated): | 0.353 | |
| Result (pCi/L, g, F): | 5.438 | |
| LCS/LCSD 2 Sigma CSU (pCi/L, g, F): | 1.189 | |
| Numerical Performance Indicator: | 0.85 | |
| Percent Recovery: | 110.98% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 60% | |

| Sample Matrix Spike Control Assessment | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/21/2022 | 10/21/2022 |
| Sample I.D. | 60413739001 | 60413740003 |
| Sample MS I.D. | 60413739002 | 60413740004 |
| Sample MSD I.D. | 60413739003 | 60413740005 |
| Spike I.D.: | 22-029 | 22-029 |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 19.763 | 19.763 |
| Spike Volume Used in MS (mL): | 0.40 | 0.40 |
| Spike Volume Used in MSD (mL): | 0.40 | 0.40 |
| MS Aliquot (L, g, F): | 0.803 | 0.803 |
| MS Target Conc.(pCi/L, g, F): | 9.848 | 9.850 |
| MSD Aliquot (L, g, F): | 0.801 | 0.805 |
| MSD Target Conc. (pCi/L, g, F): | 9.867 | 9.819 |
| MS Spike Uncertainty (calculated): | 0.709 | 0.709 |
| MSD Spike Uncertainty (calculated): | 0.710 | 0.707 |
| Sample Result: | 0.946 | 0.182 |
| Sample Result 2 Sigma CSU (pCi/L, g, F): | 0.442 | 0.344 |
| Sample Matrix Spike Result: | 10.382 | 8.444 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.080 | 1.726 |
| Sample Matrix Spike Duplicate Result: | 10.097 | 8.942 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.030 | 1.805 |
| MS Numerical Performance Indicator: | -0.360 | -1.640 |
| MSD Numerical Performance Indicator: | -0.640 | -1.055 |
| MS Percent Recovery: | 95.82% | 83.88% |
| MSD Percent Recovery: | 92.74% | 89.21% |
| MS Status vs Numerical Indicator: | Pass | Pass |
| MSD Status vs Numerical Indicator: | Pass | Pass |
| MS Status vs Recovery: | Pass | Pass |
| MSD Status vs Recovery: | Pass | Pass |
| MS/MSD Upper % Recovery Limits: | 135% | 135% |
| MS/MSD Lower % Recovery Limits: | 60% | 60% |

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

| Matrix Spike/Matrix Spike Duplicate Sample Assessment | | |
|---|---|---|
| Sample I.D. | 60413739001 | 60413740003 |
| Sample MS I.D. | 60413739002 | 60413740004 |
| Sample MSD I.D. | 60413739003 | 60413740005 |
| Sample Matrix Spike Result: | 10.382 | 8.444 |
| Matrix Spike Result 2 Sigma CSU (pCi/L, g, F): | 2.080 | 1.726 |
| Sample Matrix Spike Duplicate Result: | 10.097 | 8.942 |
| Matrix Spike Duplicate Result 2 Sigma CSU (pCi/L, g, F): | 2.030 | 1.805 |
| Duplicate Numerical Performance Indicator: | 0.193 | -0.391 |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 3.27% | 6.16% |
| MS/ MSD Duplicate Status vs Numerical Indicator: | Pass | Pass |
| MS/ MSD Duplicate Status vs RPD: | Pass | Pass |
| % RPD Limit: | 36% | 36% |

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

**Comments:**

VAM 11/15/22

# Quality Control Sample Performance Assessment

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| | |
|---|---|
| Test: | Ra-226 |
| Analyst: | GDH |
| Date: | 11/1/2022 |
| Batch ID: | 69580 |
| Matrix: | DW |

***Analyst Must Manually Enter All Fields Highlighted in Yellow.***

| **Method Blank Assessment** | |
|---|---|
| MB Sample ID | 2632952 |
| MB concentration: | 0.117 |
| M/B Counting Uncertainty: | 0.324 |
| MB MDC: | 0.629 |
| MB Numerical Performance Indicator: | 0.71 |
| MB Status vs Numerical Indicator: | N/A |
| MB Status vs. MDC: | Pass |

| **Laboratory Control Sample Assessment** | LCSD (Y or N)? | N |
|---|---|---|
| | **LCS69580** | **LCSD69580** |
| Count Date: | 11/7/2022 | |
| Spike I.D.: | 21-040 | |
| Spike Concentration (pCi/mL): | 32.424 | |
| Volume Used (mL): | 0.10 | |
| Aliquot Volume (L, g, F): | 0.652 | |
| Target Conc. (pCi/L, g, F): | 4.975 | |
| Uncertainty (Calculated): | 0.234 | |
| Result (pCi/L, g, F): | 4.211 | |
| LCS/LCSD Counting Uncertainty (pCi/L, g, F): | 0.975 | |
| Numerical Performance Indicator: | -1.49 | |
| Percent Recovery: | 84.64% | |
| Status vs Numerical Indicator: | N/A | |
| Status vs Recovery: | Pass | |
| Upper % Recovery Limits: | 135% | |
| Lower % Recovery Limits: | 73% | |

| **Sample Matrix Spike Control Assessment** | MS/MSD 1 | MS/MSD 2 |
|---|---|---|
| Sample Collection Date: | 10/21/2022 | 10/21/2022 |
| Sample I.D. | 60413739001 | 60413740003 |
| Sample MS I.D. | 60413739002 | 60413740004 |
| Sample MSD I.D. | 60413739003 | 60413740005 |
| Spike I.D.: | 21-040 | 21-040 |
| MS/MSD Decay Corrected Spike Concentration (pCi/mL): | 32.425 | 32.425 |
| Spike Volume Used in MS (mL): | 0.20 | 0.20 |
| Spike Volume Used in MSD (mL): | 0.20 | 0.20 |
| MS Aliquot (L, g, F): | 0.652 | 0.652 |
| MS Target Conc.(pCi/L, g, F): | 9.941 | 9.941 |
| MSD Aliquot (L, g, F): | 0.656 | 0.652 |
| MSD Target Conc. (pCi/L, g, F): | 9.879 | 9.942 |
| MS Spike Uncertainty (calculated): | 0.467 | 0.467 |
| MSD Spike Uncertainty (calculated): | 0.464 | 0.467 |
| Sample Result: | 0.377 | 1.749 |
| Sample Result Counting Uncertainty (pCi/L, g, F): | 0.427 | 0.679 |
| Sample Matrix Spike Result: | 9.724 | 9.032 |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.476 | 1.349 |
| Sample Matrix Spike Duplicate Result: | 9.760 | 9.110 |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.432 | 1.357 |
| MS Numerical Performance Indicator: | -0.725 | -3.295 |
| MSD Numerical Performance Indicator: | -0.621 | -3.186 |
| MS Percent Recovery: | 94.02% | 73.26% |
| MSD Percent Recovery: | 94.98% | 74.05% |
| MS Status vs Numerical Indicator: | N/A | N/A |
| MSD Status vs Numerical Indicator: | N/A | N/A |
| MS Status vs Recovery: | Pass | Pass |
| MSD Status vs Recovery: | Pass | Pass |
| MS/MSD Upper % Recovery Limits: | 136% | 136% |
| MS/MSD Lower % Recovery Limits: | 71% | 71% |

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

| **Matrix Spike/Matrix Spike Duplicate Sample Assessment** | | |
|---|---|---|
| Sample I.D. | 60413739001 | 60413740003 |
| Sample MS I.D. | 60413739002 | 60413740004 |
| Sample MSD I.D. | 60413739003 | 60413740005 |
| Sample Matrix Spike Result: | 9.724 | 9.032 |
| Matrix Spike Result Counting Uncertainty (pCi/L, g, F): | 1.476 | 1.349 |
| Sample Matrix Spike Duplicate Result: | 9.760 | 9.110 |
| Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F): | 1.432 | 1.357 |
| Duplicate Numerical Performance Indicator: | -0.034 | -0.080 |
| (Based on the Percent Recoveries) MS/ MSD Duplicate RPD: | 1.01% | 1.06% |
| MS/ MSD Duplicate Status vs Numerical Indicator: | N/A | N/A |
| MS/ MSD Duplicate Status vs RPD: | Pass | Pass |
| % RPD Limit: | 32% | 32% |

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

**Comments:**

jmm 11/15/22

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413738**
Sampling Event: October 21, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 9, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 22, 2022

This report contains the final results of the data validation conducted for the water samples collected October 21st, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges. | | | X |
| Laboratory Duplicate | The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<br>• The agreement between parent sample results and laboratory duplicate sample results were evaluated. The duplicate error ratios (DER) met the criterion of a DER ≤2. | | | X |
| Field Duplicate | The field duplicate sample results satisfied the evaluation criteria below:<br>• The agreement between parent sample results and field duplicate sample results were evaluated. The DER met the criterion of a DER ≤2. | | | X |

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.</td><td>X</td><td></td><td></td></tr>
<tr><td>Detection Limits Mets</td><td>For radiochemical results 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.
<table>
<tr><th>Sample</th><th>Analyte</th><th>Result (pCi/L)</th><th>2 Sigma (σ) Uncertainty</th><th>MDC (pCi/L)</th></tr>
<tr><td>ASH-07-CCR</td><td>Radium-226</td><td>0.391</td><td>± 0.445</td><td>0.702</td></tr>
</table>
± – Plus or Minus<br>pCi/L – Picocuries Per Liter<br>MDC – Minimum Detectable Concentration</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Tracer and/or Carrier Recovery</td><td>The sample specific recoveries were within the laboratory limits.</td><td>X</td><td></td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – During review of the data package, it was noted that the cooler temperatures upon receipt were 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.<br><br>2 – For the total radium-226 result for sample ASH-07-CCR, the 2 sigma (σ) uncertainty multiplied by 1.65 was greater than the reported minimum detectable concentration (MDC) and was qualified as estimated (J v) indicating the detection limit criteria was not met.</td></tr>
</table>

< – Less Than
≤ – Less Than or Equal To
σ – Sigma (Uncertainty)
% – Percent
± – Plus or Minus
DER – Duplicate Error Ratio
J – Estimated Concentration, Indeterminate Bias
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
MDC – Minimum Detectable Concentration
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
pCi/L – Picocuries Per Liter
v – Compound Identification Issue

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

November 18, 2022

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

RE: Project: PRPA CCR 60684835
Pace Project No.: 60413743

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on October 24, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Kansas City

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

Sincerely,

Heather M. Wilson

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

Enclosures

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



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# CERTIFICATIONS

Project: PRPA CCR 60684835
Pace Project No.: 60413743

**Pace Analytical Services Kansas**

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Illinois Certification #: 2000302021-3
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 #: T104704407-21-15
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070



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## SAMPLE SUMMARY

Project: PRPA CCR 60684835
Pace Project No.: 60413743

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60413743001** | **ASH-05-CCR** | Water | 10/20/22 10:00 | 10/24/22 09:30 |
| **60413743002** | **DUP-01-CCR** | Water | 10/20/22 00:00 | 10/24/22 09:30 |
| **60413743003** | **ASH-04-CCR** | Water | 10/20/22 14:00 | 10/24/22 09:30 |
| **60413743004** | **ERB-01-CCR** | Water | 10/20/22 16:00 | 10/24/22 09:30 |



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## SAMPLE ANALYTE COUNT

Project: PRPA CCR 60684835
Pace Project No.: 60413743

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60413743001** | **ASH-05-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| **60413743002** | **DUP-01-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| **60413743003** | **ASH-04-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |
| **60413743004** | **ERB-01-CCR** | EPA 6010 | MA1 | 3 | PASI-K |
| | | EPA 6020 | MRV | 11 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City



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## ANALYTICAL RESULTS

Project: PRPA CCR 60684835
Pace Project No.: 60413743

**Sample: ASH-05-CCR** **Lab ID: 60413743001** Collected: 10/20/22 10:00 Received: 10/24/22 09:30 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **853** | ug/L | 100 | 1 | 11/07/22 14:34 | 11/11/22 10:23 | 7440-42-8 | |
| Calcium | **483000** | ug/L | 200 | 1 | 11/07/22 14:34 | 11/11/22 10:23 | 7440-70-2 | |
| Lithium | **325** | ug/L | 10.0 | 1 | 11/07/22 14:34 | 11/11/22 10:23 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7440-38-2 | |
| Barium | **13.5** | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7440-43-9 | |
| Chromium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7440-47-3 | |
| Cobalt | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:16 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:16 | 7439-98-7 | D3 |
| Selenium | **25.9** | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:16 | 7782-49-2 | |
| Thallium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:11 | 7440-28-0 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: PRPA CCR 60684835
Pace Project No.: 60413743

**Sample: DUP-01-CCR** **Lab ID: 60413743002** Collected: 10/20/22 00:00 Received: 10/24/22 09:30 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **851** | ug/L | 100 | 1 | 11/07/22 14:34 | 11/11/22 10:25 | 7440-42-8 | |
| Calcium | **480000** | ug/L | 200 | 1 | 11/07/22 14:34 | 11/11/22 10:25 | 7440-70-2 | |
| Lithium | **324** | ug/L | 10.0 | 1 | 11/07/22 14:34 | 11/11/22 10:25 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7440-38-2 | |
| Barium | **13.1** | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7440-43-9 | |
| Chromium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7440-47-3 | |
| Cobalt | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:22 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:22 | 7439-98-7 | D3 |
| Selenium | **26.9** | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:22 | 7782-49-2 | |
| Thallium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:18 | 7440-28-0 | |



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## ANALYTICAL RESULTS

Project: PRPA CCR 60684835
Pace Project No.: 60413743

**Sample: ASH-04-CCR** **Lab ID: 60413743003** Collected: 10/20/22 14:00 Received: 10/24/22 09:30 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | **623** | ug/L | 100 | 1 | 11/07/22 14:34 | 11/11/22 10:27 | 7440-42-8 | |
| Calcium | **440000** | ug/L | 200 | 1 | 11/07/22 14:34 | 11/11/22 10:27 | 7440-70-2 | M1 |
| Lithium | **379** | ug/L | 10.0 | 1 | 11/07/22 14:34 | 11/11/22 10:27 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 10:36 | 7440-36-0 | D3 |
| Arsenic | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7440-38-2 | |
| Barium | **8.5** | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7440-41-7 | M1 |
| Cadmium | ND | ug/L | 1.5 | 3 | 11/07/22 14:34 | 11/17/22 10:36 | 7440-43-9 | D3 |
| Chromium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7440-47-3 | |
| Cobalt | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7440-48-4 | |
| Lead | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:26 | 7439-98-7 | D3 |
| Selenium | **100** | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7782-49-2 | M1 |
| Thallium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 10:31 | 7440-28-0 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: PRPA CCR 60684835
Pace Project No.: 60413743

**Sample: ERB-01-CCR** **Lab ID: 60413743004** Collected: 10/20/22 16:00 Received: 10/24/22 09:30 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **6010 MET ICP** | Analytical Method: EPA 6010 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Boron | ND | ug/L | 100 | 1 | 11/07/22 14:34 | 11/11/22 10:33 | 7440-42-8 | |
| Calcium | ND | ug/L | 200 | 1 | 11/07/22 14:34 | 11/11/22 10:33 | 7440-70-2 | |
| Lithium | ND | ug/L | 10.0 | 1 | 11/07/22 14:34 | 11/11/22 10:33 | 7439-93-2 | |
| **6020 MET ICPMS** | Analytical Method: EPA 6020 Preparation Method: EPA 3010<br>Pace Analytical Services - Kansas City | | | | | | | |
| Antimony | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7440-36-0 | |
| Arsenic | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7440-38-2 | |
| Barium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7440-39-3 | |
| Beryllium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7440-41-7 | |
| Cadmium | ND | ug/L | 0.50 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7440-43-9 | |
| Chromium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7440-47-3 | |
| Cobalt | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:39 | 7440-48-4 | D3 |
| Lead | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7439-92-1 | |
| Molybdenum | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:39 | 7439-98-7 | D3 |
| Selenium | ND | ug/L | 3.0 | 3 | 11/07/22 14:34 | 11/17/22 17:39 | 7782-49-2 | D3 |
| Thallium | ND | ug/L | 1.0 | 1 | 11/07/22 14:34 | 11/17/22 11:29 | 7440-28-0 | |



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# QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413743

QC Batch: 816993
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413743001, 60413743002, 60413743003, 60413743004

METHOD BLANK: 3249451 Matrix: Water
Associated Lab Samples: 60413743001, 60413743002, 60413743003, 60413743004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Boron | ug/L | ND | 100 | 11/11/22 10:18 | |
| Calcium | ug/L | ND | 200 | 11/11/22 10:18 | |
| Lithium | ug/L | ND | 10.0 | 11/11/22 10:18 | |

LABORATORY CONTROL SAMPLE: 3249452

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Boron | ug/L | 1000 | 935 | 93 | 80-120 | |
| Calcium | ug/L | 10000 | 9930 | 99 | 80-120 | |
| Lithium | ug/L | 1000 | 962 | 96 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3249453 3249454

| Parameter | Units | 60413743003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boron | ug/L | 623 | 1000 | 1000 | 1550 | 1560 | 93 | 94 | 75-125 | 1 | 20 | |
| Calcium | ug/L | 440000 | 10000 | 10000 | 443000 | 456000 | 35 | 163 | 75-125 | 3 | 20 | M1 |
| Lithium | ug/L | 379 | 1000 | 1000 | 1410 | 1420 | 103 | 104 | 75-125 | 0 | 20 | |

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

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## QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413743

QC Batch: 816994
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60413743001, 60413743002, 60413743003, 60413743004

METHOD BLANK: 3249456 Matrix: Water
Associated Lab Samples: 60413743001, 60413743002, 60413743003, 60413743004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 1.0 | 11/17/22 10:27 | |
| Arsenic | ug/L | ND | 1.0 | 11/17/22 10:27 | |
| Barium | ug/L | ND | 1.0 | 11/17/22 10:27 | |
| Beryllium | ug/L | ND | 0.50 | 11/17/22 10:27 | |
| Cadmium | ug/L | ND | 0.50 | 11/17/22 10:27 | |
| Chromium | ug/L | ND | 1.0 | 11/17/22 10:27 | |
| Cobalt | ug/L | ND | 1.0 | 11/17/22 17:11 | |
| Lead | ug/L | ND | 1.0 | 11/17/22 10:27 | |
| Molybdenum | ug/L | ND | 1.0 | 11/17/22 17:11 | |
| Selenium | ug/L | ND | 1.0 | 11/17/22 17:11 | |
| Thallium | ug/L | ND | 1.0 | 11/17/22 10:27 | |

LABORATORY CONTROL SAMPLE: 3249457

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 40 | 41.8 | 105 | 80-120 | |
| Arsenic | ug/L | 40 | 41.0 | 103 | 80-120 | |
| Barium | ug/L | 40 | 40.6 | 101 | 80-120 | |
| Beryllium | ug/L | 40 | 40.7 | 102 | 80-120 | |
| Cadmium | ug/L | 40 | 43.8 | 109 | 80-120 | |
| Chromium | ug/L | 40 | 40.3 | 101 | 80-120 | |
| Cobalt | ug/L | 40 | 39.5 | 99 | 80-120 | |
| Lead | ug/L | 40 | 40.5 | 101 | 80-120 | |
| Molybdenum | ug/L | 40 | 39.8 | 99 | 80-120 | |
| Selenium | ug/L | 40 | 40.5 | 101 | 80-120 | |
| Thallium | ug/L | 40 | 40.8 | 102 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3249458 3249459

| Parameter | Units | 60413743003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | ND | 40 | 40 | 38.7 | 39.1 | 96 | 97 | 75-125 | 1 | 20 | |
| Arsenic | ug/L | ND | 40 | 40 | 31.4 | 32.0 | 77 | 79 | 75-125 | 2 | 20 | |
| Barium | ug/L | 8.5 | 40 | 40 | 45.7 | 46.2 | 93 | 94 | 75-125 | 1 | 20 | |
| Beryllium | ug/L | ND | 40 | 40 | 29.8 | 29.4 | 74 | 73 | 75-125 | 1 | 20 | M1 |
| Cadmium | ug/L | ND | 40 | 40 | 33.6 | 33.7 | 84 | 84 | 75-125 | 0 | 20 | |
| Chromium | ug/L | ND | 40 | 40 | 33.8 | 34.1 | 84 | 84 | 75-125 | 1 | 20 | |

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## QUALITY CONTROL DATA

Project: PRPA CCR 60684835
Pace Project No.: 60413743

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3249458 3249459

| Parameter | Units | 60413743003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cobalt | ug/L | ND | 40 | 40 | 38.9 | 38.6 | 97 | 96 | 75-125 | 1 | 20 | |
| Lead | ug/L | ND | 40 | 40 | 32.0 | 32.0 | 80 | 80 | 75-125 | 0 | 20 | |
| Molybdenum | ug/L | ND | 40 | 40 | 43.3 | 43.5 | 105 | 106 | 75-125 | 0 | 20 | |
| Selenium | ug/L | 100 | 40 | 40 | 177 | 173 | 193 | 182 | 75-125 | 2 | 20 | M1 |
| Thallium | ug/L | ND | 40 | 40 | 33.8 | 34.0 | 85 | 85 | 75-125 | 0 | 20 | |

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

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# QUALIFIERS

Project: PRPA CCR 60684835
Pace Project No.: 60413743

## 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. |
| M1 | Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery. |



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: PRPA CCR 60684835
Pace Project No.: 60413743

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60413743001** | **ASH-05-CCR** | EPA 3010 | 816993 | EPA 6010 | 817053 |
| **60413743002** | **DUP-01-CCR** | EPA 3010 | 816993 | EPA 6010 | 817053 |
| **60413743003** | **ASH-04-CCR** | EPA 3010 | 816993 | EPA 6010 | 817053 |
| **60413743004** | **ERB-01-CCR** | EPA 3010 | 816993 | EPA 6010 | 817053 |
| **60413743001** | **ASH-05-CCR** | EPA 3010 | 816994 | EPA 6020 | 817054 |
| **60413743002** | **DUP-01-CCR** | EPA 3010 | 816994 | EPA 6020 | 817054 |
| **60413743003** | **ASH-04-CCR** | EPA 3010 | 816994 | EPA 6020 | 817054 |
| **60413743004** | **ERB-01-CCR** | EPA 3010 | 816994 | EPA 6020 | 817054 |



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WO#: 60413743

60413743

| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-LENE-0009_Sample C | | |
|---|---|---|---|
| | Revision: 2 | Effective Date: 01/12/2022 | Issued By: Lenexa |

Client Name: AEcom

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

**Tracking #:** 609107907467 Pace Shipping Label Used? Yes ☐ No ☑

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

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

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

**Cooler Temperature (°C):** **As-read** 17.3 **Corr. Factor** 0.0 **Corrected** 17.3

**Date and initials of person examining contents:** MM 10/25/22

Temperature should be above freezing to 6°C

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | cooler delay in transit. |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | All ice melted. |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 55192 | ☑Yes ☐No ☐N/A | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks: Lead acetate strip turns dark? (Record only) | ☐Yes ☐No | |
| Potassium iodide test strip turns blue/purple? (Preserve) | ☐Yes ☐No | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: Brian Rothmeyer Date/Time:

Comments/ Resolution: Due to arriving out of temp, the client has asked that only the 6010 & 6020 metals be analyzed. The rest of the analyses will be resampled. HMW 10/25/22

Project Manager Review: Date:

Qualtrax Document ID: 30468

Page 1 of 1

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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.

CCR
KS

Page: 1 of 1

| Section A Required Client Information: | | Section B Required Project Information: | | Section C Invoice Information: | |
|---|---|---|---|---|---|
| Company: | AECOM | Report To: | Vasanta Kalluri | Attention: | Accounts Payable |
| Address: | 6200 South Quebec St | Copy To: | Brian Rothmeyer | Company Name: | AECOM |
| | Greenwood Village, CO 80111 | | | Address: | Same as Section A |
| Email To: | brian.rothmeyer@aecom.com | Purchase Order No.: | ~~136205~~ 145279 | Pace Quote Reference: | 42700 |
| Phone: | (303) 740-2614 Fax: | Project Name: | ~~60659991~~ PRPA CCR 60684835 | Pace Project Manager: | Heather Wilson |
| Requested Due Date/TAT: | | Project Number: | ~~60659991~~ 60684835 | Pace Profile #: | No RLI - 11033, 3 |

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** Required Client Information

Valid Matrix Codes

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

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

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test (Y/N) | 9056 Cl, F, SO4 | 6020 Total Metals* | 6010 Total Metals** | 7470 Total Mercury | 2540C TDS | | | | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. 60413743 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-05-CCR | WT | G | 10-20-22 | 10:00 | — | — | | 3 | X | | X | | | | | | | X | X | X | X | X | BP3U | BP1U | BP1N | | |
| 2 | DUP-01-CCR | WT | G | 10.20.22 | — | — | — | | 3 | X | | X | | | | | | | X | X | X | X | X | ↓ | ↓ | ↓ | | |
| 3 | ASH-04-CCR | WT | G | 10.20.22 | 14:00 | — | — | | 9 | X | | X | | | | | | | X | X | X | X | X | 3BP3U | 3BP1U | 3BP1N | | MS / MSD |
| 4 | ERB-01-CCR | WT | G | 10.20.22 | 16:00 | — | — | | 3 | X | | X | | | | | | | X | X | X | X | X | BP3U | BP1U | | | BP1N |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | WW | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | 10-20 | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS: Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Wes Weichert / AECOM | 10.20.22 | 17:00 | [signature] Pace | 10/24 | 0930 | 17.3 | Y | Y | Y |
| **B, Ca, Li | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Wes Weichert

SIGNATURE of SAMPLER: Wes Weichert

DATE Signed (MM/DD/YY): 10/20/22

*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

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60413743**
Sampling Event: October 20, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 7, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 22, 2022

This report contains the final results of the data validation conducted for the water samples collected October 20th, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius (ºC) upon arrival at the laboratory. | | X[1] | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges.<br>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. | | X[2] | |

| Analyte | MS/MSD (%) | Limits (%) | RPD (%) | Limits (%) |
|---|---|---|---|---|
| **ASH-04-CCR** | | | | |
| Beryllium | **74/73** | 75-125 | 1 | 20 |
| Selenium | **193/182** | 75-125 | 2 | 20 |

% – Percent
MS/MSD – Matrix Spike/ Matrix Spike Duplicate
RPD – Relative Percent Difference
**Bold indicates a value that is outside of acceptance limits.**

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td>Laboratory Duplicate</td><td>The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<ul><li>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%.</li><li>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.</li></ul></td><td></td><td></td><td>X</td></tr>
<tr><td>Field Duplicate</td><td>The field duplicate sample results satisfied the evaluation criteria below:<table><tr><th>Parent Sample</th><th>Field Duplicate</th></tr><tr><td>ASH-05-CCR</td><td>DUP-01-CCR</td></tr></table><ul><li>When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.</li><li>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.</li></ul></td><td>X</td><td></td><td></td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.<table><tr><th>Analyte</th><th>Concentration</th></tr><tr><td colspan="2">60413923</td></tr><tr><td colspan="2">ERB-2-CCR</td></tr><tr><td>TDS</td><td>10.5 mg/L</td></tr><tr><td colspan="2">60414572</td></tr><tr><td colspan="2">ERB-1-CCR</td></tr><tr><td>TDS</td><td>5.5 mg/L</td></tr></table>mg/L – Milligrams per Liter<br>TDS – Total Dissolved Solids</td><td></td><td></td><td>X</td></tr>
<tr><td>Reporting Limits Met</td><td>No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits.</td><td></td><td>X[3]</td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – The samples were shipped priority overnight through FedEx on October 20, 2022 for delivery to Pace Analytical in Lenexa, Kansas (Pace). However, due to a FedEx shipping delay, the samples were received at Pace on October 24, 2022. The samples were received at a temperature of 17.3ºC, outside the temperature criterion of <6ºC. As such, the laboratory was instructed to cancel the anions, mercury, and total dissolved solids analyses for samples ASH-05-CCR, ASH-04-CCR, DUP-01-CCR, and ERB-01-CCR. The anions, mercury, and total dissolved solids parameters were recollected and reported in</td></tr>
</table>

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |

laboratory data package 60414572. As thermal preservation is not required for the 6010 and 6020 metals parameters, qualification on the basis of temperature exceedance is not considered necessary. No further action is required.

2 – As the potential bias implied by the MS/MSD recoveries were considered to be low, the associated beryllium result for sample ASH-04-CCR was qualified as estimated (UJ m).

As the potential bias implied by the MS/MSD recoveries were considered to be high, the associated detected selenium result for sample ASH-04-CCR was qualified as estimated (J+ m).

3 – 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.

> – Greater Than
% – Percent
LCSD – Laboratory Control Sample Duplicate
MS/MSD – Matrix Spike/Matrix Spike Duplicate
RPD – Relative Percent Difference
< – Less Than
J+ – Estimated Concentration, High Bias
m – Matrix Spike Recovery
NA – Not Applicable
TDS – Total Dissolved Solids
≤ – Less Than or Equal To
LCS – Laboratory Control Sample
mg/L – Milligrams per Liter
RL – Reporting Limit
UJ – Estimated, Non-detect

**Pace Analytical Services, LLC**
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November 23, 2022

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

RE: Project: 60684835 PRPA CCR
Pace Project No.: 60414572

Dear Vasanta Kalluri:

Enclosed are the analytical results for sample(s) received by the laboratory on November 02, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

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

- Pace Analytical Services - Kansas City

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

Sincerely,

Heather M. Wilson

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

Enclosures

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



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## CERTIFICATIONS

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

**Pace Analytical Services Kansas**
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Illinois Certification #: 2000302021-3
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 #: T104704407-21-15
Utah Certification #: KS000212022-12
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070



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## SAMPLE SUMMARY

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **60414572001** | **ASH-02-CCR** | Water | 11/01/22 10:50 | 11/02/22 08:35 |
| **60414572002** | **DUP-01-CCR** | Water | 11/01/22 00:00 | 11/02/22 08:35 |
| **60414572004** | **ASH-05-CCR** | Water | 11/01/22 13:25 | 11/02/22 08:35 |
| **60414572005** | **ASH-04-CCR** | Water | 11/01/22 14:15 | 11/02/22 08:35 |
| **60414572006** | **ERB-01-CCR** | Water | 11/01/22 15:00 | 11/02/22 08:35 |



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## SAMPLE ANALYTE COUNT

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **60414572002** | **DUP-01-CCR** | EPA 7470 | JXD | 1 | PASI-K |
| | | SM 2540C | BLA | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |
| **60414572004** | **ASH-05-CCR** | EPA 7470 | JXD | 1 | PASI-K |
| | | SM 2540C | BLA | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |
| **60414572005** | **ASH-04-CCR** | EPA 7470 | JXD | 1 | PASI-K |
| | | SM 2540C | BLA | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |
| **60414572006** | **ERB-01-CCR** | EPA 7470 | JXD | 1 | PASI-K |
| | | SM 2540C | BLA | 1 | PASI-K |
| | | EPA 9056 | RKA | 3 | PASI-K |

PASI-K = Pace Analytical Services - Kansas City



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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

**Sample: DUP-01-CCR** **Lab ID: 60414572002** Collected: 11/01/22 00:00 Received: 11/02/22 08:35 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/15/22 14:43 | 11/16/22 12:07 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **3210** | mg/L | 66.7 | 1 | | 11/07/22 13:22 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **22.8** | mg/L | 2.0 | 2 | | 11/18/22 01:02 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 11/16/22 15:23 | 16984-48-8 | |
| Sulfate | **2580** | mg/L | 500 | 500 | | 11/16/22 15:36 | 14808-79-8 | |

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

**Sample: ASH-05-CCR** **Lab ID: 60414572004** Collected: 11/01/22 13:25 Received: 11/02/22 08:35 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/15/22 14:43 | 11/16/22 12:09 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **4700** | mg/L | 100 | 1 | | 11/07/22 13:23 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **529** | mg/L | 400 | 400 | | 11/16/22 16:03 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 11/16/22 15:49 | 16984-48-8 | |
| Sulfate | **4360** | mg/L | 400 | 400 | | 11/16/22 16:03 | 14808-79-8 | |

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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

**Sample: ASH-04-CCR** **Lab ID: 60414572005** Collected: 11/01/22 14:15 Received: 11/02/22 08:35 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/15/22 14:43 | 11/16/22 12:11 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **5760** | mg/L | 100 | 1 | | 11/07/22 13:23 | | D6 |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | **221** | mg/L | 50.0 | 50 | | 11/18/22 01:15 | 16887-00-6 | M1 |
| Fluoride | **0.22** | mg/L | 0.20 | 1 | | 11/16/22 16:16 | 16984-48-8 | M1 |
| Sulfate | **3790** | mg/L | 500 | 500 | | 11/16/22 17:36 | 14808-79-8 | M1 |

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## ANALYTICAL RESULTS

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

**Sample: ERB-01-CCR** **Lab ID: 60414572006** Collected: 11/01/22 15:00 Received: 11/02/22 08:35 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **7470 Mercury** | Analytical Method: EPA 7470 Preparation Method: EPA 7470<br>Pace Analytical Services - Kansas City | | | | | | | |
| Mercury | ND | ug/L | 0.20 | 1 | 11/15/22 14:43 | 11/16/22 12:18 | 7439-97-6 | |
| **2540C Total Dissolved Solids** | Analytical Method: SM 2540C<br>Pace Analytical Services - Kansas City | | | | | | | |
| Total Dissolved Solids | **5.5** | mg/L | 5.0 | 1 | | 11/07/22 13:23 | | |
| **9056 IC Anions** | Analytical Method: EPA 9056<br>Pace Analytical Services - Kansas City | | | | | | | |
| Chloride | ND | mg/L | 1.0 | 1 | | 11/16/22 18:30 | 16887-00-6 | |
| Fluoride | ND | mg/L | 0.20 | 1 | | 11/16/22 18:30 | 16984-48-8 | |
| Sulfate | ND | mg/L | 1.0 | 1 | | 11/16/22 18:30 | 14808-79-8 | |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

QC Batch: 818352 — Analysis Method: EPA 7470
QC Batch Method: EPA 7470 — Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60414572002, 60414572004, 60414572005, 60414572006

METHOD BLANK: 3254694 — Matrix: Water
Associated Lab Samples: 60414572002, 60414572004, 60414572005, 60414572006

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.20 | 11/16/22 10:58 | |

LABORATORY CONTROL SAMPLE: 3254695

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

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3254696 3254697

| Parameter | Units | 60414563005 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 4.3 | 4.2 | 86 | 84 | 75-125 | 2 | 20 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3254698 3254699

| Parameter | Units | 60414572005 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 5 | 5 | 4.2 | 4.2 | 84 | 84 | 75-125 | 0 | 20 | |

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

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

QC Batch: 816862 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60414572002, 60414572004, 60414572005, 60414572006

METHOD BLANK: 3248991 Matrix: Water
Associated Lab Samples: 60414572002, 60414572004, 60414572005, 60414572006

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | ND | 5.0 | 11/07/22 13:21 | |

LABORATORY CONTROL SAMPLE: 3248992

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 1000 | 1010 | 101 | 80-120 | |

SAMPLE DUPLICATE: 3248995

| Parameter | Units | 60414563005 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 5390 | 5610 | 4 | 10 | |

SAMPLE DUPLICATE: 3248996

| Parameter | Units | 60414572005 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Total Dissolved Solids | mg/L | 5760 | 5040 | 13 | 10 | D6 |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

QC Batch: 818387 | Analysis Method: EPA 9056
QC Batch Method: EPA 9056 | Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60414572002, 60414572004, 60414572005, 60414572006

METHOD BLANK: 3254867 Matrix: Water
Associated Lab Samples: 60414572002, 60414572004, 60414572005, 60414572006

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 11/16/22 08:41 | |
| Fluoride | mg/L | ND | 0.20 | 11/16/22 08:41 | |
| Sulfate | mg/L | ND | 1.0 | 11/16/22 08:41 | |

METHOD BLANK: 3257864 Matrix: Water
Associated Lab Samples: 60414572002, 60414572004, 60414572005, 60414572006

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 10.0 | 11/17/22 09:01 | |
| Fluoride | mg/L | ND | 2.0 | 11/17/22 09:01 | |
| Sulfate | mg/L | ND | 10.0 | 11/17/22 09:01 | |

LABORATORY CONTROL SAMPLE: 3254868

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 5 | 4.6 | 92 | 80-120 | |
| Fluoride | mg/L | 2.5 | 2.7 | 107 | 80-120 | |
| Sulfate | mg/L | 5 | 5.0 | 100 | 80-120 | |

LABORATORY CONTROL SAMPLE: 3257865

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 50 | 48.0 | 96 | 80-120 | |
| Fluoride | mg/L | 25 | 26.4 | 106 | 80-120 | |
| Sulfate | mg/L | 50 | 48.8 | 98 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3254869 3254870

| Parameter | Units | 60414572005 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 221 | 250 | 250 | 560 | 503 | 135 | 112 | 80-120 | 11 | 15 | M1 |
| Fluoride | mg/L | 0.22 | 2.5 | 2.5 | 1.4 | 1.5 | 48 | 50 | 80-120 | 4 | 15 | |
| Sulfate | mg/L | 3790 | 2500 | 2500 | 6200 | 5590 | 97 | 72 | 80-120 | 10 | 15 | M1 |

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## QUALITY CONTROL DATA

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

SAMPLE DUPLICATE: 3254871

| Parameter | Units | 60414572005 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 221 | 216 | 3 | 15 | |
| Fluoride | mg/L | 0.22 | 0.22 | 3 | 15 | |
| Sulfate | mg/L | 3790 | 3650 | 4 | 15 | |

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

## REPORT OF LABORATORY ANALYSIS

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

# QUALIFIERS

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

## 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

| | |
|---|---|
| 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. |



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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 60684835 PRPA CCR
Pace Project No.: 60414572

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **60414572002** | **DUP-01-CCR** | EPA 7470 | 818352 | EPA 7470 | 818529 |
| **60414572004** | **ASH-05-CCR** | EPA 7470 | 818352 | EPA 7470 | 818529 |
| **60414572005** | **ASH-04-CCR** | EPA 7470 | 818352 | EPA 7470 | 818529 |
| **60414572006** | **ERB-01-CCR** | EPA 7470 | 818352 | EPA 7470 | 818529 |
| **60414572002** | **DUP-01-CCR** | SM 2540C | 816862 | | |
| **60414572004** | **ASH-05-CCR** | SM 2540C | 816862 | | |
| **60414572005** | **ASH-04-CCR** | SM 2540C | 816862 | | |
| **60414572006** | **ERB-01-CCR** | SM 2540C | 816862 | | |
| **60414572002** | **DUP-01-CCR** | EPA 9056 | 818387 | | |
| **60414572004** | **ASH-05-CCR** | EPA 9056 | 818387 | | |
| **60414572005** | **ASH-04-CCR** | EPA 9056 | 818387 | | |
| **60414572006** | **ERB-01-CCR** | EPA 9056 | 818387 | | |



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| Pace ANALYTICAL SERVICES | DC#_Title: ENV-FRM-LENE-0009_Sample Con | | |
|---|---|---|---|
| | Revision: 2 | Effective Date: 01/12/2022 | Iss |

WO#: 60414572

60414572

Client Name: AECOM

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

**Tracking #:** 6091, 0791 3521, 3602, 3553 3543 Pace Shipping Label Used? Yes ☐ No ☑

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

**Packing Material:** Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ Ziplc

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

**Cooler Temperature (°C):** **As-read** 0.1 **Corr. Factor** 0.0 **Corrected** 0.1

**Date and initials of person examining contents:** 11-2-2022 KM

Temperature should be above freezing to 6°C 1.9, 0.6, 1.2 1.9, 0.6, 1.2

| | | |
|---|---|---|
| Chain of Custody present: | ☑Yes ☐No ☐N/A | |
| Chain of Custody relinquished: | ☑Yes ☐No ☐N/A | |
| Samples arrived within holding time: | ☑Yes ☐No ☐N/A | |
| **Short Hold Time analyses (<72hr):** | ☐Yes ☑No ☐N/A | |
| **Rush Turn Around Time requested:** | ☐Yes ☑No ☐N/A | |
| Sufficient volume: | ☑Yes ☐No ☐N/A | |
| Correct containers used: | ☑Yes ☐No ☐N/A | |
| Pace containers used: | ☑Yes ☐No ☐N/A | |
| Containers intact: | ☑Yes ☐No ☐N/A | |
| Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs? | ☐Yes ☐No ☑N/A | |
| Filtered volume received for dissolved tests? | ☐Yes ☐No ☑N/A | |
| Sample labels match COC: Date / time / ID / analyses | ☑Yes ☐No ☐N/A | |
| Samples contain multiple phases? Matrix: WT | ☐Yes ☑No ☐N/A | |
| Containers requiring pH preservation in compliance? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:** 55192 | ☑Yes ☐No ☐N/A | List sample IDs, volumes, lot #'s of preservative and the date/time added. |
| Cyanide water sample checks: Lead acetate strip turns dark? (Record only) | ☐Yes ☐No | |
| Potassium iodide test strip turns blue/purple? (Preserve) | ☐Yes ☐No | |
| Trip Blank present: | ☐Yes ☐No ☑N/A | |
| Headspace in VOA vials ( >6mm): | ☐Yes ☐No ☑N/A | |
| Samples from USDA Regulated Area: State: | ☐Yes ☐No ☑N/A | |
| Additional labels attached to 5035A / TX1005 vials in the field? | ☐Yes ☐No ☑N/A | |

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Qualtrax Document ID: 30468

Page 1 of 1

CCR-KS

# CHAIN-OF-CUSTODY / Analytical Request Document

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

Pace Analytical
www.pacelabs.com

Page: 1 of 1

**Section A** Required Client Information:

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

**Section B** Required Project Information:

| | |
|---|---|
| Report To: | Vasanta Kalluri |
| Copy To: | Brian Rothmeyer |
| Purchase Order No.: | 145279 |
| Project Name: | 60684835 PRPA CCR |
| Project Number: | 60684835 |

**Section C** Invoice Information:

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

**REGULATORY AGENCY**

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

Site Location STATE: CO

**Section D** Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Y/N | Analysis Test: 9056 Cl, F, SO4 | 7470 Total Mercury | 2540C TDS | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ASH-02-CCR | WT | G | | | 11/1/22 | 10:50 | | 3 | 2 | | 1 | | | | | | X | X | X | N | 60411572 |
| 2 | DUP-01-CCR | WT | G | | | 11/1/22 | — | | 3 | 2 | | 1 | | | | | | X | X | X | N | |
| 3 | ASH-08-CCR | WT | G | | | 11/1/22 | 12:30 | | 3 | 2 | | 1 | | | | | | X | X | X | N | Run MS/MSD |
| 4 | ASH-05-CCR | WT | G | | | 11/1/22 | 13:25 | | 3 | 2 | | 1 | | | | | | X | X | X | N | |
| 5 | ASH-04-CCR | WT | G | | | 11/1/22 | 14:15 | | 3 | 2 | | 1 | | | | | | X | X | X | N | |
| 6 | ERB-01-CCR | WT | G | | | 11/1/22 | 15:00 | | 3 | 2 | | 1 | | | | | | X | X | X | N | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS |
|---|---|---|---|---|---|---|---|
| *Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl | Drew Woodward AECOM | 11/1/22 | 16:30 | | 11/2 | 835 | 0.1 |
| **B, Ca, Li | | | | | | | 1.9 |
| 4 Coolers | | | | | | | 5.6 |
| | | | | | | | 2.2 |

| SAMPLER NAME AND SIGNATURE | | | Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
|---|---|---|---|---|---|---|
| PRINT Name of SAMPLER: | Drew Woodward | | | | | |
| SIGNATURE of SAMPLER: | | DATE Signed (MM/DD/YY): 11/1/2022 | | | | |

*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.

# Platte River Power Authority – Rawhide
# DATA REVIEW CHECK

**Data Package: 60414572**
Sampling Event: November 1, 2022
Data Reviewer: Brian Rothmeyer — Date Completed: December 8, 2022
Peer Reviewer: Katie Abbott — Date Completed: December 22, 2022

This report contains the final results of the data validation conducted for the water samples collected November 1st, 2022. The data review was conducted in accordance with method requirements and laboratory limits using guidance from United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 542-R-20-006 (November 2020).

**General Overall Assessment:**

_____ Data are usable without qualification.
__X__ Data are usable with qualification (noted below).
_____ Some or all data are unusable for any purpose (detailed below).

**Data Review Checklist**

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| Chain of Custody, Sample Identification, & Sample Receipt | Samples were received intact and the cooler temperature was <6 degree Celsius upon arrival at the laboratory. | X | | |
| Holding Times | The samples were analyzed within the method required holding times. | X | | |
| Method Blanks (MB) | No target analytes reported in the associated MB. | X | | |
| Quality Control Samples: Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) | The LCS/LCSD recoveries were within the laboratory determined acceptance limits. | X | | |
| Matrix Spike / Matrix Spike Duplicate (MS/MSD) | The recoveries and relative percent differences for the matrix spike and matrix spike duplicate analyses were within the laboratory-determined acceptance ranges.<br>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. | | X[1] | |

| Analyte | MS/MSD (%) | Limits (%) | RPD (%) | Limits (%) |
|---|---|---|---|---|
| **ASH-04-CCR** | | | | |
| Chloride | **135**/112 | 80-120 | 11 | 15 |
| Fluoride | **48/50** | 80-120 | 4 | 15 |
| Sulfate | 97/**72** | 80-120 | 10 | 15 |

% – Percent
MS/MSD – Matrix Spike/ Matrix Spike Duplicate
N – Nitrogen
NA – Not Applicable
RPD – Relative Percent Difference
**Bold indicates a value that is outside of acceptance limits.**

<table>
<tr><th>Review Parameter</th><th>Criteria</th><th colspan="3">Criteria Met?</th></tr>
<tr><td>Sample-specific Parameters</td><td>For each “No” response, list qualified data and bias direction in Table 1 or explain no qualification in comments.</td><td>Yes</td><td>No</td><td>NA</td></tr>
<tr><td>Laboratory Duplicate</td><td>The laboratory duplicate samples were within the laboratory determined acceptance limits. The following concentration dependent criteria were used to evaluate laboratory duplicates:<ul><li>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%.</li><li>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.</li></ul></td><td>X</td><td></td><td></td></tr>
<tr><td>Field Duplicate</td><td>The field duplicate sample results satisfied the evaluation criteria below:<table><tr><th>Parent Sample</th><th>Field Duplicate</th></tr><tr><td>ASH-02-CCR</td><td>DUP-01-CCR</td></tr></table><ul><li>When both the sample and duplicate values are >5xRL acceptable sampling and analytical precision is indicated by a RPD between the results of ≤30%.</li><li>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.</li></ul></td><td>X</td><td></td><td></td></tr>
<tr><td>Equipment Blanks</td><td>No target analytes reported in the associated equipment blank.<table><tr><th>Analyte</th><th>Concentration</th></tr><tr><td colspan="2">60413923</td></tr><tr><td colspan="2">ERB-2-CCR</td></tr><tr><td>TDS</td><td>10.5 mg/L</td></tr><tr><td colspan="2">60414572</td></tr><tr><td colspan="2">ERB-1-CCR</td></tr><tr><td>TDS</td><td>5.5 mg/L</td></tr></table>mg/L – Milligrams per Liter<br>TDS – Total Dissolved Solids</td><td></td><td>X[2]</td><td></td></tr>
<tr><td>Reporting Limits Met</td><td>No samples performed at dilutions or reported as non-detect at elevated method detection limits/reporting limits.</td><td></td><td>X[3]</td><td></td></tr>
<tr><td>Reporting</td><td>No reporting issues were found and further qualification was not considered necessary.</td><td>X</td><td></td><td></td></tr>
<tr><td>Package Completeness</td><td>No results were qualified as unusable and the data are 100% complete.</td><td>X</td><td></td><td></td></tr>
<tr><th colspan="5">Comments</th></tr>
<tr><td colspan="5">1 – As the potential bias implied by the MS recovery was considered to be high, the associated detected chloride result for sample ASH-04-CCR was qualified as estimated (J+ m).<br><br>As the potential bias implied by the MS/MSD recoveries were considered to be low, the fluoride and sulfate results for sample ASH-04-CCR were qualified as estimated (J- m).</td></tr>
</table>

| Review Parameter | Criteria | Criteria Met? | | |
|---|---|---|---|---|
| ***Sample-specific Parameters*** | For each "No" response, list qualified data and bias direction in Table 1 or explain no qualification in comments. | Yes | No | NA |
| 2 – As the TDS sample results were reported at concentrations >5x the concentration of the blank contamination, qualification was not considered necessary.<br><br>3 – 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. | | | | |

> – Greater Than
< – Less Than
≤ – Less Than or Equal To
% – Percent
± – Plus or Minus/High or Low Bias
J – Estimated Concentration
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
m – Matrix Spike Recovery
mg/L – Milligrams per Liter
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
RL – Reporting Limit
RPD – Relative Percent Difference
TDS – Total Dissolved Solids

# Appendix C

# Statistical Analysis Results and Input/Output Files

| Location_ID | Date | Boron | D_Boron | Calcium | D_Calcium | Chloride | D_Chloride | Fluoride | D_Fluoride | pH | D_pH | Sulfate | D_Sulfate | TDS | D_TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASH-01 | 9/13/16 | 500 | 1 | 380000 | 1 | 29 | 1 | 0.12 | 1 | 6.74 | 1 | 2100 | 1 | 3600 | 1 |
| ASH-01 | 11/3/16 | 460 | 1 | 360000 | 1 | 25 | 1 | 0.2 | 0 | 6.92 | 1 | 2100 | 1 | 3400 | 1 |
| ASH-01 | 12/20/16 | 450 | 1 | 330000 | 1 | 24 | 1 | 1.65 | 1 | 7.03 | 1 | 2100 | 1 | 3500 | 1 |
| ASH-01 | 2/8/17 | 500 | 1 | 350000 | 1 | 25 | 1 | 0.39 | 1 | 6.94 | 1 | 2100 | 1 | 3500 | 1 |
| ASH-01 | 4/5/17 | 580 | 1 | 370000 | 1 | 25 | 1 | 0.2 | 1 | 7.3 | 1 | 2200 | 1 | 3600 | 1 |
| ASH-01 | 5/10/17 | 540 | 1 | 340000 | 1 | 22 | 1 | 0.29 | 1 | 7.2 | 1 | 2000 | 1 | 3600 | 1 |
| ASH-01 | 6/15/17 | 630 | 1 | 370000 | 1 | 21 | 1 | 0.56 | 1 | 6.55 | 1 | 2000 | 1 | 3600 | 1 |
| ASH-01 | 7/12/17 | 470 | 1 | 320000 | 1 | 20 | 1 | 0.2 | 0 | 7.22 | 1 | 1900 | 1 | 3900 | 1 |
| ASH-01 | 6/21/18 | 520 | 1 | 339000 | 1 | 19 | 1 | 0.33 | 1 | 7.14 | 1 | 2520 | 1 | 3350 | 1 |
| ASH-01 | 10/10/18 | 471 | 1 | 355000 | 1 | 19.4 | 1 | 0.23 | 1 |  |  | 1710 | 1 | 3190 | 1 |
| ASH-01 | 5/2/19 | 489 | 1 | 363000 | 1 | 20.2 | 1 | 0.2 | 0 | 7.31 | 1 | 1 | 0 | 3250 | 1 |
| ASH-01 | 7/10/19 | 474 | 1 | 375000 | 1 | 19.6 | 1 | 0.2 | 0 | 9.63 | 1 | 2000 | 1 | 3450 | 1 |
| ASH-01 | 10/8/19 | 462 | 1 | 346000 | 1 |  |  | 0.2 | 0 |  |  |  |  | 3290 | 1 |
| ASH-01 | 4/14/20 | 486 | 1 | 381000 | 1 | 23.1 | 1 | 0.24 | 1 | 7.93 | 1 | 2000 | 1 | 3250 | 1 |
| ASH-01 | 10/5/20 | 487 | 1 | 329000 | 1 | 23 | 1 | 0.24 | 1 | 7.31 | 1 | 2100 | 1 | 3330 | 1 |
| ASH-01 | 4/21/21 | 457 | 1 | 326000 | 1 | 23.6 | 1 | 0.2 | 0 | 7.29 | 1 | 1950 | 1 | 3250 | 1 |
| ASH-01 | 10/19/21 | 494 | 1 | 369000 | 1 | 25.4 | 1 | 0.2 | 0 | 7.07 | 1 | 2040 | 1 | 3420 | 1 |
| ASH-06 | 1/24/19 | 288 | 1 | 27500 | 1 | 7.8 | 1 | 0.84 | 1 | 9.25 | 1 | 104 | 1 | 487 | 1 |
| ASH-06 | 5/6/19 | 283 | 1 | 26700 | 1 | 7.8 | 1 | 0.79 | 1 | 8 | 1 | 75.7 | 1 | 384 | 1 |
| ASH-06 | 7/18/19 | 326 | 1 | 28900 | 1 | 9.7 | 1 | 0.69 | 1 | 8.28 | 1 | 197 | 1 | 634 | 1 |
| ASH-06 | 10/8/19 | 324 | 1 | 26700 | 1 |  |  | 0.81 | 1 |  |  |  |  | 515 | 1 |
| ASH-06 | 1/15/20 | 304 | 1 | 24300 | 1 | 7 | 1 | 0.72 | 1 | 7.47 | 1 | 68.3 | 1 | 500 | 1 |
| ASH-06 | 4/20/20 | 308 | 1 | 24100 | 1 | 7 | 1 | 0.69 | 1 | 8.19 | 1 | 63.6 | 1 | 443 | 1 |
| ASH-06 | 7/22/20 |  |  |  |  | 7.9 | 1 | 0.77 | 1 | 7.71 | 1 | 101 | 1 | 472 | 1 |
| ASH-06 | 7/24/20 | 334 | 1 | 37600 | 1 |  |  |  |  | 7.71 | 1 |  |  |  |  |
| ASH-06 | 10/16/20 | 312 | 1 | 24500 | 1 | 7.7 | 1 | 0.84 | 1 | 7.22 | 1 | 82.8 | 1 | 417 | 1 |
| ASH-06 | 10/20/20 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASH-06 | 1/6/21 | 334 | 1 | 27000 | 1 | 7.9 | 1 | 0.76 | 1 | 7.95 | 1 | 77.8 | 1 | 449 | 1 |
| ASH-06 | 4/7/21 | 310 | 1 | 25800 | 1 | 7 | 1 | 0.2 | 1 | 8.04 | 1 | 81.8 | 1 | 485 | 1 |
| ASH-06 | 4/12/21 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASH-06 | 10/11/21 | 290 | 1 | 23200 | 1 | 6.9 | 1 | 0.82 | 1 | 7.9 | 1 | 68.8 | 1 | 446 | 1 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | **Background Statistics for Data Sets with Non-Detects** | | | | | | | | |
| 2 | | | **User Selected Options** | | | | | | | | | |
| 3 | | | Date/Time of Computation | ProUCL 5.11/18/2022 3:57:30 PM | | | | | | | | |
| 4 | | | From File | ProUCL Input PRPA CCR ASH Appendix III Total 2016-2021.xls | | | | | | | | |
| 5 | | | Full Precision | OFF | | | | | | | | |
| 6 | | | Confidence Coefficient | 95% | | | | | | | | |
| 7 | | | Coverage | 95% | | | | | | | | |
| 8 | | | Different or Future K Observations | 1 | | | | | | | | |
| 9 | | | Number of Bootstrap Operations | 2000 | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | **Boron** | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | **General Statistics** | | | | | | | | | | | |
| 14 | | | | | | Total Number of Observations | 28 | | | Number of Distinct Observations | 26 | | |
| 15 | | | | | | | | | | Number of Missing Observations | 3 | |
| 16 | | | | | | Minimum | 283 | | | First Quartile | 321 | |
| 17 | | | | | | Second Largest | 580 | | | Median | 461 | |
| 18 | | | | | | Maximum | 630 | | | Third Quartile | 490.3 | |
| 19 | | | | | | Mean | 424.4 | | | SD | 100.9 | |
| 20 | | | | | | Coefficient of Variation | 0.238 | | | Skewness | -0.00677 | |
| 21 | | | | | | Mean of logged Data | 6.022 | | | SD of logged Data | 0.247 | |
| 22 | | | | | | | | | | | | |
| 23 | | | | | | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | |
| 24 | | | | | | Tolerance Factor K (For UTL) | 2.246 | | | d2max (for USL) | 2.714 | |
| 25 | | | | | | | | | | | | |
| 26 | | | | | | **Normal GOF Test** | | | | | | |
| 27 | | | | | | Shapiro Wilk Test Statistic | 0.888 | | | **Shapiro Wilk GOF Test** | | |
| 28 | | | | | | 5% Shapiro Wilk Critical Value | 0.924 | | | Data Not Normal at 5% Significance Level | | |
| 29 | | | | | | Lilliefors Test Statistic | 0.208 | | | **Lilliefors GOF Test** | | |
| 30 | | | | | | 5% Lilliefors Critical Value | 0.164 | | | Data Not Normal at 5% Significance Level | | |
| 31 | | | | | | **Data Not Normal at 5% Significance Level** | | | | | | |
| 32 | | | | | | | | | | | | |
| 33 | | | | | | **Background Statistics Assuming Normal Distribution** | | | | | | |
| 34 | | | | | | 95% UTL with 95% Coverage | 651 | | | 90% Percentile (z) | 553.7 | |
| 35 | | | | | | 95% UPL (t) | 599.3 | | | 95% Percentile (z) | 590.3 | |
| 36 | | | | | | 95% USL | 698.2 | | | 99% Percentile (z) | 659.1 | |
| 37 | | | | | | | | | | | | |
| 38 | | | | | | **Gamma GOF Test** | | | | | | |
| 39 | | | | | | A-D Test Statistic | 1.67 | | | **Anderson-Darling Gamma GOF Test** | | |
| 40 | | | | | | 5% A-D Critical Value | 0.745 | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 41 | | | | | | K-S Test Statistic | 0.236 | | | **Kolmogorov-Smirnov Gamma GOF Test** | | |
| 42 | | | | | | 5% K-S Critical Value | 0.165 | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 43 | | | | | | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | |
| 44 | | | | | | | | | | | | |
| 45 | | | | | | **Gamma Statistics** | | | | | | |
| 46 | | | | | | k hat (MLE) | 17.64 | | | k star (bias corrected MLE) | 15.77 | |
| 47 | | | | | | Theta hat (MLE) | 24.06 | | | Theta star (bias corrected MLE) | 26.91 | |
| 48 | | | | | | nu hat (MLE) | 987.7 | | | nu star (bias corrected) | 883.2 | |
| 49 | | | | | | MLE Mean (bias corrected) | 424.4 | | | MLE Sd (bias corrected) | 106.9 | |
| 50 | | | | | | | | | | | | |
| 51 | | | | | | **Background Statistics Assuming Gamma Distribution** | | | | | | |
| 52 | | | | | | 95% Wilson Hilferty (WH) Approx. Gamma UPL | 618.8 | | | 90% Percentile | 565.8 | |
| 53 | | | | | | 95% Hawkins Wixley (HW) Approx. Gamma UPL | 621.9 | | | 95% Percentile | 614.1 | |
| 54 | | | | | | 95% WH Approx. Gamma UTL with 95% Coverage | 689.1 | | | 99% Percentile | 711.7 | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | | | | 95% HW Approx. Gamma UTL with | 95% Coverage | 695.5 | | | | | | |
| 56 | | | | | 95% WH USL | 758 | | | | 95% HW USL | 768.4 | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | **Lognormal GOF Test** | | | | | | | |
| 59 | | | | | Shapiro Wilk Test Statistic | 0.87 | **Shapiro Wilk Lognormal GOF Test** | | | | | |
| 60 | | | | | 5% Shapiro Wilk Critical Value | 0.924 | Data Not Lognormal at 5% Significance Level | | | | | |
| 61 | | | | | Lilliefors Test Statistic | 0.245 | **Lilliefors Lognormal GOF Test** | | | | | |
| 62 | | | | | 5% Lilliefors Critical Value | 0.164 | Data Not Lognormal at 5% Significance Level | | | | | |
| 63 | | | | | **Data Not Lognormal at 5% Significance Level** | | | | | | | |
| 64 | | | | | | | | | | | | |
| 65 | | | | | **Background Statistics assuming Lognormal Distribution** | | | | | | | |
| 66 | | | | 95% UTL with | 95% Coverage | 717.9 | | | | 90% Percentile (z) | 565.8 | |
| 67 | | | | | 95% UPL (t) | 632.6 | | | | 95% Percentile (z) | 618.9 | |
| 68 | | | | | 95% USL | 805.9 | | | | 99% Percentile (z) | 732.3 | |
| 69 | | | | | | | | | | | | |
| 70 | | | | | **Nonparametric Distribution Free Background Statistics** | | | | | | | |
| 71 | | | | | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | |
| 72 | | | | | | | | | | | | |
| 73 | | | | | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | |
| 74 | | | | | Order of Statistic, r | 28 | | | | 95% UTL with | 95% Coverage | 630 |
| 75 | | | | | Approx, f used to compute achieved CC | 1.474 | | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.762 |
| 76 | | | | | | | | | | Approximate Sample Size needed to achieve specified CC | | 59 |
| 77 | | | | 95% Percentile Bootstrap UTL with | 95% Coverage | 630 | | | | 95% BCA Bootstrap UTL with | 95% Coverage | 630 |
| 78 | | | | | 95% UPL | 607.5 | | | | 90% Percentile | | 526 |
| 79 | | | | | 90% Chebyshev UPL | 732.4 | | | | 95% Percentile | | 566 |
| 80 | | | | | 95% Chebyshev UPL | 871.9 | | | | 99% Percentile | | 616.5 |
| 81 | | | | | 95% USL | 630 | | | | | | |
| 82 | | | | | | | | | | | | |
| 83 | | | | | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | |
| 84 | | | | | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | |
| 85 | | | | | and consists of observations collected from clean unimpacted locations. | | | | | | | |
| 86 | | | | | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | |
| 87 | | | | | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | |
| 88 | | | | | | | | | | | | |
| 89 | **Calcium** | | | | | | | | | | | |
| 90 | | | | | | | | | | | | |
| 91 | **General Statistics** | | | | | | | | | | | |
| 92 | | | | | Total Number of Observations | 28 | | | | Number of Distinct Observations | 26 | |
| 93 | | | | | | | | | | Number of Missing Observations | 3 | |
| 94 | | | | | Minimum | 23200 | | | | First Quartile | 26925 | |
| 95 | | | | | Second Largest | 380000 | | | | Median | 329500 | |
| 96 | | | | | Maximum | 381000 | | | | Third Quartile | 360750 | |
| 97 | | | | | Mean | 224975 | | | | SD | 162964 | |
| 98 | | | | | Coefficient of Variation | 0.724 | | | | Skewness | -0.436 | |
| 99 | | | | | Mean of logged Data | 11.76 | | | | SD of logged Data | 1.286 | |
| 100 | | | | | | | | | | | | |
| 101 | | | | | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | |
| 102 | | | | | Tolerance Factor K (For UTL) | 2.246 | | | | d2max (for USL) | 2.714 | |
| 103 | | | | | | | | | | | | |
| 104 | | | | | **Normal GOF Test** | | | | | | | |
| 105 | | | | | Shapiro Wilk Test Statistic | 0.69 | **Shapiro Wilk GOF Test** | | | | | |
| 106 | | | | | 5% Shapiro Wilk Critical Value | 0.924 | Data Not Normal at 5% Significance Level | | | | | |
| 107 | | | | | Lilliefors Test Statistic | 0.327 | **Lilliefors GOF Test** | | | | | |
| 108 | | | | | 5% Lilliefors Critical Value | 0.164 | Data Not Normal at 5% Significance Level | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 109 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 110 | | | | | | | | | | | | |
| 111 | **Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 112 | | | | 95% UTL with | 95% Coverage | 590992 | | | | 90% Percentile (z) | 433822 | |
| 113 | | | | | 95% UPL (t) | 507463 | | | | 95% Percentile (z) | 493027 | |
| 114 | | | | | 95% USL | 667334 | | | | 99% Percentile (z) | 604086 | |
| 115 | | | | | | | | | | | | |
| 116 | **Gamma GOF Test** | | | | | | | | | | | |
| 117 | | | | | A-D Test Statistic | 4.48 | **Anderson-Darling Gamma GOF Test** | | | | | |
| 118 | | | | | 5% A-D Critical Value | 0.773 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 119 | | | | | K-S Test Statistic | 0.366 | **Kolmogorov-Smirnov Gamma GOF Test** | | | | | |
| 120 | | | | | 5% K-S Critical Value | 0.17 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 121 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 122 | | | | | | | | | | | | |
| 123 | **Gamma Statistics** | | | | | | | | | | | |
| 124 | | | | | k hat (MLE) | 1.02 | | | | k star (bias corrected MLE) | 0.935 | |
| 125 | | | | | Theta hat (MLE) | 220477 | | | | Theta star (bias corrected MLE) | 240645 | |
| 126 | | | | | nu hat (MLE) | 57.14 | | | | nu star (bias corrected) | 52.35 | |
| 127 | | | | | MLE Mean (bias corrected) | 224975 | | | | MLE Sd (bias corrected) | 232678 | |
| 128 | | | | | | | | | | | | |
| 129 | **Background Statistics Assuming Gamma Distribution** | | | | | | | | | | | |
| 130 | | | | 95% Wilson Hilferty (WH) Approx. Gamma UPL | | 725340 | | | | 90% Percentile | 526675 | |
| 131 | | | | 95% Hawkins Wixley (HW) Approx. Gamma UPL | | 791249 | | | | 95% Percentile | 690250 | |
| 132 | | | | 95% WH Approx. Gamma UTL with | 95% Coverage | 1007705 | | | | 99% Percentile | 1071952 | |
| 133 | | | | 95% HW Approx. Gamma UTL with | 95% Coverage | 1155021 | | | | | | |
| 134 | | | | | 95% WH USL | 1322586 | | | | 95% HW USL | 1585803 | |
| 135 | | | | | | | | | | | | |
| 136 | **Lognormal GOF Test** | | | | | | | | | | | |
| 137 | | | | | Shapiro Wilk Test Statistic | 0.667 | **Shapiro Wilk Lognormal GOF Test** | | | | | |
| 138 | | | | | 5% Shapiro Wilk Critical Value | 0.924 | Data Not Lognormal at 5% Significance Level | | | | | |
| 139 | | | | | Lilliefors Test Statistic | 0.369 | **Lilliefors Lognormal GOF Test** | | | | | |
| 140 | | | | | 5% Lilliefors Critical Value | 0.164 | Data Not Lognormal at 5% Significance Level | | | | | |
| 141 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 142 | | | | | | | | | | | | |
| 143 | **Background Statistics assuming Lognormal Distribution** | | | | | | | | | | | |
| 144 | | | | 95% UTL with | 95% Coverage | 2300940 | | | | 90% Percentile (z) | 665363 | |
| 145 | | | | | 95% UPL (t) | 1189958 | | | | 95% Percentile (z) | 1061791 | |
| 146 | | | | | 95% USL | 4203759 | | | | 99% Percentile (z) | 2551505 | |
| 147 | | | | | | | | | | | | |
| 148 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 149 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 150 | | | | | | | | | | | | |
| 151 | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | | | | | |
| 152 | | | | | Order of Statistic, r | 28 | | | | 95% UTL with | 95% Coverage | 381000 |
| 153 | | | | | Approx, f used to compute achieved CC | 1.474 | Approximate Actual Confidence Coefficient achieved by UTL | | | | | 0.762 |
| 154 | | | | | | | Approximate Sample Size needed to achieve specified CC | | | | | 59 |
| 155 | | | | 95% Percentile Bootstrap UTL with | 95% Coverage | 381000 | | | | 95% BCA Bootstrap UTL with | 95% Coverage | 381000 |
| 156 | | | | | 95% UPL | 380550 | | | | 90% Percentile | | 371500 |
| 157 | | | | | 90% Chebyshev UPL | 722520 | | | | 95% Percentile | | 378250 |
| 158 | | | | | 95% Chebyshev UPL | 947892 | | | | 99% Percentile | | 380730 |
| 159 | | | | | 95% USL | 381000 | | | | | | |
| 160 | | | | | | | | | | | | |
| 161 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 162 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 163 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 164 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 165 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 166 | | | | | | | | | | | | |
| 167 | **Chloride** | | | | | | | | | | | |
| 168 | | | | | | | | | | | | |
| 169 | **General Statistics** | | | | | | | | | | | |
| 170 | | | | | | Total Number of Observations | 26 | | | Number of Distinct Observations | 20 | |
| 171 | | | | | | | | | | Number of Missing Observations | 5 | |
| 172 | | | | | | Minimum | 6.9 | | | First Quartile | 7.825 | |
| 173 | | | | | | Second Largest | 25.4 | | | Median | 19.8 | |
| 174 | | | | | | Maximum | 29 | | | Third Quartile | 23.48 | |
| 175 | | | | | | Mean | 16.96 | | | SD | 7.812 | |
| 176 | | | | | | Coefficient of Variation | 0.461 | | | Skewness | -0.263 | |
| 177 | | | | | | Mean of logged Data | 2.701 | | | SD of logged Data | 0.55 | |
| 178 | | | | | | | | | | | | |
| 179 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 180 | | | | | | Tolerance Factor K (For UTL) | 2.275 | | | d2max (for USL) | 2.681 | |
| 181 | | | | | | | | | | | | |
| 182 | **Normal GOF Test** | | | | | | | | | | | |
| 183 | | | | | | Shapiro Wilk Test Statistic | 0.825 | | | **Shapiro Wilk GOF Test** | | |
| 184 | | | | | | 5% Shapiro Wilk Critical Value | 0.92 | | | Data Not Normal at 5% Significance Level | | |
| 185 | | | | | | Lilliefors Test Statistic | 0.223 | | | **Lilliefors GOF Test** | | |
| 186 | | | | | | 5% Lilliefors Critical Value | 0.17 | | | Data Not Normal at 5% Significance Level | | |
| 187 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 188 | | | | | | | | | | | | |
| 189 | **Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 190 | | | | | | 95% UTL with 95% Coverage | 34.73 | | | 90% Percentile (z) | 26.97 | |
| 191 | | | | | | 95% UPL (t) | 30.56 | | | 95% Percentile (z) | 29.81 | |
| 192 | | | | | | 95% USL | 37.91 | | | 99% Percentile (z) | 35.14 | |
| 193 | | | | | | | | | | | | |
| 194 | **Gamma GOF Test** | | | | | | | | | | | |
| 195 | | | | | | A-D Test Statistic | 2.429 | | | **Anderson-Darling Gamma GOF Test** | | |
| 196 | | | | | | 5% A-D Critical Value | 0.748 | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 197 | | | | | | K-S Test Statistic | 0.27 | | | **Kolmogorov-Smirnov Gamma GOF Test** | | |
| 198 | | | | | | 5% K-S Critical Value | 0.172 | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 199 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 200 | | | | | | | | | | | | |
| 201 | **Gamma Statistics** | | | | | | | | | | | |
| 202 | | | | | | k hat (MLE) | 4 | | | k star (bias corrected MLE) | 3.564 | |
| 203 | | | | | | Theta hat (MLE) | 4.24 | | | Theta star (bias corrected MLE) | 4.759 | |
| 204 | | | | | | nu hat (MLE) | 208 | | | nu star (bias corrected) | 185.3 | |
| 205 | | | | | | MLE Mean (bias corrected) | 16.96 | | | MLE Sd (bias corrected) | 8.984 | |
| 206 | | | | | | | | | | | | |
| 207 | **Background Statistics Assuming Gamma Distribution** | | | | | | | | | | | |
| 208 | | | | | | 95% Wilson Hilferty (WH) Approx. Gamma UPL | 34.68 | | | 90% Percentile | 29.01 | |
| 209 | | | | | | 95% Hawkins Wixley (HW) Approx. Gamma UPL | 35.51 | | | 95% Percentile | 33.92 | |
| 210 | | | | | | 95% WH Approx. Gamma UTL with 95% Coverage | 42.69 | | | 99% Percentile | 44.46 | |
| 211 | | | | | | 95% HW Approx. Gamma UTL with 95% Coverage | 44.45 | | | | | |
| 212 | | | | | | 95% WH USL | 49.54 | | | 95% HW USL | 52.3 | |
| 213 | | | | | | | | | | | | |
| 214 | **Lognormal GOF Test** | | | | | | | | | | | |
| 215 | | | | | | Shapiro Wilk Test Statistic | 0.78 | | | **Shapiro Wilk Lognormal GOF Test** | | |
| 216 | | | | | | 5% Shapiro Wilk Critical Value | 0.92 | | | Data Not Lognormal at 5% Significance Level | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 217 | | | | Lilliefors Test Statistic | | 0.286 | **Lilliefors Lognormal GOF Test** | | | | | |
| 218 | | | | 5% Lilliefors Critical Value | | 0.17 | Data Not Lognormal at 5% Significance Level | | | | | |
| 219 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 220 | | | | | | | | | | | | |
| 221 | **Background Statistics assuming Lognormal Distribution** | | | | | | | | | | | |
| 222 | | | | 95% UTL with 95% Coverage | | 52.08 | | | | 90% Percentile (z) | | 30.15 |
| 223 | | | | 95% UPL (t) | | 38.81 | | | | 95% Percentile (z) | | 36.82 |
| 224 | | | | 95% USL | | 65.11 | | | | 99% Percentile (z) | | 53.57 |
| 225 | | | | | | | | | | | | |
| 226 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 227 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 228 | | | | | | | | | | | | |
| 229 | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | | | | | |
| 230 | | | | Order of Statistic, r | | 26 | | | | 95% UTL with 95% Coverage | | 29 |
| 231 | | | | Approx, f used to compute achieved CC | | 1.368 | | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.736 |
| 232 | | | | | | | | | | Approximate Sample Size needed to achieve specified CC | | 59 |
| 233 | | | 95% Percentile Bootstrap UTL with 95% Coverage | | | 29 | | | | 95% BCA Bootstrap UTL with 95% Coverage | | 28.1 |
| 234 | | | | 95% UPL | | 27.74 | | | | 90% Percentile | | 25 |
| 235 | | | | 90% Chebyshev UPL | | 40.84 | | | | 95% Percentile | | 25.3 |
| 236 | | | | 95% Chebyshev UPL | | 51.66 | | | | 99% Percentile | | 28.1 |
| 237 | | | | 95% USL | | 29 | | | | | | |
| 238 | | | | | | | | | | | | |
| 239 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 240 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 241 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 242 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 243 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 244 | | | | | | | | | | | | |
| 245 | **Fluoride** | | | | | | | | | | | |
| 246 | | | | | | | | | | | | |
| 247 | **General Statistics** | | | | | | | | | | | |
| 248 | | | | Total Number of Observations | | 28 | | | | Number of Missing Observations | | 3 |
| 249 | | | | Number of Distinct Observations | | 17 | | | | | | |
| 250 | | | | Number of Detects | | 21 | | | | Number of Non-Detects | | 7 |
| 251 | | | | Number of Distinct Detects | | 17 | | | | Number of Distinct Non-Detects | | 1 |
| 252 | | | | Minimum Detect | | 0.12 | | | | Minimum Non-Detect | | 0.2 |
| 253 | | | | Maximum Detect | | 1.65 | | | | Maximum Non-Detect | | 0.2 |
| 254 | | | | Variance Detected | | 0.129 | | | | Percent Non-Detects | | 25% |
| 255 | | | | Mean Detected | | 0.58 | | | | SD Detected | | 0.359 |
| 256 | | | | Mean of Detected Logged Data | | -0.744 | | | | SD of Detected Logged Data | | 0.68 |
| 257 | | | | | | | | | | | | |
| 258 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 259 | | | | Tolerance Factor K (For UTL) | | 2.246 | | | | d2max (for USL) | | 2.714 |
| 260 | | | | | | | | | | | | |
| 261 | **Normal GOF Test on Detects Only** | | | | | | | | | | | |
| 262 | | | | Shapiro Wilk Test Statistic | | 0.857 | **Shapiro Wilk GOF Test** | | | | | |
| 263 | | | | 5% Shapiro Wilk Critical Value | | 0.908 | Data Not Normal at 5% Significance Level | | | | | |
| 264 | | | | Lilliefors Test Statistic | | 0.187 | **Lilliefors GOF Test** | | | | | |
| 265 | | | | 5% Lilliefors Critical Value | | 0.188 | Detected Data appear Normal at 5% Significance Level | | | | | |
| 266 | **Detected Data appear Approximate Normal at 5% Significance Level** | | | | | | | | | | | |
| 267 | | | | | | | | | | | | |
| 268 | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 269 | | | | KM Mean | | 0.465 | | | | KM SD | | 0.363 |
| 270 | | | | 95% UTL95% Coverage | | 1.281 | | | | 95% KM UPL (t) | | 1.095 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 271 | | | | 90% KM Percentile (z) | | 0.931 | | | | 95% KM Percentile (z) | | 1.063 |
| 272 | | | | 99% KM Percentile (z) | | 1.31 | | | | 95% KM USL | | 1.451 |
| 273 | | | | | | | | | | | | |
| 274 | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 275 | | | | Mean | | 0.46 | | | | SD | | 0.375 |
| 276 | | | | 95% UTL95% Coverage | | 1.302 | | | | 95% UPL (t) | | 1.11 |
| 277 | | | | 90% Percentile (z) | | 0.94 | | | | 95% Percentile (z) | | 1.077 |
| 278 | | | | 99% Percentile (z) | | 1.332 | | | | 95% USL | | 1.478 |
| 279 | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | | | | |
| 280 | | | | | | | | | | | | |
| 281 | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | | | | |
| 282 | | | | A-D Test Statistic | | 0.918 | **Anderson-Darling GOF Test** | | | | | |
| 283 | | | | 5% A-D Critical Value | | 0.751 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 284 | | | | K-S Test Statistic | | 0.213 | **Kolmogorov-Smirnov GOF** | | | | | |
| 285 | | | | 5% K-S Critical Value | | 0.191 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 286 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 287 | | | | | | | | | | | | |
| 288 | **Gamma Statistics on Detected Data Only** | | | | | | | | | | | |
| 289 | | | | k hat (MLE) | | 2.66 | | | | k star (bias corrected MLE) | | 2.312 |
| 290 | | | | Theta hat (MLE) | | 0.218 | | | | Theta star (bias corrected MLE) | | 0.251 |
| 291 | | | | nu hat (MLE) | | 111.7 | | | | nu star (bias corrected) | | 97.1 |
| 292 | | | | MLE Mean (bias corrected) | | 0.58 | | | | | | |
| 293 | | | | MLE Sd (bias corrected) | | 0.381 | | | | 95% Percentile of Chisquare (2kstar) | | 10.48 |
| 294 | | | | | | | | | | | | |
| 295 | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | | | | | |
| 296 | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | | | | | |
| 297 | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | | | | | |
| 298 | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | | | | | |
| 299 | This is especially true when the sample size is small. | | | | | | | | | | | |
| 300 | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | | | | | |
| 301 | | | | Minimum | | 0.01 | | | | Mean | | 0.452 |
| 302 | | | | Maximum | | 1.65 | | | | Median | | 0.31 |
| 303 | | | | SD | | 0.384 | | | | CV | | 0.851 |
| 304 | | | | k hat (MLE) | | 1.026 | | | | k star (bias corrected MLE) | | 0.94 |
| 305 | | | | Theta hat (MLE) | | 0.44 | | | | Theta star (bias corrected MLE) | | 0.481 |
| 306 | | | | nu hat (MLE) | | 57.44 | | | | nu star (bias corrected) | | 52.62 |
| 307 | | | | MLE Mean (bias corrected) | | 0.452 | | | | MLE Sd (bias corrected) | | 0.466 |
| 308 | | | | 95% Percentile of Chisquare (2kstar) | | 5.755 | | | | 90% Percentile | | 1.056 |
| 309 | | | | 95% Percentile | | 1.383 | | | | 99% Percentile | | 2.147 |
| 310 | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | | | | | |
| 311 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 312 | | | | | WH | HW | | | | | WH | HW |
| 313 | | | | 95% Approx. Gamma UTL with 95% Coverage | 1.972 | 2.264 | | | | 95% Approx. Gamma UPL | 1.426 | 1.559 |
| 314 | | | | 95% Gamma USL | 2.58 | 3.096 | | | | | | |
| 315 | | | | | | | | | | | | |
| 316 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 317 | | | | Mean (KM) | | 0.465 | | | | SD (KM) | | 0.363 |
| 318 | | | | Variance (KM) | | 0.132 | | | | SE of Mean (KM) | | 0.0703 |
| 319 | | | | k hat (KM) | | 1.638 | | | | k star (KM) | | 1.487 |
| 320 | | | | nu hat (KM) | | 91.75 | | | | nu star (KM) | | 83.26 |
| 321 | | | | theta hat (KM) | | 0.284 | | | | theta star (KM) | | 0.313 |
| 322 | | | | 80% gamma percentile (KM) | | 0.72 | | | | 90% gamma percentile (KM) | | 0.971 |
| 323 | | | | 95% gamma percentile (KM) | | 1.215 | | | | 99% gamma percentile (KM) | | 1.766 |
| 324 | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 325 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 326 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 327 | | | | | WH | HW | | | | | WH | HW |
| 328 | 95% Approx. Gamma UTL with 95% Coverage | | | | 1.593 | 1.684 | 95% Approx. Gamma UPL | | | | 1.212 | 1.247 |
| 329 | 95% KM Gamma Percentile | | | | 1.153 | 1.182 | 95% Gamma USL | | | | 2.004 | 2.175 |
| 330 | | | | | | | | | | | | |
| 331 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 332 | Shapiro Wilk Test Statistic | | | | 0.912 | | **Shapiro Wilk GOF Test** | | | | | |
| 333 | 5% Shapiro Wilk Critical Value | | | | 0.908 | | Detected Data appear Lognormal at 5% Significance Level | | | | | |
| 334 | Lilliefors Test Statistic | | | | 0.232 | | **Lilliefors GOF Test** | | | | | |
| 335 | 5% Lilliefors Critical Value | | | | 0.188 | | Data Not Lognormal at 5% Significance Level | | | | | |
| 336 | **Detected Data appear Approximate Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 337 | | | | | | | | | | | | |
| 338 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 339 | Mean in Original Scale | | | | 0.467 | | Mean in Log Scale | | | | -1.086 | |
| 340 | SD in Original Scale | | | | 0.369 | | SD in Log Scale | | | | 0.857 | |
| 341 | 95% UTL95% Coverage | | | | 2.313 | | 95% BCA UTL95% Coverage | | | | 1.367 | |
| 342 | 95% Bootstrap (%) UTL95% Coverage | | | | 1.65 | | 95% UPL (t) | | | | 1.491 | |
| 343 | 90% Percentile (z) | | | | 1.012 | | 95% Percentile (z) | | | | 1.382 | |
| 344 | 99% Percentile (z) | | | | 2.478 | | 95% USL | | | | 3.456 | |
| 345 | | | | | | | | | | | | |
| 346 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 347 | KM Mean of Logged Data | | | | -1.088 | | 95% KM UTL (Lognormal)95% Coverage | | | | 2.161 | |
| 348 | KM SD of Logged Data | | | | 0.828 | | 95% KM UPL (Lognormal) | | | | 1.414 | |
| 349 | 95% KM Percentile Lognormal (z) | | | | 1.314 | | 95% KM USL (Lognormal) | | | | 3.184 | |
| 350 | | | | | | | | | | | | |
| 351 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 352 | Mean in Original Scale | | | | 0.46 | | Mean in Log Scale | | | | -1.134 | |
| 353 | SD in Original Scale | | | | 0.375 | | SD in Log Scale | | | | 0.902 | |
| 354 | 95% UTL95% Coverage | | | | 2.442 | | 95% UPL (t) | | | | 1.538 | |
| 355 | 90% Percentile (z) | | | | 1.023 | | 95% Percentile (z) | | | | 1.42 | |
| 356 | 99% Percentile (z) | | | | 2.626 | | 95% USL | | | | 3.727 | |
| 357 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 358 | | | | | | | | | | | | |
| 359 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 360 | **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | | | | | | | | | |
| 361 | | | | | | | | | | | | |
| 362 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 363 | Order of Statistic, r | | | | 28 | | 95% UTL with95% Coverage | | | | 1.65 | |
| 364 | Approx, f used to compute achieved CC | | | | 1.474 | | Approximate Actual Confidence Coefficient achieved by UTL | | | | 0.762 | |
| 365 | Approximate Sample Size needed to achieve specified CC | | | | 59 | | 95% UPL | | | | 1.286 | |
| 366 | 95% USL | | | | 1.65 | | 95% KM Chebyshev UPL | | | | 2.077 | |
| 367 | | | | | | | | | | | | |
| 368 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 369 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 370 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 371 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 372 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 373 | | | | | | | | | | | | |
| 374 | **pH** | | | | | | | | | | | |
| 375 | | | | | | | | | | | | |
| 376 | **General Statistics** | | | | | | | | | | | |
| 377 | Total Number of Observations | | | | 26 | | Number of Distinct Observations | | | | 23 | |
| 378 | | | | | | | Number of Missing Observations | | | | 5 | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 379 | | | | | Minimum | 6.55 | | | | | First Quartile | 7.155 |
| 380 | | | | | Second Largest | 9.25 | | | | | Median | 7.31 |
| 381 | | | | | Maximum | 9.63 | | | | | Third Quartile | 7.945 |
| 382 | | | | | Mean | 7.588 | | | | | SD | 0.714 |
| 383 | | | | | Coefficient of Variation | 0.094 | | | | | Skewness | 1.308 |
| 384 | | | | | Mean of logged Data | 2.023 | | | | | SD of logged Data | 0.0899 |
| 385 | | | | | | | | | | | | |
| 386 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 387 | | | | | Tolerance Factor K (For UTL) | 2.275 | | | | | d2max (for USL) | 2.681 |
| 388 | | | | | | | | | | | | |
| 389 | **Normal GOF Test** | | | | | | | | | | | |
| 390 | | | | | Shapiro Wilk Test Statistic | 0.892 | **Shapiro Wilk GOF Test** | | | | | |
| 391 | | | | | 5% Shapiro Wilk Critical Value | 0.92 | Data Not Normal at 5% Significance Level | | | | | |
| 392 | | | | | Lilliefors Test Statistic | 0.19 | **Lilliefors GOF Test** | | | | | |
| 393 | | | | | 5% Lilliefors Critical Value | 0.17 | Data Not Normal at 5% Significance Level | | | | | |
| 394 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 395 | | | | | | | | | | | | |
| 396 | **Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 397 | | | | 95% UTL with | 95% Coverage | 9.212 | | | | | 90% Percentile (z) | 8.503 |
| 398 | | | | | 95% UPL (t) | 8.83 | | | | | 95% Percentile (z) | 8.762 |
| 399 | | | | | 95% USL | 9.501 | | | | | 99% Percentile (z) | 9.248 |
| 400 | | | | | | | | | | | | |
| 401 | **Gamma GOF Test** | | | | | | | | | | | |
| 402 | | | | | A-D Test Statistic | 0.749 | **Anderson-Darling Gamma GOF Test** | | | | | |
| 403 | | | | | 5% A-D Critical Value | 0.742 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 404 | | | | | K-S Test Statistic | 0.189 | **Kolmogorov-Smirnov Gamma GOF Test** | | | | | |
| 405 | | | | | 5% K-S Critical Value | 0.171 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 406 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 407 | | | | | | | | | | | | |
| 408 | **Gamma Statistics** | | | | | | | | | | | |
| 409 | | | | | k hat (MLE) | 125.2 | | | | | k star (bias corrected MLE) | 110.8 |
| 410 | | | | | Theta hat (MLE) | 0.0606 | | | | | Theta star (bias corrected MLE) | 0.0685 |
| 411 | | | | | nu hat (MLE) | 6512 | | | | | nu star (bias corrected) | 5762 |
| 412 | | | | | MLE Mean (bias corrected) | 7.588 | | | | | MLE Sd (bias corrected) | 0.721 |
| 413 | | | | | | | | | | | | |
| 414 | **Background Statistics Assuming Gamma Distribution** | | | | | | | | | | | |
| 415 | | | | 95% Wilson Hilferty (WH) Approx. Gamma UPL | | 8.834 | | | | | 90% Percentile | 8.526 |
| 416 | | | | 95% Hawkins Wixley (HW) Approx. Gamma UPL | | 8.835 | | | | | 95% Percentile | 8.812 |
| 417 | | | | 95% WH Approx. Gamma UTL with | 95% Coverage | 9.249 | | | | | 99% Percentile | 9.365 |
| 418 | | | | 95% HW Approx. Gamma UTL with | 95% Coverage | 9.255 | | | | | | |
| 419 | | | | | 95% WH USL | 9.573 | | | | | 95% HW USL | 9.584 |
| 420 | | | | | | | | | | | | |
| 421 | **Lognormal GOF Test** | | | | | | | | | | | |
| 422 | | | | | Shapiro Wilk Test Statistic | 0.922 | **Shapiro Wilk Lognormal GOF Test** | | | | | |
| 423 | | | | | 5% Shapiro Wilk Critical Value | 0.92 | Data appear Lognormal at 5% Significance Level | | | | | |
| 424 | | | | | Lilliefors Test Statistic | 0.183 | **Lilliefors Lognormal GOF Test** | | | | | |
| 425 | | | | | 5% Lilliefors Critical Value | 0.17 | Data Not Lognormal at 5% Significance Level | | | | | |
| 426 | **Data appear Approximate Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 427 | | | | | | | | | | | | |
| 428 | **Background Statistics assuming Lognormal Distribution** | | | | | | | | | | | |
| 429 | | | | 95% UTL with | 95% Coverage | 9.273 | | | | | 90% Percentile (z) | 8.481 |
| 430 | | | | | 95% UPL (t) | 8.838 | | | | | 95% Percentile (z) | 8.762 |
| 431 | | | | | 95% USL | 9.618 | | | | | 99% Percentile (z) | 9.316 |
| 432 | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 433 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 434 | **Data appear Approximate Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 435 | | | | | | | | | | | | |
| 436 | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | | | | | |
| 437 | | | | | Order of Statistic, r | 26 | | | | 95% UTL with 95% Coverage | | 9.63 |
| 438 | | | | | Approx, f used to compute achieved CC | 1.368 | | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.736 |
| 439 | | | | | | | | | | Approximate Sample Size needed to achieve specified CC | | 59 |
| 440 | | | | | 95% Percentile Bootstrap UTL with 95% Coverage | 9.63 | | | | 95% BCA Bootstrap UTL with 95% Coverage | | 9.63 |
| 441 | | | | | 95% UPL | 9.497 | | | | 90% Percentile | | 8.235 |
| 442 | | | | | 90% Chebyshev UPL | 9.77 | | | | 95% Percentile | | 9.008 |
| 443 | | | | | 95% Chebyshev UPL | 10.76 | | | | 99% Percentile | | 9.535 |
| 444 | | | | | 95% USL | 9.63 | | | | | | |
| 445 | | | | | | | | | | | | |
| 446 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 447 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 448 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 449 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 450 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 451 | | | | | | | | | | | | |
| 452 | **Sulfate** | | | | | | | | | | | |
| 453 | | | | | | | | | | | | |
| 454 | **General Statistics** | | | | | | | | | | | |
| 455 | | | | | Total Number of Observations | 26 | | | | Number of Missing Observations | | 5 |
| 456 | | | | | Number of Distinct Observations | 19 | | | | | | |
| 457 | | | | | Number of Detects | 25 | | | | Number of Non-Detects | | 1 |
| 458 | | | | | Number of Distinct Detects | 18 | | | | Number of Distinct Non-Detects | | 1 |
| 459 | | | | | Minimum Detect | 63.6 | | | | Minimum Non-Detect | | 1 |
| 460 | | | | | Maximum Detect | 2520 | | | | Maximum Non-Detect | | 1 |
| 461 | | | | | Variance Detected | 980753 | | | | Percent Non-Detects | | 3.846% |
| 462 | | | | | Mean Detected | 1270 | | | | SD Detected | | 990.3 |
| 463 | | | | | Mean of Detected Logged Data | 6.361 | | | | SD of Detected Logged Data | | 1.594 |
| 464 | | | | | | | | | | | | |
| 465 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 466 | | | | | Tolerance Factor K (For UTL) | 2.275 | | | | d2max (for USL) | | 2.681 |
| 467 | | | | | | | | | | | | |
| 468 | **Normal GOF Test on Detects Only** | | | | | | | | | | | |
| 469 | | | | | Shapiro Wilk Test Statistic | 0.721 | | | | **Shapiro Wilk GOF Test** | | |
| 470 | | | | | 5% Shapiro Wilk Critical Value | 0.918 | | | | Data Not Normal at 5% Significance Level | | |
| 471 | | | | | Lilliefors Test Statistic | 0.298 | | | | **Lilliefors GOF Test** | | |
| 472 | | | | | 5% Lilliefors Critical Value | 0.173 | | | | Data Not Normal at 5% Significance Level | | |
| 473 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 474 | | | | | | | | | | | | |
| 475 | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 476 | | | | | KM Mean | 1221 | | | | KM SD | | 982.3 |
| 477 | | | | | 95% UTL95% Coverage | 3455 | | | | 95% KM UPL (t) | | 2931 |
| 478 | | | | | 90% KM Percentile (z) | 2480 | | | | 95% KM Percentile (z) | | 2837 |
| 479 | | | | | 99% KM Percentile (z) | 3506 | | | | 95% KM USL | | 3854 |
| 480 | | | | | | | | | | | | |
| 481 | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 482 | | | | | Mean | 1221 | | | | SD | | 1002 |
| 483 | | | | | 95% UTL95% Coverage | 3500 | | | | 95% UPL (t) | | 2965 |
| 484 | | | | | 90% Percentile (z) | 2505 | | | | 95% Percentile (z) | | 2869 |
| 485 | | | | | 99% Percentile (z) | 3551 | | | | 95% USL | | 3906 |
| 486 | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | | | | |

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| 487 | | | | | | | | | | | | |
| 488 | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | | | | |
| 489 | | | | | A-D Test Statistic | 3.735 | **Anderson-Darling GOF Test** | | | | | |
| 490 | | | | | 5% A-D Critical Value | 0.783 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 491 | | | | | K-S Test Statistic | 0.343 | **Kolmogorov-Smirnov GOF** | | | | | |
| 492 | | | | | 5% K-S Critical Value | 0.181 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 493 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 494 | | | | | | | | | | | | |
| 495 | **Gamma Statistics on Detected Data Only** | | | | | | | | | | | |
| 496 | | | | | k hat (MLE) | 0.761 | k star (bias corrected MLE) | 0.696 | | | | |
| 497 | | | | | Theta hat (MLE) | 1669 | Theta star (bias corrected MLE) | 1824 | | | | |
| 498 | | | | | nu hat (MLE) | 38.03 | nu star (bias corrected) | 34.8 | | | | |
| 499 | | | | | MLE Mean (bias corrected) | 1270 | | | | | | |
| 500 | | | | | MLE Sd (bias corrected) | 1522 | 95% Percentile of Chisquare (2kstar) | 4.748 | | | | |
| 501 | | | | | | | | | | | | |
| 502 | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | | | | | |
| 503 | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | | | | | |
| 504 | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | | | | | |
| 505 | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | | | | | |
| 506 | This is especially true when the sample size is small. | | | | | | | | | | | |
| 507 | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | | | | | |
| 508 | | | | | Minimum | 63.6 | Mean | 1241 | | | | |
| 509 | | | | | Maximum | 2520 | Median | 1925 | | | | |
| 510 | | | | | SD | 981.5 | CV | 0.791 | | | | |
| 511 | | | | | k hat (MLE) | 0.777 | k star (bias corrected MLE) | 0.713 | | | | |
| 512 | | | | | Theta hat (MLE) | 1597 | Theta star (bias corrected MLE) | 1740 | | | | |
| 513 | | | | | nu hat (MLE) | 40.4 | nu star (bias corrected) | 37.07 | | | | |
| 514 | | | | | MLE Mean (bias corrected) | 1241 | MLE Sd (bias corrected) | 1469 | | | | |
| 515 | | | | | 95% Percentile of Chisquare (2kstar) | 4.821 | 90% Percentile | 3101 | | | | |
| 516 | | | | | 95% Percentile | 4195 | 99% Percentile | 6803 | | | | |
| 517 | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | | | | | |
| 518 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 519 | | | | | | WH | HW | | | WH | HW | |
| 520 | | | | | 95% Approx. Gamma UTL with 95% Coverage | 6448 | 7668 | 95% Approx. Gamma UPL | | 4441 | 4958 | |
| 521 | | | | | 95% Gamma USL | 8323 | 10372 | | | | | |
| 522 | | | | | | | | | | | | |
| 523 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 524 | | | | | Mean (KM) | 1221 | SD (KM) | 982.3 | | | | |
| 525 | | | | | Variance (KM) | 964830 | SE of Mean (KM) | 196.6 | | | | |
| 526 | | | | | k hat (KM) | 1.545 | k star (KM) | 1.392 | | | | |
| 527 | | | | | nu hat (KM) | 80.33 | nu star (KM) | 72.39 | | | | |
| 528 | | | | | theta hat (KM) | 790.3 | theta star (KM) | 876.9 | | | | |
| 529 | | | | | 80% gamma percentile (KM) | 1904 | 90% gamma percentile (KM) | 2591 | | | | |
| 530 | | | | | 95% gamma percentile (KM) | 3261 | 99% gamma percentile (KM) | 4782 | | | | |
| 531 | | | | | | | | | | | | |
| 532 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 533 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 534 | | | | | | WH | HW | | | WH | HW | |
| 535 | | | | | 95% Approx. Gamma UTL with 95% Coverage | 6709 | 8275 | 95% Approx. Gamma UPL | | 4544 | 5208 | |
| 536 | | | | | 95% KM Gamma Percentile | 4214 | 4764 | 95% Gamma USL | | 8748 | 11386 | |
| 537 | | | | | | | | | | | | |
| 538 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 539 | | | | | Shapiro Wilk Test Statistic | 0.695 | **Shapiro Wilk GOF Test** | | | | | |
| 540 | | | | | 5% Shapiro Wilk Critical Value | 0.918 | Data Not Lognormal at 5% Significance Level | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 541 | | | | | Lilliefors Test Statistic | 0.352 | **Lilliefors GOF Test** | | | | | |
| 542 | | | | | 5% Lilliefors Critical Value | 0.173 | Data Not Lognormal at 5% Significance Level | | | | | |
| 543 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 544 | | | | | | | | | | | | |
| 545 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 546 | | | | | Mean in Original Scale | 1222 | | | | Mean in Log Scale | 6.229 | |
| 547 | | | | | SD in Original Scale | 1001 | | | | SD in Log Scale | 1.7 | |
| 548 | | | | | 95% UTL95% Coverage | 24259 | | | | 95% BCA UTL95% Coverage | 2440 | |
| 549 | | | | | 95% Bootstrap (%) UTL95% Coverage | 2520 | | | | 95% UPL (t) | 9781 | |
| 550 | | | | | 90% Percentile (z) | 4482 | | | | 95% Percentile (z) | 8311 | |
| 551 | | | | | 99% Percentile (z) | 26472 | | | | 95% USL | 48366 | |
| 552 | | | | | | | | | | | | |
| 553 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 554 | | | | | KM Mean of Logged Data | 6.116 | | | | 95% KM UTL (Lognormal)95% Coverage | 39139 | |
| 555 | | | | | KM SD of Logged Data | 1.96 | | | | 95% KM UPL (Lognormal) | 13735 | |
| 556 | | | | | 95% KM Percentile Lognormal (z) | 11383 | | | | 95% KM USL (Lognormal) | 86715 | |
| 557 | | | | | | | | | | | | |
| 558 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 559 | | | | | Mean in Original Scale | 1221 | | | | Mean in Log Scale | 6.09 | |
| 560 | | | | | SD in Original Scale | 1002 | | | | SD in Log Scale | 2.086 | |
| 561 | | | | | 95% UTL95% Coverage | 50803 | | | | 95% UPL (t) | 16664 | |
| 562 | | | | | 90% Percentile (z) | 6394 | | | | 95% Percentile (z) | 13644 | |
| 563 | | | | | 99% Percentile (z) | 56547 | | | | 95% USL | 118479 | |
| 564 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 565 | | | | | | | | | | | | |
| 566 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 567 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 568 | | | | | | | | | | | | |
| 569 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 570 | | | | | Order of Statistic, r | 26 | | | | 95% UTL with95% Coverage | 2520 | |
| 571 | | | | | Approx, f used to compute achieved CC | 1.368 | | | | Approximate Actual Confidence Coefficient achieved by UTL | 0.736 | |
| 572 | | | | | Approximate Sample Size needed to achieve specified CC | 59 | | | | 95% UPL | 2408 | |
| 573 | | | | | 95% USL | 2520 | | | | 95% KM Chebyshev UPL | 5584 | |
| 574 | | | | | | | | | | | | |
| 575 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 576 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 577 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 578 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 579 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 580 | | | | | | | | | | | | |
| 581 | **TDS** | | | | | | | | | | | |
| 582 | | | | | | | | | | | | |
| 583 | **General Statistics** | | | | | | | | | | | |
| 584 | | | | | Total Number of Observations | 28 | | | | Number of Distinct Observations | 22 | |
| 585 | | | | | | | | | | Number of Missing Observations | 3 | |
| 586 | | | | | Minimum | 384 | | | | First Quartile | 486.5 | |
| 587 | | | | | Second Largest | 3600 | | | | Median | 3250 | |
| 588 | | | | | Maximum | 3900 | | | | Third Quartile | 3463 | |
| 589 | | | | | Mean | 2275 | | | | SD | 1482 | |
| 590 | | | | | Coefficient of Variation | 0.651 | | | | Skewness | -0.436 | |
| 591 | | | | | Mean of logged Data | 7.362 | | | | SD of logged Data | 0.991 | |
| 592 | | | | | | | | | | | | |
| 593 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 594 | | | | | Tolerance Factor K (For UTL) | 2.246 | | | | d2max (for USL) | 2.714 | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 595 | | | | | | | | | | | | |
| 596 | **Normal GOF Test** | | | | | | | | | | | |
| 597 | | | | | Shapiro Wilk Test Statistic | 0.702 | **Shapiro Wilk GOF Test** | | | | | |
| 598 | | | | | 5% Shapiro Wilk Critical Value | 0.924 | Data Not Normal at 5% Significance Level | | | | | |
| 599 | | | | | Lilliefors Test Statistic | 0.339 | **Lilliefors GOF Test** | | | | | |
| 600 | | | | | 5% Lilliefors Critical Value | 0.164 | Data Not Normal at 5% Significance Level | | | | | |
| 601 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 602 | | | | | | | | | | | | |
| 603 | **Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 604 | | | | 95% UTL with | 95% Coverage | 5603 | | | 90% Percentile (z) | 4174 | | |
| 605 | | | | | 95% UPL (t) | 4844 | | | 95% Percentile (z) | 4712 | | |
| 606 | | | | | 95% USL | 6297 | | | 99% Percentile (z) | 5722 | | |
| 607 | | | | | | | | | | | | |
| 608 | **Gamma GOF Test** | | | | | | | | | | | |
| 609 | | | | | A-D Test Statistic | 4.292 | **Anderson-Darling Gamma GOF Test** | | | | | |
| 610 | | | | | 5% A-D Critical Value | 0.763 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 611 | | | | | K-S Test Statistic | 0.367 | **Kolmogorov-Smirnov Gamma GOF Test** | | | | | |
| 612 | | | | | 5% K-S Critical Value | 0.168 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 613 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 614 | | | | | | | | | | | | |
| 615 | **Gamma Statistics** | | | | | | | | | | | |
| 616 | | | | | k hat (MLE) | 1.504 | | | k star (bias corrected MLE) | 1.367 | | |
| 617 | | | | | Theta hat (MLE) | 1513 | | | Theta star (bias corrected MLE) | 1665 | | |
| 618 | | | | | nu hat (MLE) | 84.23 | | | nu star (bias corrected) | 76.54 | | |
| 619 | | | | | MLE Mean (bias corrected) | 2275 | | | MLE Sd (bias corrected) | 1946 | | |
| 620 | | | | | | | | | | | | |
| 621 | **Background Statistics Assuming Gamma Distribution** | | | | | | | | | | | |
| 622 | | | | 95% Wilson Hilferty (WH) Approx. Gamma UPL | | 6369 | | | 90% Percentile | 4851 | | |
| 623 | | | | 95% Hawkins Wixley (HW) Approx. Gamma UPL | | 6767 | | | 95% Percentile | 6116 | | |
| 624 | | | | 95% WH Approx. Gamma UTL with | 95% Coverage | 8494 | | | 99% Percentile | 8991 | | |
| 625 | | | | 95% HW Approx. Gamma UTL with | 95% Coverage | 9358 | | | | | | |
| 626 | | | | | 95% WH USL | 10808 | | | 95% HW USL | 12318 | | |
| 627 | | | | | | | | | | | | |
| 628 | **Lognormal GOF Test** | | | | | | | | | | | |
| 629 | | | | | Shapiro Wilk Test Statistic | 0.685 | **Shapiro Wilk Lognormal GOF Test** | | | | | |
| 630 | | | | | 5% Shapiro Wilk Critical Value | 0.924 | Data Not Lognormal at 5% Significance Level | | | | | |
| 631 | | | | | Lilliefors Test Statistic | 0.369 | **Lilliefors Lognormal GOF Test** | | | | | |
| 632 | | | | | 5% Lilliefors Critical Value | 0.164 | Data Not Lognormal at 5% Significance Level | | | | | |
| 633 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 634 | | | | | | | | | | | | |
| 635 | **Background Statistics assuming Lognormal Distribution** | | | | | | | | | | | |
| 636 | | | | 95% UTL with | 95% Coverage | 14594 | | | 90% Percentile (z) | 5610 | | |
| 637 | | | | | 95% UPL (t) | 8781 | | | 95% Percentile (z) | 8043 | | |
| 638 | | | | | 95% USL | 23220 | | | 99% Percentile (z) | 15804 | | |
| 639 | | | | | | | | | | | | |
| 640 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 641 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 642 | | | | | | | | | | | | |
| 643 | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | | | | | |
| 644 | | | | | Order of Statistic, r | 28 | | | 95% UTL with | 95% Coverage | 3900 | |
| 645 | | | | | Approx, f used to compute achieved CC | 1.474 | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.762 | |
| 646 | | | | | | | | | Approximate Sample Size needed to achieve specified CC | | 59 | |
| 647 | | | | 95% Percentile Bootstrap UTL with | 95% Coverage | 3900 | | | 95% BCA Bootstrap UTL with | 95% Coverage | 3600 | |
| 648 | | | | | 95% UPL | 3765 | | | 90% Percentile | | 3600 | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 649 | | | | | 90% Chebyshev UPL | 6799 | | | | | 95% Percentile | 3600 |
| 650 | | | | | 95% Chebyshev UPL | 8848 | | | | | 99% Percentile | 3819 |
| 651 | | | | | 95% USL | 3900 | | | | | | |
| 652 | | | | | | | | | | | | |
| 653 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 654 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 655 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 656 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 657 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 658 | | | | | | | | | | | | |

| Location_ID | Date | Antimony | D_Antimony | Arsenic | D_Arsenic | Barium | D_Barium | Beryllium | D_Beryllium | Cadmium | D_Cadmium | Chromium | D_Chromium | Cobalt | D_Cobalt | Fluoride | D_Fluoride | Lead | D_Lead | Lithium | D_Lithium | Mercury | D_Mercury | Molybdenum | D_Molybdenum | Radium | D_Radium | Radium-226 | D_Radium-226 | Radium-228 | D_Radium-228 | Selenium | D_Selenium | Thallium | D_Thallium |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASH-01 | 9/13/16 | 1 | 0 | 1 | 0 | 11 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 0.12 | 1 | 1 | 0 | 410 | 1 | 0.1 | 0 | 1 | 0 | 3 | 1 | | | | | 2 | 1 | 1 | 0 |
| ASH-01 | 11/3/16 | 1 | 0 | 1 | 0 | 11 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 0.2 | 0 | 1 | 0 | 407 | 1 | 0.1 | 0 | 1 | 0 | 0.91 | 1 | | | | | 2 | 1 | 1 | 0 |
| ASH-01 | 12/20/16 | 1 | 0 | 1 | 0 | 9 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 1.65 | 1 | 1 | 0 | 570 | 1 | 0.1 | 0 | 1 | 0 | 1.2 | 1 | | | | | 3 | 1 | 1 | 0 |
| ASH-01 | 2/8/17 | 1 | 0 | 1 | 0 | 9 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 0.39 | 1 | 1 | 0 | 440 | 1 | 0.1 | 0 | 1 | 0 | 1.9 | 1 | | | | | 1 | 1 | 1 | 0 |
| ASH-01 | 4/5/17 | 1 | 0 | 1 | 0 | 8 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 0.2 | 1 | 2 | 1 | 399 | 1 | 0.1 | 0 | 1 | 0 | 0.48 | 0 | | | | | 2 | 1 | 1 | 0 |
| ASH-01 | 5/10/17 | 1 | 0 | 1 | 0 | 10 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 0.29 | 1 | 1 | 0 | 405 | 1 | 0.1 | 0 | 2 | 1 | 0.96 | 1 | | | | | 1 | 0 | 1 | 0 |
| ASH-01 | 6/15/17 | 1 | 0 | 1 | 0 | 10 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 0.56 | 1 | 1 | 0 | 525 | 1 | 0.1 | 0 | 1 | 0 | 1.1 | 1 | | | | | 2 | 1 | 1 | 0 |
| ASH-01 | 7/12/17 | 1 | 0 | 1 | 0 | 10 | 1 | 1 | 0 | 0.1 | 0 | 1 | 0 | 1 | 0 | 0.2 | 0 | 1 | 0 | 399 | 1 | 0.1 | 0 | 1 | 0 | 0.71 | 0 | | | | | 2 | 1 | 1 | 0 |
| ASH-01 | 6/21/18 | 3 | 0 | 3 | 0 | 9.6 | 1 | 0.5 | 0 | 1.5 | 0 | 3 | 0 | 3 | 0 | 0.33 | 1 | 3 | 0 | 433 | 1 | 0.2 | 0 | 3 | 0 | 0.797 | 1 | 0.285 | 1 | 0.512 | 1 | 3 | 0 | 3 | 0 |
| ASH-01 | 10/10/18 | 0.5 | 0 | 0.5 | 0 | 11.9 | 1 | 0.2 | 0 | 0.08 | 0 | 0.93 | 0 | 0.5 | 0 | 0.23 | 1 | 0.5 | 1 | 409 | 1 | 0.2 | 0 | 0.5 | 0 | | | | | | | 0.5 | 0 | 0.1 | 0 |
| ASH-01 | 5/2/19 | 1 | 0 | 1 | 0 | 8.3 | 1 | 0.5 | 0 | 0.5 | 0 | 1 | 0 | 1 | 0 | 0.2 | 0 | 1 | 0 | 398 | 1 | 0.2 | 0 | 1 | 0 | 1.62 | 1 | 0.947 | 1 | 0.676 | 1 | 1 | 0 | 1 | 0 |
| ASH-01 | 7/10/19 | 1 | 0 | 1 | 0 | 9 | 1 | 0.5 | 0 | 5 | 0 | 1 | 0 | 1 | 0 | 0.2 | 0 | 1 | 0 | 402 | 1 | 0.2 | 0 | 1 | 0 | | | | | | | 1 | 0 | 1 | 0 |
| ASH-01 | 10/8/19 | 4 | 0 | 4 | 0 | 9.7 | 1 | 2 | 0 | 2 | 0 | 4 | 0 | 4 | 0 | 0.2 | 0 | 4 | 0 | 387 | 1 | 0.2 | 0 | 4 | 0 | 0.282 | 1 | 0.187 | 1 | 1.08 | 1 | 4 | 0 | 4 | 0 |
| ASH-01 | 4/14/20 | 1 | 0 | 1 | 0 | 9.6 | 1 | 0.5 | 0 | 0.5 | 0 | 1 | 0 | 1 | 0 | 0.24 | 1 | 1 | 0 | 439 | 1 | 0.2 | 0 | 1 | 0 | 0.981 | 1 | 0.238 | 1 | 0.743 | 1 | 1 | 0 | 1 | 0 |
| ASH-01 | 10/5/20 | 1 | 0 | 1 | 0 | 9.3 | 1 | 0.5 | 0 | 0.5 | 0 | 1 | 0 | 1 | 0 | 0.24 | 1 | 1 | 0 | 413 | 1 | 0.2 | 0 | 1 | 0 | 1.32 | 1 | 0.202 | 1 | 1.12 | 1 | 1 | 0 | 1 | 0 |
| ASH-01 | 4/21/21 | 1 | 0 | 1 | 0 | 9.1 | 1 | 0.5 | 0 | 0.5 | 0 | 1 | 0 | 1 | 0 | 0.2 | 0 | 1 | 0 | 390 | 1 | 0.2 | 0 | 1 | 0 | 2.71 | 1 | 0.818 | 1 | 1.89 | 1 | 1 | 0 | 1 | 0 |
| ASH-01 | 10/19/21 | 1 | 0 | 1 | 0 | 9.8 | 1 | 0.5 | 0 | 0.5 | 0 | 1 | 0 | 1 | 0 | 0.2 | 0 | 1 | 0 | 435 | 1 | 0.2 | 0 | 1 | 0 | 2.12 | 1 | 0.364 | 1 | 1.76 | 1 | 1 | 0 | 1 | 0 |
| ASH-06 | 1/24/19 | 1 | 0 | 1.3 | 1 | 72.2 | 1 | 0.5 | 0 | 0.5 | 0 | 42.2 | 1 | 1 | 0 | 0.84 | 1 | 1 | 0 | 89.5 | 1 | 0.2 | 0 | 41 | 1 | | | | | | | 20.6 | 1 | 1 | 0 |
| ASH-06 | 5/6/19 | 1 | 0 | 1.2 | 1 | 67 | 1 | 0.5 | 0 | 0.5 | 0 | 3.4 | 1 | 1 | 0 | 0.79 | 1 | 1 | 0 | 56 | 1 | 0.2 | 0 | 29.1 | 1 | 0.873 | 1 | 0.639 | 1 | 0.234 | 1 | 22.8 | 1 | 1 | 0 |
| ASH-06 | 7/18/19 | 1 | 0 | 1 | 0 | 66.6 | 1 | 0.5 | 0 | 0.5 | 0 | 1 | 0 | 1 | 0 | 0.69 | 1 | 1 | 0 | 63.9 | 1 | 0.2 | 0 | 55.8 | 1 | 2.74 | 1 | 1.71 | 1 | 1.03 | 1 | 24.2 | 1 | 1 | 0 |
| ASH-06 | 10/8/19 | 1 | 0 | 1 | 0 | 60.5 | 1 | 0.5 | 0 | 0.5 | 0 | 1.6 | 1 | 1 | 0 | 0.81 | 1 | 1 | 0 | 51.9 | 1 | 0.2 | 0 | 48.2 | 1 | 0.901 | 1 | -0.0627 | 1 | 0.969 | 1 | 33.7 | 1 | 1 | 0 |
| ASH-06 | 1/15/20 | 1 | 0 | 1.2 | 1 | 61.6 | 1 | 0.5 | 0 | 0.5 | 0 | 2.3 | 1 | 1 | 0 | 0.72 | 1 | 1 | 0 | 56.3 | 1 | 0.2 | 0 | 17.3 | 1 | 0.812 | 1 | 0.122 | 1 | 0.69 | 1 | 23.5 | 1 | 1 | 0 |
| ASH-06 | 4/20/20 | 1 | 0 | 1.2 | 1 | 58.8 | 1 | 0.5 | 0 | 0.5 | 0 | 2.6 | 0 | 1 | 0 | 0.69 | 1 | 1 | 0 | 60.2 | 1 | 0.2 | 0 | 15.4 | 1 | 0.481 | 1 | 0.0661 | 1 | 0.415 | 1 | 24.5 | 1 | 1 | 0 |
| ASH-06 | 7/22/20 | | | | | | | | | | | | | | | 0.77 | 1 | | | | | | | | | | | | | | | | | | |
| ASH-06 | 7/24/20 | 5 | 0 | 5 | 0 | 64.7 | 1 | 2.5 | 0 | 2.5 | 0 | 12.6 | 1 | 5 | 0 | | | 5 | 0 | 57.5 | 1 | 0.2 | 0 | 22.4 | 1 | | | | | | | 25.9 | 1 | 5 | 0 |
| ASH-06 | 10/16/20 | 3 | 0 | 3 | 0 | 47.7 | 1 | 1.5 | 0 | 1.5 | 0 | 5.1 | 1 | 3 | 0 | 0.84 | 1 | 3 | 0 | 51.6 | 1 | 0.2 | 0 | 17.7 | 1 | | | | | | | 27.6 | 1 | 3 | 0 |
| ASH-06 | 10/20/20 | | | | | | | | | | | | | | | | | | | | | | | | | 1.11 | 1 | 0.213 | 1 | 0.899 | 1 | | | | |
| ASH-06 | 1/6/21 | 1 | 0 | 1 | 0 | 56.1 | 1 | 0.5 | 0 | 0.5 | 0 | 8.3 | 1 | 1 | 0 | 0.76 | 1 | 1 | 0 | 55.9 | 1 | 0.2 | 0 | 13.7 | 1 | 0.584 | 1 | -0.0582 | 1 | 0.584 | 1 | 24.9 | 1 | 1 | 0 |
| ASH-06 | 4/7/21 | 1 | 0 | 1 | 0 | 45.5 | 1 | 0.5 | 0 | 0.5 | 0 | 21.9 | 1 | 1 | 0 | 0.2 | 1 | 1 | 0 | 51.8 | 1 | 0.2 | 0 | 17.9 | 1 | | | | | | | 45 | 1 | 1 | 0 |
| ASH-06 | 4/12/21 | | | | | | | | | | | | | | | | | | | | | | | | | 0.908 | 1 | -0.0505 | 1 | 0.908 | 1 | | | | |
| ASH-06 | 10/11/21 | 2 | 0 | 2 | 0 | 40.7 | 1 | 1 | 0 | 1 | 0 | 2.6 | 1 | 2 | 0 | 0.82 | 1 | 2 | 0 | 54.9 | 1 | 0.2 | 0 | 11.8 | 1 | 1.5 | 1 | 0.718 | 1 | 0.786 | 1 | 21 | 1 | 2 | 0 |

| | | |
|---|---|---|
| | **Background Statistics for Data Sets with Non-Detects** | |
| **User Selected Options** | | |
| Date/Time of Computation | ProUCL 5.11/19/2022 10:35:53 AM | |
| From File | ProUCL Input PRPA CCR ASH Appendix IV Total 2016-2021.xls | |
| Full Precision | OFF | |
| Confidence Coefficient | 95% | |
| Coverage | 95% | |
| Different or Future K Observations | 1 | |
| Number of Bootstrap Operations | 2000 | |

**Antimony**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 28 | Number of Missing Observations | 3 |
| Number of Distinct Observations | 6 | | |
| Number of Detects | 0 | Number of Non-Detects | 28 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |
| Minimum Detect | N/A | Minimum Non-Detect | 0.5 |
| Maximum Detect | N/A | Maximum Non-Detect | 5 |
| Variance Detected | N/A | Percent Non-Detects | 100% |
| Mean Detected | N/A | SD Detected | N/A |
| Mean of Detected Logged Data | N/A | SD of Detected Logged Data | N/A |

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**

**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**

**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Antimony was not processed!**

**Arsenic**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 28 | Number of Missing Observations | 3 |
| Number of Distinct Observations | 8 | | |
| Number of Detects | 4 | Number of Non-Detects | 24 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 6 |
| Minimum Detect | 1.2 | Minimum Non-Detect | 0.5 |
| Maximum Detect | 1.3 | Maximum Non-Detect | 5 |
| Variance Detected | 0.0025 | Percent Non-Detects | 85.71% |
| Mean Detected | 1.225 | SD Detected | 0.05 |
| Mean of Detected Logged Data | 0.202 | SD of Detected Logged Data | 0.04 |

**Critical Values for Background Threshold Values (BTVs)**

| | | | |
|---|---|---|---|
| Tolerance Factor K (For UTL) | 2.246 | d2max (for USL) | 2.714 |

**Normal GOF Test on Detects Only**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.63 | **Shapiro Wilk GOF Test** |
| 5% Shapiro Wilk Critical Value | 0.748 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.441 | **Lilliefors GOF Test** |
| 5% Lilliefors Critical Value | 0.375 | Data Not Normal at 5% Significance Level |

**Data Not Normal at 5% Significance Level**

**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | | | | | KM Mean | 0.626 | | | | | KM SD | 0.275 |
| 56 | | | | | 95% UTL95% Coverage | 1.245 | | | | | 95% KM UPL (t) | 1.103 |
| 57 | | | | | 90% KM Percentile (z) | 0.979 | | | | | 95% KM Percentile (z) | 1.079 |
| 58 | | | | | 99% KM Percentile (z) | 1.267 | | | | | 95% KM USL | 1.374 |
| 59 | | | | | | | | | | | | |
| 60 | | | | | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | |
| 61 | | | | | Mean | 0.809 | | | | | SD | 0.544 |
| 62 | | | | | 95% UTL95% Coverage | 2.032 | | | | | 95% UPL (t) | 1.753 |
| 63 | | | | | 90% Percentile (z) | 1.507 | | | | | 95% Percentile (z) | 1.704 |
| 64 | | | | | 99% Percentile (z) | 2.075 | | | | | 95% USL | 2.287 |
| 65 | | | | | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | |
| 66 | | | | | | | | | | | | |
| 67 | | | | | **Gamma GOF Tests on Detected Observations Only** | | | | | | | |
| 68 | | | | | A-D Test Statistic | 0.96 | **Anderson-Darling GOF Test** | | | | | |
| 69 | | | | | 5% A-D Critical Value | 0.657 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 70 | | | | | K-S Test Statistic | 0.468 | **Kolmogorov-Smirnov GOF** | | | | | |
| 71 | | | | | 5% K-S Critical Value | 0.394 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 72 | | | | | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | |
| 73 | | | | | | | | | | | | |
| 74 | | | | | **Gamma Statistics on Detected Data Only** | | | | | | | |
| 75 | | | | | k hat (MLE) | 821.7 | k star (bias corrected MLE) | 205.6 | | | | |
| 76 | | | | | Theta hat (MLE) | 0.00149 | Theta star (bias corrected MLE) | 0.00596 | | | | |
| 77 | | | | | nu hat (MLE) | 6574 | nu star (bias corrected) | 1645 | | | | |
| 78 | | | | | MLE Mean (bias corrected) | 1.225 | | | | | | |
| 79 | | | | | MLE Sd (bias corrected) | 0.0854 | 95% Percentile of Chisquare (2kstar) | 459.5 | | | | |
| 80 | | | | | | | | | | | | |
| 81 | | | | | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | |
| 82 | | | | | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | |
| 83 | | | | | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | |
| 84 | | | | | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | |
| 85 | | | | | This is especially true when the sample size is small. | | | | | | | |
| 86 | | | | | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | |
| 87 | | | | | Minimum | 0.815 | Mean | 1.038 | | | | |
| 88 | | | | | Maximum | 1.3 | Median | 1.036 | | | | |
| 89 | | | | | SD | 0.11 | CV | 0.106 | | | | |
| 90 | | | | | k hat (MLE) | 92.31 | k star (bias corrected MLE) | 82.45 | | | | |
| 91 | | | | | Theta hat (MLE) | 0.0112 | Theta star (bias corrected MLE) | 0.0126 | | | | |
| 92 | | | | | nu hat (MLE) | 5170 | nu star (bias corrected) | 4617 | | | | |
| 93 | | | | | MLE Mean (bias corrected) | 1.038 | MLE Sd (bias corrected) | 0.114 | | | | |
| 94 | | | | | 95% Percentile of Chisquare (2kstar) | 195.9 | 90% Percentile | 1.187 | | | | |
| 95 | | | | | 95% Percentile | 1.233 | 99% Percentile | 1.323 | | | | |
| 96 | | | | | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | |
| 97 | | | | | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | |
| 98 | | | | | | WH | HW | | | | WH | HW |
| 99 | | | | | 95% Approx. Gamma UTL with 95% Coverage | 1.301 | 1.304 | 95% Approx. Gamma UPL | 1.237 | 1.238 | | |
| 100 | | | | | 95% Gamma USL | 1.362 | 1.366 | | | | | |
| 101 | | | | | | | | | | | | |
| 102 | | | | | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | |
| 103 | | | | | Mean (KM) | 0.626 | SD (KM) | 0.275 | | | | |
| 104 | | | | | Variance (KM) | 0.0758 | SE of Mean (KM) | 0.0663 | | | | |
| 105 | | | | | k hat (KM) | 5.168 | k star (KM) | 4.639 | | | | |
| 106 | | | | | nu hat (KM) | 289.4 | nu star (KM) | 259.8 | | | | |
| 107 | | | | | theta hat (KM) | 0.121 | theta star (KM) | 0.135 | | | | |
| 108 | | | | | 80% gamma percentile (KM) | 0.849 | 90% gamma percentile (KM) | 1.015 | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 109 | | | | 95% gamma percentile (KM) | | 1.168 | | | | 99% gamma percentile (KM) | | 1.491 |
| 110 | | | | | | | | | | | | |
| 111 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 112 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 113 | | | | | WH | HW | | | | | WH | HW |
| 114 | | | | 95% Approx. Gamma UTL with 95% Coverage | 1.25 | 1.25 | | | | 95% Approx. Gamma UPL | 1.072 | 1.067 |
| 115 | | | | 95% KM Gamma Percentile | 1.043 | 1.038 | | | | 95% Gamma USL | 1.428 | 1.437 |
| 116 | | | | | | | | | | | | |
| 117 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 118 | | | | Shapiro Wilk Test Statistic | | 0.63 | **Shapiro Wilk GOF Test** | | | | | |
| 119 | | | | 5% Shapiro Wilk Critical Value | | 0.748 | Data Not Lognormal at 5% Significance Level | | | | | |
| 120 | | | | Lilliefors Test Statistic | | 0.441 | **Lilliefors GOF Test** | | | | | |
| 121 | | | | 5% Lilliefors Critical Value | | 0.375 | Data Not Lognormal at 5% Significance Level | | | | | |
| 122 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 123 | | | | | | | | | | | | |
| 124 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 125 | | | | Mean in Original Scale | | 1.055 | Mean in Log Scale | | | | | 0.0498 |
| 126 | | | | SD in Original Scale | | 0.0968 | SD in Log Scale | | | | | 0.0909 |
| 127 | | | | 95% UTL95% Coverage | | 1.289 | 95% BCA UTL95% Coverage | | | | | 1.2 |
| 128 | | | | 95% Bootstrap (%) UTL95% Coverage | | 1.3 | 95% UPL (t) | | | | | 1.23 |
| 129 | | | | 90% Percentile (z) | | 1.181 | 95% Percentile (z) | | | | | 1.221 |
| 130 | | | | 99% Percentile (z) | | 1.299 | 95% USL | | | | | 1.345 |
| 131 | | | | | | | | | | | | |
| 132 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 133 | | | | KM Mean of Logged Data | | -0.537 | 95% KM UTL (Lognormal)95% Coverage | | | | | 1.253 |
| 134 | | | | KM SD of Logged Data | | 0.34 | 95% KM UPL (Lognormal) | | | | | 1.053 |
| 135 | | | | 95% KM Percentile Lognormal (z) | | 1.022 | 95% KM USL (Lognormal) | | | | | 1.469 |
| 136 | | | | | | | | | | | | |
| 137 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 138 | | | | Mean in Original Scale | | 0.809 | Mean in Log Scale | | | | | -0.38 |
| 139 | | | | SD in Original Scale | | 0.544 | SD in Log Scale | | | | | 0.556 |
| 140 | | | | 95% UTL95% Coverage | | 2.385 | 95% UPL (t) | | | | | 1.794 |
| 141 | | | | 90% Percentile (z) | | 1.395 | 95% Percentile (z) | | | | | 1.707 |
| 142 | | | | 99% Percentile (z) | | 2.494 | 95% USL | | | | | 3.095 |
| 143 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 144 | | | | | | | | | | | | |
| 145 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 146 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 147 | | | | | | | | | | | | |
| 148 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 149 | | | | Order of Statistic, r | | 28 | 95% UTL with95% Coverage | | | | | 5 |
| 150 | | | | Approx, f used to compute achieved CC | | 1.474 | Approximate Actual Confidence Coefficient achieved by UTL | | | | | 0.762 |
| 151 | | | | Approximate Sample Size needed to achieve specified CC | | 59 | 95% UPL | | | | | 4.55 |
| 152 | | | | 95% USL | | 5 | 95% KM Chebyshev UPL | | | | | 1.848 |
| 153 | | | | | | | | | | | | |
| 154 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 155 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 156 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 157 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 158 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 159 | | | | | | | | | | | | |
| 160 | **Barium** | | | | | | | | | | | |
| 161 | | | | | | | | | | | | |
| 162 | **General Statistics** | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 163 | Total Number of Observations | | | | | 28 | Number of Distinct Observations | | | | | 22 |
| 164 | | | | | | | Number of Missing Observations | | | | | 3 |
| 165 | Minimum | | | | | 8 | First Quartile | | | | | 9.525 |
| 166 | Second Largest | | | | | 67 | Median | | | | | 10.5 |
| 167 | Maximum | | | | | 72.2 | Third Quartile | | | | | 56.78 |
| 168 | Mean | | | | | 28.78 | SD | | | | | 24.95 |
| 169 | Coefficient of Variation | | | | | 0.867 | Skewness | | | | | 0.634 |
| 170 | Mean of logged Data | | | | | 2.966 | SD of logged Data | | | | | 0.899 |
| 171 | | | | | | | | | | | | |
| 172 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 173 | Tolerance Factor K (For UTL) | | | | | 2.246 | d2max (for USL) | | | | | 2.714 |
| 174 | | | | | | | | | | | | |
| 175 | **Normal GOF Test** | | | | | | | | | | | |
| 176 | Shapiro Wilk Test Statistic | | | | | 0.725 | **Shapiro Wilk GOF Test** | | | | | |
| 177 | 5% Shapiro Wilk Critical Value | | | | | 0.924 | Data Not Normal at 5% Significance Level | | | | | |
| 178 | Lilliefors Test Statistic | | | | | 0.358 | **Lilliefors GOF Test** | | | | | |
| 179 | 5% Lilliefors Critical Value | | | | | 0.164 | Data Not Normal at 5% Significance Level | | | | | |
| 180 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 181 | | | | | | | | | | | | |
| 182 | **Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 183 | 95% UTL with 95% Coverage | | | | | 84.81 | 90% Percentile (z) | | | | | 60.75 |
| 184 | 95% UPL (t) | | | | | 72.02 | 95% Percentile (z) | | | | | 69.81 |
| 185 | 95% USL | | | | | 96.49 | 99% Percentile (z) | | | | | 86.81 |
| 186 | | | | | | | | | | | | |
| 187 | **Gamma GOF Test** | | | | | | | | | | | |
| 188 | A-D Test Statistic | | | | | 3.59 | **Anderson-Darling Gamma GOF Test** | | | | | |
| 189 | 5% A-D Critical Value | | | | | 0.765 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 190 | K-S Test Statistic | | | | | 0.339 | **Kolmogorov-Smirnov Gamma GOF Test** | | | | | |
| 191 | 5% K-S Critical Value | | | | | 0.169 | Data Not Gamma Distributed at 5% Significance Level | | | | | |
| 192 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 193 | | | | | | | | | | | | |
| 194 | **Gamma Statistics** | | | | | | | | | | | |
| 195 | k hat (MLE) | | | | | 1.414 | k star (bias corrected MLE) | | | | | 1.287 |
| 196 | Theta hat (MLE) | | | | | 20.35 | Theta star (bias corrected MLE) | | | | | 22.36 |
| 197 | nu hat (MLE) | | | | | 79.2 | nu star (bias corrected) | | | | | 72.05 |
| 198 | MLE Mean (bias corrected) | | | | | 28.78 | MLE Sd (bias corrected) | | | | | 25.37 |
| 199 | | | | | | | | | | | | |
| 200 | **Background Statistics Assuming Gamma Distribution** | | | | | | | | | | | |
| 201 | 95% Wilson Hilferty (WH) Approx. Gamma UPL | | | | | 81.24 | 90% Percentile | | | | | 62.26 |
| 202 | 95% Hawkins Wixley (HW) Approx. Gamma UPL | | | | | 83.33 | 95% Percentile | | | | | 78.96 |
| 203 | 95% WH Approx. Gamma UTL with 95% Coverage | | | | | 109.3 | 99% Percentile | | | | | 117 |
| 204 | 95% HW Approx. Gamma UTL with 95% Coverage | | | | | 115.5 | | | | | | |
| 205 | 95% WH USL | | | | | 139.9 | 95% HW USL | | | | | 152.3 |
| 206 | | | | | | | | | | | | |
| 207 | **Lognormal GOF Test** | | | | | | | | | | | |
| 208 | Shapiro Wilk Test Statistic | | | | | 0.73 | **Shapiro Wilk Lognormal GOF Test** | | | | | |
| 209 | 5% Shapiro Wilk Critical Value | | | | | 0.924 | Data Not Lognormal at 5% Significance Level | | | | | |
| 210 | Lilliefors Test Statistic | | | | | 0.314 | **Lilliefors Lognormal GOF Test** | | | | | |
| 211 | 5% Lilliefors Critical Value | | | | | 0.164 | Data Not Lognormal at 5% Significance Level | | | | | |
| 212 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 213 | | | | | | | | | | | | |
| 214 | **Background Statistics assuming Lognormal Distribution** | | | | | | | | | | | |
| 215 | 95% UTL with 95% Coverage | | | | | 146.3 | 90% Percentile (z) | | | | | 61.46 |
| 216 | 95% UPL (t) | | | | | 92.28 | 95% Percentile (z) | | | | | 85.21 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 217 | | | | | 95% USL | 222.9 | | | | 99% Percentile (z) | | 157.3 |
| 218 | | | | | | | | | | | | |
| 219 | | | | | **Nonparametric Distribution Free Background Statistics** | | | | | | | |
| 220 | | | | | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | |
| 221 | | | | | | | | | | | | |
| 222 | | | | | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | |
| 223 | | | | | Order of Statistic, r | 28 | | | | 95% UTL with 95% Coverage | | 72.2 |
| 224 | | | | | Approx, f used to compute achieved CC | 1.474 | | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.762 |
| 225 | | | | | | | | | | Approximate Sample Size needed to achieve specified CC | | 59 |
| 226 | | | | | 95% Percentile Bootstrap UTL with 95% Coverage | 72.2 | | | | 95% BCA Bootstrap UTL with 95% Coverage | | 72.2 |
| 227 | | | | | 95% UPL | 69.86 | | | | 90% Percentile | | 65.27 |
| 228 | | | | | 90% Chebyshev UPL | 104.9 | | | | 95% Percentile | | 66.86 |
| 229 | | | | | 95% Chebyshev UPL | 139.4 | | | | 99% Percentile | | 70.8 |
| 230 | | | | | 95% USL | 72.2 | | | | | | |
| 231 | | | | | | | | | | | | |
| 232 | | | | | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | |
| 233 | | | | | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | |
| 234 | | | | | and consists of observations collected from clean unimpacted locations. | | | | | | | |
| 235 | | | | | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | |
| 236 | | | | | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | |
| 237 | | | | | | | | | | | | |
| 238 | **Beryllium** | | | | | | | | | | | |
| 239 | | | | | | | | | | | | |
| 240 | | | | | **General Statistics** | | | | | | | |
| 241 | | | | | Total Number of Observations | 28 | | | | Number of Missing Observations | | 3 |
| 242 | | | | | Number of Distinct Observations | 6 | | | | | | |
| 243 | | | | | Number of Detects | 0 | | | | Number of Non-Detects | | 28 |
| 244 | | | | | Number of Distinct Detects | 0 | | | | Number of Distinct Non-Detects | | 6 |
| 245 | | | | | Minimum Detect | N/A | | | | Minimum Non-Detect | | 0.2 |
| 246 | | | | | Maximum Detect | N/A | | | | Maximum Non-Detect | | 2.5 |
| 247 | | | | | Variance Detected | N/A | | | | Percent Non-Detects | | 100% |
| 248 | | | | | Mean Detected | N/A | | | | SD Detected | | N/A |
| 249 | | | | | Mean of Detected Logged Data | N/A | | | | SD of Detected Logged Data | | N/A |
| 250 | | | | | | | | | | | | |
| 251 | | | | | **Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!** | | | | | | | |
| 252 | | | | | **Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!** | | | | | | | |
| 253 | | | | | **The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).** | | | | | | | |
| 254 | | | | | | | | | | | | |
| 255 | | | | | **The data set for variable Beryllium was not processed!** | | | | | | | |
| 256 | | | | | | | | | | | | |
| 257 | | | | | | | | | | | | |
| 258 | **Cadmium** | | | | | | | | | | | |
| 259 | | | | | | | | | | | | |
| 260 | | | | | **General Statistics** | | | | | | | |
| 261 | | | | | Total Number of Observations | 28 | | | | Number of Missing Observations | | 3 |
| 262 | | | | | Number of Distinct Observations | 8 | | | | | | |
| 263 | | | | | Number of Detects | 0 | | | | Number of Non-Detects | | 28 |
| 264 | | | | | Number of Distinct Detects | 0 | | | | Number of Distinct Non-Detects | | 8 |
| 265 | | | | | Minimum Detect | N/A | | | | Minimum Non-Detect | | 0.08 |
| 266 | | | | | Maximum Detect | N/A | | | | Maximum Non-Detect | | 5 |
| 267 | | | | | Variance Detected | N/A | | | | Percent Non-Detects | | 100% |
| 268 | | | | | Mean Detected | N/A | | | | SD Detected | | N/A |
| 269 | | | | | Mean of Detected Logged Data | N/A | | | | SD of Detected Logged Data | | N/A |
| 270 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 271 | **Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!** | | | | | | | | | | | |
| 272 | **Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!** | | | | | | | | | | | |
| 273 | **The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).** | | | | | | | | | | | |
| 274 | | | | | | | | | | | | |
| 275 | **The data set for variable Cadmium was not processed!** | | | | | | | | | | | |
| 276 | | | | | | | | | | | | |
| 277 | | | | | | | | | | | | |
| 278 | **Chromium** | | | | | | | | | | | |
| 279 | | | | | | | | | | | | |
| 280 | **General Statistics** | | | | | | | | | | | |
| 281 | | | | | | Total Number of Observations | 28 | | | | Number of Missing Observations | 3 | |
| 282 | | | | | | Number of Distinct Observations | 13 | | | | | | |
| 283 | | | | | | Number of Detects | 9 | | | | Number of Non-Detects | 19 | |
| 284 | | | | | | Number of Distinct Detects | 9 | | | | Number of Distinct Non-Detects | 5 | |
| 285 | | | | | | Minimum Detect | 1.6 | | | | Minimum Non-Detect | 0.93 | |
| 286 | | | | | | Maximum Detect | 42.2 | | | | Maximum Non-Detect | 4 | |
| 287 | | | | | | Variance Detected | 178.6 | | | | Percent Non-Detects | 67.86% | |
| 288 | | | | | | Mean Detected | 11.11 | | | | SD Detected | 13.37 | |
| 289 | | | | | | Mean of Detected Logged Data | 1.843 | | | | SD of Detected Logged Data | 1.108 | |
| 290 | | | | | | | | | | | | | |
| 291 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 292 | | | | | | Tolerance Factor K (For UTL) | 2.246 | | | | d2max (for USL) | 2.714 | |
| 293 | | | | | | | | | | | | | |
| 294 | **Normal GOF Test on Detects Only** | | | | | | | | | | | |
| 295 | | | | | | Shapiro Wilk Test Statistic | 0.748 | | | | **Shapiro Wilk GOF Test** | | |
| 296 | | | | | | 5% Shapiro Wilk Critical Value | 0.829 | | | | Data Not Normal at 5% Significance Level | | |
| 297 | | | | | | Lilliefors Test Statistic | 0.25 | | | | **Lilliefors GOF Test** | | |
| 298 | | | | | | 5% Lilliefors Critical Value | 0.274 | | | | Detected Data appear Normal at 5% Significance Level | | |
| 299 | **Detected Data appear Approximate Normal at 5% Significance Level** | | | | | | | | | | | |
| 300 | | | | | | | | | | | | | |
| 301 | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 302 | | | | | | KM Mean | 4.224 | | | | KM SD | 8.576 | |
| 303 | | | | | | 95% UTL95% Coverage | 23.48 | | | | 95% KM UPL (t) | 19.09 | |
| 304 | | | | | | 90% KM Percentile (z) | 15.21 | | | | 95% KM Percentile (z) | 18.33 | |
| 305 | | | | | | 99% KM Percentile (z) | 24.17 | | | | 95% KM USL | 27.5 | |
| 306 | | | | | | | | | | | | | |
| 307 | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 308 | | | | | | Mean | 4.027 | | | | SD | 8.815 | |
| 309 | | | | | | 95% UTL95% Coverage | 23.83 | | | | 95% UPL (t) | 19.31 | |
| 310 | | | | | | 90% Percentile (z) | 15.32 | | | | 95% Percentile (z) | 18.53 | |
| 311 | | | | | | 99% Percentile (z) | 24.53 | | | | 95% USL | 27.96 | |
| 312 | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | | | | |
| 313 | | | | | | | | | | | | | |
| 314 | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | | | | |
| 315 | | | | | | A-D Test Statistic | 0.418 | | | | **Anderson-Darling GOF Test** | | |
| 316 | | | | | | 5% A-D Critical Value | 0.743 | | | | Detected data appear Gamma Distributed at 5% Significance Level | | |
| 317 | | | | | | K-S Test Statistic | 0.191 | | | | **Kolmogorov-Smirnov GOF** | | |
| 318 | | | | | | 5% K-S Critical Value | 0.287 | | | | Detected data appear Gamma Distributed at 5% Significance Level | | |
| 319 | **Detected data appear Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 320 | | | | | | | | | | | | | |
| 321 | **Gamma Statistics on Detected Data Only** | | | | | | | | | | | |
| 322 | | | | | | k hat (MLE) | 1.02 | | | | k star (bias corrected MLE) | 0.754 | |
| 323 | | | | | | Theta hat (MLE) | 10.89 | | | | Theta star (bias corrected MLE) | 14.73 | |
| 324 | | | | | | nu hat (MLE) | 18.36 | | | | nu star (bias corrected) | 13.57 | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 325 | | | | MLE Mean (bias corrected) | | 11.11 | | | | | | |
| 326 | | | | MLE Sd (bias corrected) | | 12.8 | | | | 95% Percentile of Chisquare (2kstar) | | 4.998 |
| 327 | | | | | | | | | | | | |
| 328 | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | | | | | |
| 329 | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | | | | | |
| 330 | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | | | | | |
| 331 | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | | | | | |
| 332 | This is especially true when the sample size is small. | | | | | | | | | | | |
| 333 | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | | | | | |
| 334 | | | | Minimum | | 0.01 | | | | Mean | | 3.578 |
| 335 | | | | Maximum | | 42.2 | | | | Median | | 0.01 |
| 336 | | | | SD | | 8.989 | | | | CV | | 2.512 |
| 337 | | | | k hat (MLE) | | 0.194 | | | | k star (bias corrected MLE) | | 0.197 |
| 338 | | | | Theta hat (MLE) | | 18.43 | | | | Theta star (bias corrected MLE) | | 18.15 |
| 339 | | | | nu hat (MLE) | | 10.87 | | | | nu star (bias corrected) | | 11.04 |
| 340 | | | | MLE Mean (bias corrected) | | 3.578 | | | | MLE Sd (bias corrected) | | 8.058 |
| 341 | | | | 95% Percentile of Chisquare (2kstar) | | 2.04 | | | | 90% Percentile | | 10.82 |
| 342 | | | | 95% Percentile | | 18.51 | | | | 99% Percentile | | 39.71 |
| 343 | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | | | | | |
| 344 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 345 | | | | | WH | HW | | | | | WH | HW |
| 346 | | | | 95% Approx. Gamma UTL with 95% Coverage | 23.83 | 26.78 | | | | 95% Approx. Gamma UPL | 13.8 | 13.74 |
| 347 | | | | 95% Gamma USL | 36.45 | 45.31 | | | | | | |
| 348 | | | | | | | | | | | | |
| 349 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 350 | | | | Mean (KM) | | 4.224 | | | | SD (KM) | | 8.576 |
| 351 | | | | Variance (KM) | | 73.54 | | | | SE of Mean (KM) | | 1.719 |
| 352 | | | | k hat (KM) | | 0.243 | | | | k star (KM) | | 0.24 |
| 353 | | | | nu hat (KM) | | 13.59 | | | | nu star (KM) | | 13.46 |
| 354 | | | | theta hat (KM) | | 17.41 | | | | theta star (KM) | | 17.57 |
| 355 | | | | 80% gamma percentile (KM) | | 6.047 | | | | 90% gamma percentile (KM) | | 12.71 |
| 356 | | | | 95% gamma percentile (KM) | | 20.68 | | | | 99% gamma percentile (KM) | | 42.02 |
| 357 | | | | | | | | | | | | |
| 358 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 359 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 360 | | | | | WH | HW | | | | | WH | HW |
| 361 | | | | 95% Approx. Gamma UTL with 95% Coverage | 19.55 | 19.3 | | | | 95% Approx. Gamma UPL | 13.41 | 12.79 |
| 362 | | | | 95% KM Gamma Percentile | 12.5 | 11.86 | | | | 95% Gamma USL | 26.58 | 27.17 |
| 363 | | | | | | | | | | | | |
| 364 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 365 | | | | Shapiro Wilk Test Statistic | | 0.949 | | | | **Shapiro Wilk GOF Test** | | |
| 366 | | | | 5% Shapiro Wilk Critical Value | | 0.829 | | | | Detected Data appear Lognormal at 5% Significance Level | | |
| 367 | | | | Lilliefors Test Statistic | | 0.156 | | | | **Lilliefors GOF Test** | | |
| 368 | | | | 5% Lilliefors Critical Value | | 0.274 | | | | Detected Data appear Lognormal at 5% Significance Level | | |
| 369 | **Detected Data appear Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 370 | | | | | | | | | | | | |
| 371 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 372 | | | | Mean in Original Scale | | 3.764 | | | | Mean in Log Scale | | -0.649 |
| 373 | | | | SD in Original Scale | | 8.916 | | | | SD in Log Scale | | 2.123 |
| 374 | | | | 95% UTL95% Coverage | | 61.56 | | | | 95% BCA UTL95% Coverage | | 42.2 |
| 375 | | | | 95% Bootstrap (%) UTL95% Coverage | | 42.2 | | | | 95% UPL (t) | | 20.73 |
| 376 | | | | 90% Percentile (z) | | 7.942 | | | | 95% Percentile (z) | | 17.18 |
| 377 | | | | 99% Percentile (z) | | 73.01 | | | | 95% USL | | 166.4 |
| 378 | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 379 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 380 | KM Mean of Logged Data | | | | 0.557 | 95% KM UTL (Lognormal)95% Coverage | | | | | | 19.35 |
| 381 | KM SD of Logged Data | | | | 1.071 | 95% KM UPL (Lognormal) | | | | | | 11.18 |
| 382 | 95% KM Percentile Lognormal (z) | | | | 10.16 | 95% KM USL (Lognormal) | | | | | | 31.96 |
| 383 | | | | | | | | | | | | |
| 384 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 385 | Mean in Original Scale | | | | 4.027 | Mean in Log Scale | | | | | | 0.242 |
| 386 | SD in Original Scale | | | | 8.815 | SD in Log Scale | | | | | | 1.323 |
| 387 | 95% UTL95% Coverage | | | | 24.89 | 95% UPL (t) | | | | | | 12.63 |
| 388 | 90% Percentile (z) | | | | 6.946 | 95% Percentile (z) | | | | | | 11.23 |
| 389 | 99% Percentile (z) | | | | 27.68 | 95% USL | | | | | | 46.25 |
| 390 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 391 | | | | | | | | | | | | |
| 392 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 393 | **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | | | | | | | | | |
| 394 | | | | | | | | | | | | |
| 395 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 396 | Order of Statistic, r | | | | 28 | 95% UTL with95% Coverage | | | | | | 42.2 |
| 397 | Approx, f used to compute achieved CC | | | | 1.474 | Approximate Actual Confidence Coefficient achieved by UTL | | | | | | 0.762 |
| 398 | Approximate Sample Size needed to achieve specified CC | | | | 59 | 95% UPL | | | | | | 33.06 |
| 399 | 95% USL | | | | 42.2 | 95% KM Chebyshev UPL | | | | | | 42.27 |
| 400 | | | | | | | | | | | | |
| 401 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 402 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 403 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 404 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 405 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 406 | | | | | | | | | | | | |
| 407 | **Cobalt** | | | | | | | | | | | |
| 408 | | | | | | | | | | | | |
| 409 | **General Statistics** | | | | | | | | | | | |
| 410 | Total Number of Observations | | | | 28 | Number of Missing Observations | | | | | | 3 |
| 411 | Number of Distinct Observations | | | | 6 | | | | | | | |
| 412 | Number of Detects | | | | 0 | Number of Non-Detects | | | | | | 28 |
| 413 | Number of Distinct Detects | | | | 0 | Number of Distinct Non-Detects | | | | | | 6 |
| 414 | Minimum Detect | | | | N/A | Minimum Non-Detect | | | | | | 0.5 |
| 415 | Maximum Detect | | | | N/A | Maximum Non-Detect | | | | | | 5 |
| 416 | Variance Detected | | | | N/A | Percent Non-Detects | | | | | | 100% |
| 417 | Mean Detected | | | | N/A | SD Detected | | | | | | N/A |
| 418 | Mean of Detected Logged Data | | | | N/A | SD of Detected Logged Data | | | | | | N/A |
| 419 | | | | | | | | | | | | |
| 420 | **Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!** | | | | | | | | | | | |
| 421 | **Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!** | | | | | | | | | | | |
| 422 | **The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).** | | | | | | | | | | | |
| 423 | | | | | | | | | | | | |
| 424 | **The data set for variable Cobalt was not processed!** | | | | | | | | | | | |
| 425 | | | | | | | | | | | | |
| 426 | | | | | | | | | | | | |
| 427 | **Fluoride** | | | | | | | | | | | |
| 428 | | | | | | | | | | | | |
| 429 | **General Statistics** | | | | | | | | | | | |
| 430 | Total Number of Observations | | | | 28 | Number of Missing Observations | | | | | | 3 |
| 431 | Number of Distinct Observations | | | | 17 | | | | | | | |
| 432 | Number of Detects | | | | 21 | Number of Non-Detects | | | | | | 7 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 433 | | | | Number of Distinct Detects | | 17 | | | | Number of Distinct Non-Detects | | 1 |
| 434 | | | | Minimum Detect | | 0.12 | | | | Minimum Non-Detect | | 0.2 |
| 435 | | | | Maximum Detect | | 1.65 | | | | Maximum Non-Detect | | 0.2 |
| 436 | | | | Variance Detected | | 0.129 | | | | Percent Non-Detects | | 25% |
| 437 | | | | Mean Detected | | 0.58 | | | | SD Detected | | 0.359 |
| 438 | | | | Mean of Detected Logged Data | | -0.744 | | | | SD of Detected Logged Data | | 0.68 |
| 439 | | | | | | | | | | | | |
| 440 | | | | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | |
| 441 | | | | Tolerance Factor K (For UTL) | | 2.246 | | | | d2max (for USL) | | 2.714 |
| 442 | | | | | | | | | | | | |
| 443 | | | | **Normal GOF Test on Detects Only** | | | | | | | | |
| 444 | | | | Shapiro Wilk Test Statistic | | 0.857 | | | | **Shapiro Wilk GOF Test** | | |
| 445 | | | | 5% Shapiro Wilk Critical Value | | 0.908 | | | | Data Not Normal at 5% Significance Level | | |
| 446 | | | | Lilliefors Test Statistic | | 0.187 | | | | **Lilliefors GOF Test** | | |
| 447 | | | | 5% Lilliefors Critical Value | | 0.188 | | | | Detected Data appear Normal at 5% Significance Level | | |
| 448 | | | | **Detected Data appear Approximate Normal at 5% Significance Level** | | | | | | | | |
| 449 | | | | | | | | | | | | |
| 450 | | | | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | |
| 451 | | | | KM Mean | | 0.465 | | | | KM SD | | 0.363 |
| 452 | | | | 95% UTL95% Coverage | | 1.281 | | | | 95% KM UPL (t) | | 1.095 |
| 453 | | | | 90% KM Percentile (z) | | 0.931 | | | | 95% KM Percentile (z) | | 1.063 |
| 454 | | | | 99% KM Percentile (z) | | 1.31 | | | | 95% KM USL | | 1.451 |
| 455 | | | | | | | | | | | | |
| 456 | | | | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | |
| 457 | | | | Mean | | 0.46 | | | | SD | | 0.375 |
| 458 | | | | 95% UTL95% Coverage | | 1.302 | | | | 95% UPL (t) | | 1.11 |
| 459 | | | | 90% Percentile (z) | | 0.94 | | | | 95% Percentile (z) | | 1.077 |
| 460 | | | | 99% Percentile (z) | | 1.332 | | | | 95% USL | | 1.478 |
| 461 | | | | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | |
| 462 | | | | | | | | | | | | |
| 463 | | | | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | |
| 464 | | | | A-D Test Statistic | | 0.918 | | | | **Anderson-Darling GOF Test** | | |
| 465 | | | | 5% A-D Critical Value | | 0.751 | | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 466 | | | | K-S Test Statistic | | 0.213 | | | | **Kolmogorov-Smirnov GOF** | | |
| 467 | | | | 5% K-S Critical Value | | 0.191 | | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 468 | | | | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | |
| 469 | | | | | | | | | | | | |
| 470 | | | | **Gamma Statistics on Detected Data Only** | | | | | | | | |
| 471 | | | | k hat (MLE) | | 2.66 | | | | k star (bias corrected MLE) | | 2.312 |
| 472 | | | | Theta hat (MLE) | | 0.218 | | | | Theta star (bias corrected MLE) | | 0.251 |
| 473 | | | | nu hat (MLE) | | 111.7 | | | | nu star (bias corrected) | | 97.1 |
| 474 | | | | MLE Mean (bias corrected) | | 0.58 | | | | | | |
| 475 | | | | MLE Sd (bias corrected) | | 0.381 | | | | 95% Percentile of Chisquare (2kstar) | | 10.48 |
| 476 | | | | | | | | | | | | |
| 477 | | | | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | | |
| 478 | | | | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | | |
| 479 | | | | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | | |
| 480 | | | | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | | |
| 481 | | | | This is especially true when the sample size is small. | | | | | | | | |
| 482 | | | | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | | |
| 483 | | | | Minimum | | 0.01 | | | | Mean | | 0.452 |
| 484 | | | | Maximum | | 1.65 | | | | Median | | 0.31 |
| 485 | | | | SD | | 0.384 | | | | CV | | 0.851 |
| 486 | | | | k hat (MLE) | | 1.026 | | | | k star (bias corrected MLE) | | 0.94 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 487 | | | | | Theta hat (MLE) | 0.44 | | | | Theta star (bias corrected MLE) | | 0.481 |
| 488 | | | | | nu hat (MLE) | 57.44 | | | | nu star (bias corrected) | | 52.62 |
| 489 | | | | | MLE Mean (bias corrected) | 0.452 | | | | MLE Sd (bias corrected) | | 0.466 |
| 490 | | | | | 95% Percentile of Chisquare (2kstar) | 5.755 | | | | 90% Percentile | | 1.056 |
| 491 | | | | | 95% Percentile | 1.383 | | | | 99% Percentile | | 2.147 |
| 492 | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | | | | | |
| 493 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 494 | | | | | WH | HW | | | | | WH | HW |
| 495 | 95% Approx. Gamma UTL with 95% Coverage | | | | 1.972 | 2.264 | 95% Approx. Gamma UPL | | | | 1.426 | 1.559 |
| 496 | 95% Gamma USL | | | | 2.58 | 3.096 | | | | | | |
| 497 | | | | | | | | | | | | |
| 498 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 499 | | | | | Mean (KM) | 0.465 | | | | SD (KM) | | 0.363 |
| 500 | | | | | Variance (KM) | 0.132 | | | | SE of Mean (KM) | | 0.0703 |
| 501 | | | | | k hat (KM) | 1.638 | | | | k star (KM) | | 1.487 |
| 502 | | | | | nu hat (KM) | 91.75 | | | | nu star (KM) | | 83.26 |
| 503 | | | | | theta hat (KM) | 0.284 | | | | theta star (KM) | | 0.313 |
| 504 | | | | | 80% gamma percentile (KM) | 0.72 | | | | 90% gamma percentile (KM) | | 0.971 |
| 505 | | | | | 95% gamma percentile (KM) | 1.215 | | | | 99% gamma percentile (KM) | | 1.766 |
| 506 | | | | | | | | | | | | |
| 507 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 508 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 509 | | | | | WH | HW | | | | | WH | HW |
| 510 | 95% Approx. Gamma UTL with 95% Coverage | | | | 1.593 | 1.684 | 95% Approx. Gamma UPL | | | | 1.212 | 1.247 |
| 511 | 95% KM Gamma Percentile | | | | 1.153 | 1.182 | 95% Gamma USL | | | | 2.004 | 2.175 |
| 512 | | | | | | | | | | | | |
| 513 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 514 | | | | | Shapiro Wilk Test Statistic | 0.912 | **Shapiro Wilk GOF Test** | | | | | |
| 515 | | | | | 5% Shapiro Wilk Critical Value | 0.908 | Detected Data appear Lognormal at 5% Significance Level | | | | | |
| 516 | | | | | Lilliefors Test Statistic | 0.232 | **Lilliefors GOF Test** | | | | | |
| 517 | | | | | 5% Lilliefors Critical Value | 0.188 | Data Not Lognormal at 5% Significance Level | | | | | |
| 518 | **Detected Data appear Approximate Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 519 | | | | | | | | | | | | |
| 520 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 521 | | | | | Mean in Original Scale | 0.467 | Mean in Log Scale | | | | | -1.086 |
| 522 | | | | | SD in Original Scale | 0.369 | SD in Log Scale | | | | | 0.857 |
| 523 | | | | | 95% UTL95% Coverage | 2.313 | 95% BCA UTL95% Coverage | | | | | 1.367 |
| 524 | | | | | 95% Bootstrap (%) UTL95% Coverage | 1.65 | 95% UPL (t) | | | | | 1.491 |
| 525 | | | | | 90% Percentile (z) | 1.012 | 95% Percentile (z) | | | | | 1.382 |
| 526 | | | | | 99% Percentile (z) | 2.478 | 95% USL | | | | | 3.456 |
| 527 | | | | | | | | | | | | |
| 528 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 529 | | | | | KM Mean of Logged Data | -1.088 | 95% KM UTL (Lognormal)95% Coverage | | | | | 2.161 |
| 530 | | | | | KM SD of Logged Data | 0.828 | 95% KM UPL (Lognormal) | | | | | 1.414 |
| 531 | | | | | 95% KM Percentile Lognormal (z) | 1.314 | 95% KM USL (Lognormal) | | | | | 3.184 |
| 532 | | | | | | | | | | | | |
| 533 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 534 | | | | | Mean in Original Scale | 0.46 | Mean in Log Scale | | | | | -1.134 |
| 535 | | | | | SD in Original Scale | 0.375 | SD in Log Scale | | | | | 0.902 |
| 536 | | | | | 95% UTL95% Coverage | 2.442 | 95% UPL (t) | | | | | 1.538 |
| 537 | | | | | 90% Percentile (z) | 1.023 | 95% Percentile (z) | | | | | 1.42 |
| 538 | | | | | 99% Percentile (z) | 2.626 | 95% USL | | | | | 3.727 |
| 539 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 540 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 541 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 542 | **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | | | | | | | | | |
| 543 | | | | | | | | | | | | |
| 544 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 545 | | | | | Order of Statistic, r | 28 | | | 95% UTL with95% Coverage | | | 1.65 |
| 546 | | | | | Approx, f used to compute achieved CC | 1.474 | | | Approximate Actual Confidence Coefficient achieved by UTL | | | 0.762 |
| 547 | | | | | Approximate Sample Size needed to achieve specified CC | 59 | | | 95% UPL | | | 1.286 |
| 548 | | | | | 95% USL | 1.65 | | | 95% KM Chebyshev UPL | | | 2.077 |
| 549 | | | | | | | | | | | | |
| 550 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 551 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 552 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 553 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 554 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 555 | | | | | | | | | | | | |
| 556 | **Lead** | | | | | | | | | | | |
| 557 | | | | | | | | | | | | |
| 558 | **General Statistics** | | | | | | | | | | | |
| 559 | | | | | Total Number of Observations | 28 | | | Number of Missing Observations | | | 3 |
| 560 | | | | | Number of Distinct Observations | 6 | | | | | | |
| 561 | | | | | Number of Detects | 2 | | | Number of Non-Detects | | | 26 |
| 562 | | | | | Number of Distinct Detects | 2 | | | Number of Distinct Non-Detects | | | 5 |
| 563 | | | | | Minimum Detect | 0.5 | | | Minimum Non-Detect | | | 1 |
| 564 | | | | | Maximum Detect | 2 | | | Maximum Non-Detect | | | 5 |
| 565 | | | | | Variance Detected | 1.125 | | | Percent Non-Detects | | | 92.86% |
| 566 | | | | | Mean Detected | 1.25 | | | SD Detected | | | 1.061 |
| 567 | | | | | Mean of Detected Logged Data | 0 | | | SD of Detected Logged Data | | | 0.98 |
| 568 | | | | | | | | | | | | |
| 569 | **Warning: Data set has only 2 Detected Values.** | | | | | | | | | | | |
| 570 | **This is not enough to compute meaningful or reliable statistics and estimates.** | | | | | | | | | | | |
| 571 | | | | | | | | | | | | |
| 572 | | | | | | | | | | | | |
| 573 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 574 | | | | | Tolerance Factor K (For UTL) | 2.246 | | | d2max (for USL) | | | 2.714 |
| 575 | | | | | | | | | | | | |
| 576 | **Normal GOF Test on Detects Only** | | | | | | | | | | | |
| 577 | **Not Enough Data to Perform GOF Test** | | | | | | | | | | | |
| 578 | | | | | | | | | | | | |
| 579 | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 580 | | | | | KM Mean | 0.563 | | | KM SD | | | 0.3 |
| 581 | | | | | 95% UTL95% Coverage | 1.236 | | | 95% KM UPL (t) | | | 1.082 |
| 582 | | | | | 90% KM Percentile (z) | 0.947 | | | 95% KM Percentile (z) | | | 1.056 |
| 583 | | | | | 99% KM Percentile (z) | 1.26 | | | 95% KM USL | | | 1.376 |
| 584 | | | | | | | | | | | | |
| 585 | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 586 | | | | | Mean | 0.768 | | | SD | | | 0.569 |
| 587 | | | | | 95% UTL95% Coverage | 2.046 | | | 95% UPL (t) | | | 1.754 |
| 588 | | | | | 90% Percentile (z) | 1.497 | | | 95% Percentile (z) | | | 1.704 |
| 589 | | | | | 99% Percentile (z) | 2.092 | | | 95% USL | | | 2.312 |
| 590 | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | | | | |
| 591 | | | | | | | | | | | | |
| 592 | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | | | | |
| 593 | **Not Enough Data to Perform GOF Test** | | | | | | | | | | | |
| 594 | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 595 | **Gamma Statistics on Detected Data Only** | | | | | | | | | | | |
| 596 | | | | | | k hat (MLE) | 2.394 | | | k star (bias corrected MLE) | | N/A |
| 597 | | | | | | Theta hat (MLE) | 0.522 | | | Theta star (bias corrected MLE) | | N/A |
| 598 | | | | | | nu hat (MLE) | 9.577 | | | nu star (bias corrected) | | N/A |
| 599 | | | | | | MLE Mean (bias corrected) | N/A | | | | | |
| 600 | | | | | | MLE Sd (bias corrected) | N/A | | | 95% Percentile of Chisquare (2kstar) | | N/A |
| 601 | | | | | | | | | | | | |
| 602 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 603 | | | | | | Mean (KM) | 0.563 | | | SD (KM) | | 0.3 |
| 604 | | | | | | Variance (KM) | 0.0898 | | | SE of Mean (KM) | | 0.0865 |
| 605 | | | | | | k hat (KM) | 3.522 | | | k star (KM) | | 3.168 |
| 606 | | | | | | nu hat (KM) | 197.2 | | | nu star (KM) | | 177.4 |
| 607 | | | | | | theta hat (KM) | 0.16 | | | theta star (KM) | | 0.178 |
| 608 | | | | | | 80% gamma percentile (KM) | 0.797 | | | 90% gamma percentile (KM) | | 0.986 |
| 609 | | | | | | 95% gamma percentile (KM) | 1.162 | | | 99% gamma percentile (KM) | | 1.543 |
| 610 | | | | | | | | | | | | |
| 611 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 612 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 613 | | | | | | | WH | HW | | | WH | HW |
| 614 | | | | | | 95% Approx. Gamma UTL with 95% Coverage | 1.069 | 1.048 | | 95% Approx. Gamma UPL | 0.926 | 0.908 |
| 615 | | | | | | 95% KM Gamma Percentile | 0.902 | 0.885 | | 95% Gamma USL | 1.211 | 1.19 |
| 616 | | | | | | | | | | | | |
| 617 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 618 | **Not Enough Data to Perform GOF Test** | | | | | | | | | | | |
| 619 | | | | | | | | | | | | |
| 620 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 621 | | | | | | Mean in Original Scale | 0.607 | | | Mean in Log Scale | | -0.652 |
| 622 | | | | | | SD in Original Scale | 0.381 | | | SD in Log Scale | | 0.551 |
| 623 | | | | | | 95% UTL95% Coverage | 1.795 | | | 95% BCA UTL95% Coverage | | 2 |
| 624 | | | | | | 95% Bootstrap (%) UTL95% Coverage | 2 | | | 95% UPL (t) | | 1.354 |
| 625 | | | | | | 90% Percentile (z) | 1.055 | | | 95% Percentile (z) | | 1.289 |
| 626 | | | | | | 99% Percentile (z) | 1.876 | | | 95% USL | | 2.323 |
| 627 | | | | | | | | | | | | |
| 628 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 629 | | | | | | KM Mean of Logged Data | -0.635 | | | 95% KM UTL (Lognormal)95% Coverage | | 0.987 |
| 630 | | | | | | KM SD of Logged Data | 0.277 | | | 95% KM UPL (Lognormal) | | 0.856 |
| 631 | | | | | | 95% KM Percentile Lognormal (z) | 0.835 | | | 95% KM USL (Lognormal) | | 1.124 |
| 632 | | | | | | | | | | | | |
| 633 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 634 | | | | | | Mean in Original Scale | 0.768 | | | Mean in Log Scale | | -0.433 |
| 635 | | | | | | SD in Original Scale | 0.569 | | | SD in Log Scale | | 0.525 |
| 636 | | | | | | 95% UTL95% Coverage | 2.108 | | | 95% UPL (t) | | 1.61 |
| 637 | | | | | | 90% Percentile (z) | 1.27 | | | 95% Percentile (z) | | 1.537 |
| 638 | | | | | | 99% Percentile (z) | 2.198 | | | 95% USL | | 2.695 |
| 639 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 640 | | | | | | | | | | | | |
| 641 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 642 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 643 | | | | | | | | | | | | |
| 644 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 645 | | | | | | Order of Statistic, r | 28 | | | 95% UTL with95% Coverage | | 5 |
| 646 | | | | | | Approx, f used to compute achieved CC | 1.474 | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.762 |
| 647 | | | | | | Approximate Sample Size needed to achieve specified CC | 59 | | | 95% UPL | | 4.55 |
| 648 | | | | | | 95% USL | 5 | | | 95% KM Chebyshev UPL | | 1.892 |

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.
Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers
and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data
represents a background data set and when many onsite observations need to be compared with the BTV.

**Lithium**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 28 | Number of Distinct Observations | 27 |
| | | Number of Missing Observations | 3 |
| Minimum | 51.6 | First Quartile | 57.2 |
| Second Largest | 525 | Median | 398.5 |
| Maximum | 570 | Third Quartile | 410.8 |
| Mean | 282.5 | SD | 187 |
| Coefficient of Variation | 0.662 | Skewness | -0.317 |
| Mean of logged Data | 5.272 | SD of logged Data | 0.995 |

**Critical Values for Background Threshold Values (BTVs)**

| | | | |
|---|---|---|---|
| Tolerance Factor K (For UTL) | 2.246 | d2max (for USL) | 2.714 |

**Normal GOF Test**

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.759 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.924 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.319 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.164 | Data Not Normal at 5% Significance Level | |

**Data Not Normal at 5% Significance Level**

**Background Statistics Assuming Normal Distribution**

| | | | |
|---|---|---|---|
| 95% UTL with 95% Coverage | 702.5 | 90% Percentile (z) | 522.2 |
| 95% UPL (t) | 606.7 | 95% Percentile (z) | 590.1 |
| 95% USL | 790.1 | 99% Percentile (z) | 717.5 |

**Gamma GOF Test**

| | | | |
|---|---|---|---|
| A-D Test Statistic | 3.86 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.763 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.357 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.168 | Data Not Gamma Distributed at 5% Significance Level | |

**Data Not Gamma Distributed at 5% Significance Level**

**Gamma Statistics**

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.488 | k star (bias corrected MLE) | 1.353 |
| Theta hat (MLE) | 189.8 | Theta star (bias corrected MLE) | 208.9 |
| nu hat (MLE) | 83.34 | nu star (bias corrected) | 75.74 |
| MLE Mean (bias corrected) | 282.5 | MLE Sd (bias corrected) | 242.9 |

**Background Statistics Assuming Gamma Distribution**

| | | | |
|---|---|---|---|
| 95% Wilson Hilferty (WH) Approx. Gamma UPL | 793.4 | 90% Percentile | 603.8 |
| 95% Hawkins Wixley (HW) Approx. Gamma UPL | 842.6 | 95% Percentile | 762.1 |
| 95% WH Approx. Gamma UTL with 95% Coverage | 1059 | 99% Percentile | 1122 |
| 95% HW Approx. Gamma UTL with 95% Coverage | 1167 | | |
| 95% WH USL | 1349 | 95% HW USL | 1537 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 703 | **Lognormal GOF Test** | | | | | | | | | | | |
| 704 | | | | | Shapiro Wilk Test Statistic | 0.707 | **Shapiro Wilk Lognormal GOF Test** | | | | | |
| 705 | | | | | 5% Shapiro Wilk Critical Value | 0.924 | Data Not Lognormal at 5% Significance Level | | | | | |
| 706 | | | | | Lilliefors Test Statistic | 0.362 | **Lilliefors Lognormal GOF Test** | | | | | |
| 707 | | | | | 5% Lilliefors Critical Value | 0.164 | Data Not Lognormal at 5% Significance Level | | | | | |
| 708 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 709 | | | | | | | | | | | | |
| 710 | **Background Statistics assuming Lognormal Distribution** | | | | | | | | | | | |
| 711 | | | | | 95% UTL with 95% Coverage | 1821 | | | | 90% Percentile (z) | 697.2 | |
| 712 | | | | | 95% UPL (t) | 1093 | | | | 95% Percentile (z) | 1001 | |
| 713 | | | | | 95% USL | 2903 | | | | 99% Percentile (z) | 1972 | |
| 714 | | | | | | | | | | | | |
| 715 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 716 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 717 | | | | | | | | | | | | |
| 718 | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | | | | | |
| 719 | | | | | Order of Statistic, r | 28 | | | | 95% UTL with 95% Coverage | 570 | |
| 720 | | | | | Approx, f used to compute achieved CC | 1.474 | | | | Approximate Actual Confidence Coefficient achieved by UTL | 0.762 | |
| 721 | | | | | | | | | | Approximate Sample Size needed to achieve specified CC | 59 | |
| 722 | | | | | 95% Percentile Bootstrap UTL with 95% Coverage | 570 | | | | 95% BCA Bootstrap UTL with 95% Coverage | 570 | |
| 723 | | | | | 95% UPL | 549.8 | | | | 90% Percentile | 439.3 | |
| 724 | | | | | 90% Chebyshev UPL | 853.4 | | | | 95% Percentile | 495.3 | |
| 725 | | | | | 95% Chebyshev UPL | 1112 | | | | 99% Percentile | 557.9 | |
| 726 | | | | | 95% USL | 570 | | | | | | |
| 727 | | | | | | | | | | | | |
| 728 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 729 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 730 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 731 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 732 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 733 | | | | | | | | | | | | |
| 734 | **Mercury** | | | | | | | | | | | |
| 735 | | | | | | | | | | | | |
| 736 | **General Statistics** | | | | | | | | | | | |
| 737 | | | | | Total Number of Observations | 28 | | | | Number of Missing Observations | 3 | |
| 738 | | | | | Number of Distinct Observations | 2 | | | | | | |
| 739 | | | | | Number of Detects | 0 | | | | Number of Non-Detects | 28 | |
| 740 | | | | | Number of Distinct Detects | 0 | | | | Number of Distinct Non-Detects | 2 | |
| 741 | | | | | Minimum Detect | N/A | | | | Minimum Non-Detect | 0.1 | |
| 742 | | | | | Maximum Detect | N/A | | | | Maximum Non-Detect | 0.2 | |
| 743 | | | | | Variance Detected | N/A | | | | Percent Non-Detects | 100% | |
| 744 | | | | | Mean Detected | N/A | | | | SD Detected | N/A | |
| 745 | | | | | Mean of Detected Logged Data | N/A | | | | SD of Detected Logged Data | N/A | |
| 746 | | | | | | | | | | | | |
| 747 | **Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!** | | | | | | | | | | | |
| 748 | **Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!** | | | | | | | | | | | |
| 749 | **The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).** | | | | | | | | | | | |
| 750 | | | | | | | | | | | | |
| 751 | **The data set for variable Mercury was not processed!** | | | | | | | | | | | |
| 752 | | | | | | | | | | | | |
| 753 | | | | | | | | | | | | |
| 754 | **Molybdenum** | | | | | | | | | | | |
| 755 | | | | | | | | | | | | |
| 756 | **General Statistics** | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 757 | | | | Total Number of Observations | | 28 | | | | Number of Missing Observations | | 3 |
| 758 | | | | Number of Distinct Observations | | 16 | | | | | | |
| 759 | | | | Number of Detects | | 12 | | | | Number of Non-Detects | | 16 |
| 760 | | | | Number of Distinct Detects | | 12 | | | | Number of Distinct Non-Detects | | 4 |
| 761 | | | | Minimum Detect | | 2 | | | | Minimum Non-Detect | | 0.5 |
| 762 | | | | Maximum Detect | | 55.8 | | | | Maximum Non-Detect | | 4 |
| 763 | | | | Variance Detected | | 258.9 | | | | Percent Non-Detects | | 57.14% |
| 764 | | | | Mean Detected | | 24.36 | | | | SD Detected | | 16.09 |
| 765 | | | | Mean of Detected Logged Data | | 2.934 | | | | SD of Detected Logged Data | | 0.868 |
| 766 | | | | | | | | | | | | |
| 767 | | | | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | |
| 768 | | | | Tolerance Factor K (For UTL) | | 2.246 | | | | d2max (for USL) | | 2.714 |
| 769 | | | | | | | | | | | | |
| 770 | | | | **Normal GOF Test on Detects Only** | | | | | | | | |
| 771 | | | | Shapiro Wilk Test Statistic | | 0.9 | | | | **Shapiro Wilk GOF Test** | | |
| 772 | | | | 5% Shapiro Wilk Critical Value | | 0.859 | | | | Detected Data appear Normal at 5% Significance Level | | |
| 773 | | | | Lilliefors Test Statistic | | 0.239 | | | | **Lilliefors GOF Test** | | |
| 774 | | | | 5% Lilliefors Critical Value | | 0.243 | | | | Detected Data appear Normal at 5% Significance Level | | |
| 775 | | | | **Detected Data appear Normal at 5% Significance Level** | | | | | | | | |
| 776 | | | | | | | | | | | | |
| 777 | | | | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | |
| 778 | | | | KM Mean | | 10.73 | | | | KM SD | | 15.52 |
| 779 | | | | 95% UTL95% Coverage | | 45.6 | | | | 95% KM UPL (t) | | 37.64 |
| 780 | | | | 90% KM Percentile (z) | | 30.63 | | | | 95% KM Percentile (z) | | 36.27 |
| 781 | | | | 99% KM Percentile (z) | | 46.84 | | | | 95% KM USL | | 52.87 |
| 782 | | | | | | | | | | | | |
| 783 | | | | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | |
| 784 | | | | Mean | | 10.81 | | | | SD | | 15.76 |
| 785 | | | | 95% UTL95% Coverage | | 46.21 | | | | 95% UPL (t) | | 38.13 |
| 786 | | | | 90% Percentile (z) | | 31.01 | | | | 95% Percentile (z) | | 36.73 |
| 787 | | | | 99% Percentile (z) | | 47.47 | | | | 95% USL | | 53.59 |
| 788 | | | | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | |
| 789 | | | | | | | | | | | | |
| 790 | | | | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | |
| 791 | | | | A-D Test Statistic | | 0.407 | | | | **Anderson-Darling GOF Test** | | |
| 792 | | | | 5% A-D Critical Value | | 0.741 | | | | Detected data appear Gamma Distributed at 5% Significance Level | | |
| 793 | | | | K-S Test Statistic | | 0.162 | | | | **Kolmogorov-Smirnov GOF** | | |
| 794 | | | | 5% K-S Critical Value | | 0.248 | | | | Detected data appear Gamma Distributed at 5% Significance Level | | |
| 795 | | | | **Detected data appear Gamma Distributed at 5% Significance Level** | | | | | | | | |
| 796 | | | | | | | | | | | | |
| 797 | | | | **Gamma Statistics on Detected Data Only** | | | | | | | | |
| 798 | | | | k hat (MLE) | | 2.086 | | | | k star (bias corrected MLE) | | 1.62 |
| 799 | | | | Theta hat (MLE) | | 11.68 | | | | Theta star (bias corrected MLE) | | 15.04 |
| 800 | | | | nu hat (MLE) | | 50.06 | | | | nu star (bias corrected) | | 38.87 |
| 801 | | | | MLE Mean (bias corrected) | | 24.36 | | | | | | |
| 802 | | | | MLE Sd (bias corrected) | | 19.14 | | | | 95% Percentile of Chisquare (2kstar) | | 8.226 |
| 803 | | | | | | | | | | | | |
| 804 | | | | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | | |
| 805 | | | | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | | |
| 806 | | | | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | | |
| 807 | | | | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | | |
| 808 | | | | This is especially true when the sample size is small. | | | | | | | | |
| 809 | | | | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | | |
| 810 | | | | Minimum | | 0.01 | | | | Mean | | 10.52 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 811 | | | | | Maximum | 55.8 | | | | Median | | 0.01 |
| 812 | | | | | SD | 15.96 | | | | CV | | 1.517 |
| 813 | | | | | k hat (MLE) | 0.207 | | | | k star (bias corrected MLE) | | 0.209 |
| 814 | | | | | Theta hat (MLE) | 50.82 | | | | Theta star (bias corrected MLE) | | 50.42 |
| 815 | | | | | nu hat (MLE) | 11.59 | | | | nu star (bias corrected) | | 11.68 |
| 816 | | | | | MLE Mean (bias corrected) | 10.52 | | | | MLE Sd (bias corrected) | | 23.03 |
| 817 | | | | | 95% Percentile of Chisquare (2kstar) | 2.126 | | | | 90% Percentile | | 31.81 |
| 818 | | | | | 95% Percentile | 53.6 | | | | 99% Percentile | | 113.2 |
| 819 | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | | | | | |
| 820 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 821 | | | | | WH | HW | | | | WH | HW | |
| 822 | 95% Approx. Gamma UTL with 95% Coverage | | | | 81.76 | 108.2 | 95% Approx. Gamma UPL | | | 48.86 | 56.83 | |
| 823 | 95% Gamma USL | | | | 122.5 | 180.3 | | | | | | |
| 824 | | | | | | | | | | | | |
| 825 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 826 | | | | | Mean (KM) | 10.73 | | | | SD (KM) | | 15.52 |
| 827 | | | | | Variance (KM) | 241 | | | | SE of Mean (KM) | | 3.064 |
| 828 | | | | | k hat (KM) | 0.478 | | | | k star (KM) | | 0.451 |
| 829 | | | | | nu hat (KM) | 26.77 | | | | nu star (KM) | | 25.23 |
| 830 | | | | | theta hat (KM) | 22.45 | | | | theta star (KM) | | 23.82 |
| 831 | | | | | 80% gamma percentile (KM) | 17.52 | | | | 90% gamma percentile (KM) | | 29.65 |
| 832 | | | | | 95% gamma percentile (KM) | 42.78 | | | | 99% gamma percentile (KM) | | 75.38 |
| 833 | | | | | | | | | | | | |
| 834 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 835 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 836 | | | | | WH | HW | | | | WH | HW | |
| 837 | 95% Approx. Gamma UTL with 95% Coverage | | | | 64.81 | 73.72 | 95% Approx. Gamma UPL | | | 41.9 | 44.26 | |
| 838 | 95% KM Gamma Percentile | | | | 38.59 | 40.24 | 95% Gamma USL | | | 91.94 | 111.7 | |
| 839 | | | | | | | | | | | | |
| 840 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 841 | | | | | Shapiro Wilk Test Statistic | 0.862 | **Shapiro Wilk GOF Test** | | | | | |
| 842 | | | | | 5% Shapiro Wilk Critical Value | 0.859 | Detected Data appear Lognormal at 5% Significance Level | | | | | |
| 843 | | | | | Lilliefors Test Statistic | 0.212 | **Lilliefors GOF Test** | | | | | |
| 844 | | | | | 5% Lilliefors Critical Value | 0.243 | Detected Data appear Lognormal at 5% Significance Level | | | | | |
| 845 | **Detected Data appear Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 846 | | | | | | | | | | | | |
| 847 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 848 | | | | | Mean in Original Scale | 11.78 | | | | Mean in Log Scale | | 1.616 |
| 849 | | | | | SD in Original Scale | 15.16 | | | | SD in Log Scale | | 1.405 |
| 850 | | | | | 95% UTL95% Coverage | 118.2 | | | | 95% BCA UTL95% Coverage | | 55.8 |
| 851 | | | | | 95% Bootstrap (%) UTL95% Coverage | 55.8 | | | | 95% UPL (t) | | 57.52 |
| 852 | | | | | 90% Percentile (z) | 30.48 | | | | 95% Percentile (z) | | 50.78 |
| 853 | | | | | 99% Percentile (z) | 132.3 | | | | 95% USL | | 228.3 |
| 854 | | | | | | | | | | | | |
| 855 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 856 | | | | | KM Mean of Logged Data | 0.868 | | | | 95% KM UTL (Lognormal)95% Coverage | | 159.9 |
| 857 | | | | | KM SD of Logged Data | 1.873 | | | | 95% KM UPL (Lognormal) | | 61.22 |
| 858 | | | | | 95% KM Percentile Lognormal (z) | 51.86 | | | | 95% KM USL (Lognormal) | | 384.4 |
| 859 | | | | | | | | | | | | |
| 860 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 861 | | | | | Mean in Original Scale | 10.81 | | | | Mean in Log Scale | | 0.925 |
| 862 | | | | | SD in Original Scale | 15.76 | | | | SD in Log Scale | | 1.89 |
| 863 | | | | | 95% UTL95% Coverage | 176 | | | | 95% UPL (t) | | 66.8 |
| 864 | | | | | 90% Percentile (z) | 28.44 | | | | 95% Percentile (z) | | 56.5 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 865 | | | | 99% Percentile (z) | 204.9 | | | | | 95% USL | 426.6 | |
| 866 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 867 | | | | | | | | | | | | |
| 868 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 869 | **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | | | | | | | | | |
| 870 | | | | | | | | | | | | |
| 871 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 872 | | | | Order of Statistic, r | 28 | | | | | 95% UTL with95% Coverage | 55.8 | |
| 873 | | | | Approx, f used to compute achieved CC | 1.474 | | | | | Approximate Actual Confidence Coefficient achieved by UTL | 0.762 | |
| 874 | | | | Approximate Sample Size needed to achieve specified CC | 59 | | | | | 95% UPL | 52.38 | |
| 875 | | | | 95% USL | 55.8 | | | | | 95% KM Chebyshev UPL | 79.59 | |
| 876 | | | | | | | | | | | | |
| 877 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 878 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 879 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 880 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 881 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 882 | | | | | | | | | | | | |
| 883 | **Radium** | | | | | | | | | | | |
| 884 | | | | | | | | | | | | |
| 885 | **General Statistics** | | | | | | | | | | | |
| 886 | | | | Total Number of Observations | 24 | | | | | Number of Missing Observations | 7 | |
| 887 | | | | Number of Distinct Observations | 24 | | | | | | | |
| 888 | | | | Number of Detects | 22 | | | | | Number of Non-Detects | 2 | |
| 889 | | | | Number of Distinct Detects | 22 | | | | | Number of Distinct Non-Detects | 2 | |
| 890 | | | | Minimum Detect | 0.282 | | | | | Minimum Non-Detect | 0.48 | |
| 891 | | | | Maximum Detect | 3 | | | | | Maximum Non-Detect | 0.71 | |
| 892 | | | | Variance Detected | 0.561 | | | | | Percent Non-Detects | 8.333% | |
| 893 | | | | Mean Detected | 1.31 | | | | | SD Detected | 0.749 | |
| 894 | | | | Mean of Detected Logged Data | 0.117 | | | | | SD of Detected Logged Data | 0.577 | |
| 895 | | | | | | | | | | | | |
| 896 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 897 | | | | Tolerance Factor K (For UTL) | 2.309 | | | | | d2max (for USL) | 2.644 | |
| 898 | | | | | | | | | | | | |
| 899 | **Normal GOF Test on Detects Only** | | | | | | | | | | | |
| 900 | | | | Shapiro Wilk Test Statistic | 0.879 | | | | | **Shapiro Wilk GOF Test** | | |
| 901 | | | | 5% Shapiro Wilk Critical Value | 0.911 | | | | | Data Not Normal at 5% Significance Level | | |
| 902 | | | | Lilliefors Test Statistic | 0.196 | | | | | **Lilliefors GOF Test** | | |
| 903 | | | | 5% Lilliefors Critical Value | 0.184 | | | | | Data Not Normal at 5% Significance Level | | |
| 904 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 905 | | | | | | | | | | | | |
| 906 | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 907 | | | | KM Mean | 1.229 | | | | | KM SD | 0.751 | |
| 908 | | | | 95% UTL95% Coverage | 2.962 | | | | | 95% KM UPL (t) | 2.542 | |
| 909 | | | | 90% KM Percentile (z) | 2.191 | | | | | 95% KM Percentile (z) | 2.464 | |
| 910 | | | | 99% KM Percentile (z) | 2.975 | | | | | 95% KM USL | 3.213 | |
| 911 | | | | | | | | | | | | |
| 912 | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 913 | | | | Mean | 1.225 | | | | | SD | 0.771 | |
| 914 | | | | 95% UTL95% Coverage | 3.005 | | | | | 95% UPL (t) | 2.574 | |
| 915 | | | | 90% Percentile (z) | 2.213 | | | | | 95% Percentile (z) | 2.493 | |
| 916 | | | | 99% Percentile (z) | 3.019 | | | | | 95% USL | 3.264 | |
| 917 | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | | | | |
| 918 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 919 | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | | | | |
| 920 | | | | A-D Test Statistic | | 0.484 | **Anderson-Darling GOF Test** | | | | | |
| 921 | | | | 5% A-D Critical Value | | 0.748 | Detected data appear Gamma Distributed at 5% Significance Level | | | | | |
| 922 | | | | K-S Test Statistic | | 0.137 | **Kolmogorov-Smirnov GOF** | | | | | |
| 923 | | | | 5% K-S Critical Value | | 0.186 | Detected data appear Gamma Distributed at 5% Significance Level | | | | | |
| 924 | **Detected data appear Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 925 | | | | | | | | | | | | |
| 926 | **Gamma Statistics on Detected Data Only** | | | | | | | | | | | |
| 927 | | | | k hat (MLE) | | 3.442 | k star (bias corrected MLE) | | | | | 3.003 |
| 928 | | | | Theta hat (MLE) | | 0.38 | Theta star (bias corrected MLE) | | | | | 0.436 |
| 929 | | | | nu hat (MLE) | | 151.4 | nu star (bias corrected) | | | | | 132.1 |
| 930 | | | | MLE Mean (bias corrected) | | 1.31 | | | | | | |
| 931 | | | | MLE Sd (bias corrected) | | 0.756 | 95% Percentile of Chisquare (2kstar) | | | | | 12.6 |
| 932 | | | | | | | | | | | | |
| 933 | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | | | | | |
| 934 | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | | | | | |
| 935 | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | | | | | |
| 936 | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | | | | | |
| 937 | This is especially true when the sample size is small. | | | | | | | | | | | |
| 938 | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | | | | | |
| 939 | | | | Minimum | | 0.16 | Mean | | | | | 1.22 |
| 940 | | | | Maximum | | 3 | Median | | | | | 0.971 |
| 941 | | | | SD | | 0.778 | CV | | | | | 0.637 |
| 942 | | | | k hat (MLE) | | 2.469 | k star (bias corrected MLE) | | | | | 2.189 |
| 943 | | | | Theta hat (MLE) | | 0.494 | Theta star (bias corrected MLE) | | | | | 0.558 |
| 944 | | | | nu hat (MLE) | | 118.5 | nu star (bias corrected) | | | | | 105 |
| 945 | | | | MLE Mean (bias corrected) | | 1.22 | MLE Sd (bias corrected) | | | | | 0.825 |
| 946 | | | | 95% Percentile of Chisquare (2kstar) | | 10.09 | 90% Percentile | | | | | 2.324 |
| 947 | | | | 95% Percentile | | 2.814 | 99% Percentile | | | | | 3.894 |
| 948 | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | | | | | |
| 949 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 950 | | | | | WH | HW | | | | | WH | HW |
| 951 | | | | 95% Approx. Gamma UTL with 95% Coverage | 3.749 | 3.971 | 95% Approx. Gamma UPL | | | | 2.89 | 2.985 |
| 952 | | | | 95% Gamma USL | 4.337 | 4.666 | | | | | | |
| 953 | | | | | | | | | | | | |
| 954 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 955 | | | | Mean (KM) | | 1.229 | SD (KM) | | | | | 0.751 |
| 956 | | | | Variance (KM) | | 0.563 | SE of Mean (KM) | | | | | 0.157 |
| 957 | | | | k hat (KM) | | 2.682 | k star (KM) | | | | | 2.375 |
| 958 | | | | nu hat (KM) | | 128.7 | nu star (KM) | | | | | 114 |
| 959 | | | | theta hat (KM) | | 0.458 | theta star (KM) | | | | | 0.518 |
| 960 | | | | 80% gamma percentile (KM) | | 1.803 | 90% gamma percentile (KM) | | | | | 2.297 |
| 961 | | | | 95% gamma percentile (KM) | | 2.764 | 99% gamma percentile (KM) | | | | | 3.789 |
| 962 | | | | | | | | | | | | |
| 963 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 964 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 965 | | | | | WH | HW | | | | | WH | HW |
| 966 | | | | 95% Approx. Gamma UTL with 95% Coverage | 3.527 | 3.684 | 95% Approx. Gamma UPL | | | | 2.758 | 2.821 |
| 967 | | | | 95% KM Gamma Percentile | 2.628 | 2.679 | 95% Gamma USL | | | | 4.05 | 4.287 |
| 968 | | | | | | | | | | | | |
| 969 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 970 | | | | Shapiro Wilk Test Statistic | | 0.961 | **Shapiro Wilk GOF Test** | | | | | |
| 971 | | | | 5% Shapiro Wilk Critical Value | | 0.911 | Detected Data appear Lognormal at 5% Significance Level | | | | | |
| 972 | | | | Lilliefors Test Statistic | | 0.139 | **Lilliefors GOF Test** | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 973 | | | | 5% Lilliefors Critical Value | | 0.184 | Detected Data appear Lognormal at 5% Significance Level | | | | | |
| 974 | **Detected Data appear Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 975 | | | | | | | | | | | | |
| 976 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 977 | | | | Mean in Original Scale | | 1.233 | | | | Mean in Log Scale | | 0.0298 |
| 978 | | | | SD in Original Scale | | 0.761 | | | | SD in Log Scale | | 0.627 |
| 979 | | | | 95% UTL95% Coverage | | 4.383 | | | | 95% BCA UTL95% Coverage | | 3 |
| 980 | | | | 95% Bootstrap (%) UTL95% Coverage | | 3 | | | | 95% UPL (t) | | 3.085 |
| 981 | | | | 90% Percentile (z) | | 2.301 | | | | 95% Percentile (z) | | 2.89 |
| 982 | | | | 99% Percentile (z) | | 4.431 | | | | 95% USL | | 5.407 |
| 983 | | | | | | | | | | | | |
| 984 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 985 | | | | KM Mean of Logged Data | | 0.0153 | | | | 95% KM UTL (Lognormal)95% Coverage | | 4.473 |
| 986 | | | | KM SD of Logged Data | | 0.642 | | | | 95% KM UPL (Lognormal) | | 3.122 |
| 987 | | | | 95% KM Percentile Lognormal (z) | | 2.92 | | | | 95% KM USL (Lognormal) | | 5.546 |
| 988 | | | | | | | | | | | | |
| 989 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 990 | | | | Mean in Original Scale | | 1.225 | | | | Mean in Log Scale | | 0.005 |
| 991 | | | | SD in Original Scale | | 0.771 | | | | SD in Log Scale | | 0.672 |
| 992 | | | | 95% UTL95% Coverage | | 4.748 | | | | 95% UPL (t) | | 3.259 |
| 993 | | | | 90% Percentile (z) | | 2.379 | | | | 95% Percentile (z) | | 3.038 |
| 994 | | | | 99% Percentile (z) | | 4.804 | | | | 95% USL | | 5.947 |
| 995 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 996 | | | | | | | | | | | | |
| 997 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 998 | **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | | | | | | | | | |
| 999 | | | | | | | | | | | | |
| 1000 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 1001 | | | | Order of Statistic, r | | 24 | | | | 95% UTL with95% Coverage | | 3 |
| 1002 | | | | Approx, f used to compute achieved CC | | 1.263 | | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.708 |
| 1003 | | | | Approximate Sample Size needed to achieve specified CC | | 59 | | | | 95% UPL | | 2.935 |
| 1004 | | | | 95% USL | | 3 | | | | 95% KM Chebyshev UPL | | 4.568 |
| 1005 | | | | | | | | | | | | |
| 1006 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 1007 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 1008 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 1009 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 1010 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 1011 | | | | | | | | | | | | |
| 1012 | **Radium-226** | | | | | | | | | | | |
| 1013 | | | | | | | | | | | | |
| 1014 | **General Statistics** | | | | | | | | | | | |
| 1015 | | | | Total Number of Observations | | 16 | | | | Number of Distinct Observations | | 16 |
| 1016 | | | | | | | | | | Number of Missing Observations | | 15 |
| 1017 | | | | Minimum | | -0.0627 | | | | First Quartile | | 0.108 |
| 1018 | | | | Second Largest | | 0.947 | | | | Median | | 0.226 |
| 1019 | | | | Maximum | | 1.71 | | | | Third Quartile | | 0.659 |
| 1020 | | | | Mean | | 0.396 | | | | SD | | 0.471 |
| 1021 | | | | Coefficient of Variation | | 1.188 | | | | Skewness | | 1.603 |
| 1022 | | | | | | | | | | | | |
| 1023 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 1024 | | | | Tolerance Factor K (For UTL) | | 2.524 | | | | d2max (for USL) | | 2.443 |
| 1025 | | | | | | | | | | | | |
| 1026 | **Normal GOF Test** | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1027 | | | | | Shapiro Wilk Test Statistic | 0.839 | **Shapiro Wilk GOF Test** | | | | | |
| 1028 | | | | | 5% Shapiro Wilk Critical Value | 0.887 | Data Not Normal at 5% Significance Level | | | | | |
| 1029 | | | | | Lilliefors Test Statistic | 0.218 | **Lilliefors GOF Test** | | | | | |
| 1030 | | | | | 5% Lilliefors Critical Value | 0.213 | Data Not Normal at 5% Significance Level | | | | | |
| 1031 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 1032 | | | | | | | | | | | | |
| 1033 | **Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 1034 | | | | 95% UTL with | 95% Coverage | 1.584 | | | | 90% Percentile (z) | | 0.999 |
| 1035 | | | | | 95% UPL (t) | 1.247 | | | | 95% Percentile (z) | | 1.17 |
| 1036 | | | | | 95% USL | 1.546 | | | | 99% Percentile (z) | | 1.491 |
| 1037 | | | | | | | | | | | | |
| 1038 | **Gamma Statistics** | | | | | | | | | | | |
| 1039 | **Gamma Statistics Not Available** | | | | | | | | | | | |
| 1040 | | | | | | | | | | | | |
| 1041 | **Dataset Contains Values <= 0 - Cannot Compute Gamma Statistics** | | | | | | | | | | | |
| 1042 | | | | | | | | | | | | |
| 1043 | **Dataset Contains Values <= 0 - Cannot Compute Log Statistics** | | | | | | | | | | | |
| 1044 | | | | | | | | | | | | |
| 1045 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 1046 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 1047 | | | | | | | | | | | | |
| 1048 | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | | | | | |
| 1049 | | | | | Order of Statistic, r | 16 | | | | 95% UTL with | 95% Coverage | 1.71 |
| 1050 | | | | Approx, f used to compute achieved CC | | 0.842 | | | | Approximate Actual Confidence Coefficient achieved by UTL | | 0.56 |
| 1051 | | | | | | | | | | Approximate Sample Size needed to achieve specified CC | | 59 |
| 1052 | | | 95% Percentile Bootstrap UTL with | | 95% Coverage | 1.71 | | | | 95% BCA Bootstrap UTL with | 95% Coverage | 1.71 |
| 1053 | | | | | 95% UPL | 1.71 | | | | 90% Percentile | | 0.883 |
| 1054 | | | | | 90% Chebyshev UPL | 1.852 | | | | 95% Percentile | | 1.138 |
| 1055 | | | | | 95% Chebyshev UPL | 2.511 | | | | 99% Percentile | | 1.596 |
| 1056 | | | | | 95% USL | 1.71 | | | | | | |
| 1057 | | | | | | | | | | | | |
| 1058 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 1059 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 1060 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 1061 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 1062 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 1063 | | | | | | | | | | | | |
| 1064 | **Radium-228** | | | | | | | | | | | |
| 1065 | | | | | | | | | | | | |
| 1066 | **General Statistics** | | | | | | | | | | | |
| 1067 | | | | | Total Number of Observations | 16 | | | | Number of Distinct Observations | | 16 |
| 1068 | | | | | | | | | | Number of Missing Observations | | 15 |
| 1069 | | | | | Minimum | 0.234 | | | | First Quartile | | 0.653 |
| 1070 | | | | | Second Largest | 1.76 | | | | Median | | 0.843 |
| 1071 | | | | | Maximum | 1.89 | | | | Third Quartile | | 1.043 |
| 1072 | | | | | Mean | 0.894 | | | | SD | | 0.438 |
| 1073 | | | | | Coefficient of Variation | 0.491 | | | | Skewness | | 1.046 |
| 1074 | | | | | Mean of logged Data | -0.228 | | | | SD of logged Data | | 0.516 |
| 1075 | | | | | | | | | | | | |
| 1076 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 1077 | | | | | Tolerance Factor K (For UTL) | 2.524 | | | | d2max (for USL) | | 2.443 |
| 1078 | | | | | | | | | | | | |
| 1079 | **Normal GOF Test** | | | | | | | | | | | |
| 1080 | | | | | Shapiro Wilk Test Statistic | 0.911 | **Shapiro Wilk GOF Test** | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1081 | | | | 5% Shapiro Wilk Critical Value | | 0.887 | | Data appear Normal at 5% Significance Level | | | | |
| 1082 | | | | Lilliefors Test Statistic | | 0.178 | | **Lilliefors GOF Test** | | | | |
| 1083 | | | | 5% Lilliefors Critical Value | | 0.213 | | Data appear Normal at 5% Significance Level | | | | |
| 1084 | | | | **Data appear Normal at 5% Significance Level** | | | | | | | | |
| 1085 | | | | | | | | | | | | |
| 1086 | | | | **Background Statistics Assuming Normal Distribution** | | | | | | | | |
| 1087 | | | | 95% UTL with 95% Coverage | | 2 | | 90% Percentile (z) | | | | 1.455 |
| 1088 | | | | 95% UPL (t) | | 1.686 | | 95% Percentile (z) | | | | 1.615 |
| 1089 | | | | 95% USL | | 1.965 | | 99% Percentile (z) | | | | 1.913 |
| 1090 | | | | | | | | | | | | |
| 1091 | | | | **Gamma GOF Test** | | | | | | | | |
| 1092 | | | | A-D Test Statistic | | 0.253 | | **Anderson-Darling Gamma GOF Test** | | | | |
| 1093 | | | | 5% A-D Critical Value | | 0.742 | | Detected data appear Gamma Distributed at 5% Significance Level | | | | |
| 1094 | | | | K-S Test Statistic | | 0.132 | | **Kolmogorov-Smirnov Gamma GOF Test** | | | | |
| 1095 | | | | 5% K-S Critical Value | | 0.216 | | Detected data appear Gamma Distributed at 5% Significance Level | | | | |
| 1096 | | | | **Detected data appear Gamma Distributed at 5% Significance Level** | | | | | | | | |
| 1097 | | | | | | | | | | | | |
| 1098 | | | | **Gamma Statistics** | | | | | | | | |
| 1099 | | | | k hat (MLE) | | 4.483 | | k star (bias corrected MLE) | | | | 3.684 |
| 1100 | | | | Theta hat (MLE) | | 0.199 | | Theta star (bias corrected MLE) | | | | 0.243 |
| 1101 | | | | nu hat (MLE) | | 143.4 | | nu star (bias corrected) | | | | 117.9 |
| 1102 | | | | MLE Mean (bias corrected) | | 0.894 | | MLE Sd (bias corrected) | | | | 0.466 |
| 1103 | | | | | | | | | | | | |
| 1104 | | | | **Background Statistics Assuming Gamma Distribution** | | | | | | | | |
| 1105 | | | | 95% Wilson Hilferty (WH) Approx. Gamma UPL | | 1.824 | | 90% Percentile | | | | 1.518 |
| 1106 | | | | 95% Hawkins Wixley (HW) Approx. Gamma UPL | | 1.86 | | 95% Percentile | | | | 1.771 |
| 1107 | | | | 95% WH Approx. Gamma UTL with 95% Coverage | | 2.374 | | 99% Percentile | | | | 2.313 |
| 1108 | | | | 95% HW Approx. Gamma UTL with 95% Coverage | | 2.47 | | | | | | |
| 1109 | | | | 95% WH USL | | 2.307 | | 95% HW USL | | | | 2.394 |
| 1110 | | | | | | | | | | | | |
| 1111 | | | | **Lognormal GOF Test** | | | | | | | | |
| 1112 | | | | Shapiro Wilk Test Statistic | | 0.961 | | **Shapiro Wilk Lognormal GOF Test** | | | | |
| 1113 | | | | 5% Shapiro Wilk Critical Value | | 0.887 | | Data appear Lognormal at 5% Significance Level | | | | |
| 1114 | | | | Lilliefors Test Statistic | | 0.129 | | **Lilliefors Lognormal GOF Test** | | | | |
| 1115 | | | | 5% Lilliefors Critical Value | | 0.213 | | Data appear Lognormal at 5% Significance Level | | | | |
| 1116 | | | | **Data appear Lognormal at 5% Significance Level** | | | | | | | | |
| 1117 | | | | | | | | | | | | |
| 1118 | | | | **Background Statistics assuming Lognormal Distribution** | | | | | | | | |
| 1119 | | | | 95% UTL with 95% Coverage | | 2.926 | | 90% Percentile (z) | | | | 1.541 |
| 1120 | | | | 95% UPL (t) | | 2.021 | | 95% Percentile (z) | | | | 1.859 |
| 1121 | | | | 95% USL | | 2.806 | | 99% Percentile (z) | | | | 2.642 |
| 1122 | | | | | | | | | | | | |
| 1123 | | | | **Nonparametric Distribution Free Background Statistics** | | | | | | | | |
| 1124 | | | | **Data appear Normal at 5% Significance Level** | | | | | | | | |
| 1125 | | | | | | | | | | | | |
| 1126 | | | | **Nonparametric Upper Limits for Background Threshold Values** | | | | | | | | |
| 1127 | | | | Order of Statistic, r | | 16 | | 95% UTL with 95% Coverage | | | | 1.89 |
| 1128 | | | | Approx, f used to compute achieved CC | | 0.842 | | Approximate Actual Confidence Coefficient achieved by UTL | | | | 0.56 |
| 1129 | | | | | | | | Approximate Sample Size needed to achieve specified CC | | | | 59 |
| 1130 | | | | 95% Percentile Bootstrap UTL with 95% Coverage | | 1.89 | | 95% BCA Bootstrap UTL with 95% Coverage | | | | 1.89 |
| 1131 | | | | 95% UPL | | 1.89 | | 90% Percentile | | | | 1.44 |
| 1132 | | | | 90% Chebyshev UPL | | 2.249 | | 95% Percentile | | | | 1.793 |
| 1133 | | | | 95% Chebyshev UPL | | 2.863 | | 99% Percentile | | | | 1.871 |
| 1134 | | | | 95% USL | | 1.89 | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1135 | | | | | | | | | | | | |
| 1136 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 1137 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 1138 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 1139 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 1140 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 1141 | | | | | | | | | | | | |
| 1142 | **Selenium** | | | | | | | | | | | |
| 1143 | | | | | | | | | | | | |
| 1144 | **General Statistics** | | | | | | | | | | | |
| 1145 | | | | | | Total Number of Observations | 28 | | | Number of Missing Observations | 3 | |
| 1146 | | | | | | Number of Distinct Observations | 16 | | | | | |
| 1147 | | | | | | Number of Detects | 18 | | | Number of Non-Detects | 10 | |
| 1148 | | | | | | Number of Distinct Detects | 14 | | | Number of Distinct Non-Detects | 4 | |
| 1149 | | | | | | Minimum Detect | 1 | | | Minimum Non-Detect | 0.5 | |
| 1150 | | | | | | Maximum Detect | 45 | | | Maximum Non-Detect | 4 | |
| 1151 | | | | | | Variance Detected | 182.7 | | | Percent Non-Detects | 35.71% | |
| 1152 | | | | | | Mean Detected | 17.09 | | | SD Detected | 13.52 | |
| 1153 | | | | | | Mean of Detected Logged Data | 2.245 | | | SD of Detected Logged Data | 1.333 | |
| 1154 | | | | | | | | | | | | |
| 1155 | **Critical Values for Background Threshold Values (BTVs)** | | | | | | | | | | | |
| 1156 | | | | | | Tolerance Factor K (For UTL) | 2.246 | | | d2max (for USL) | 2.714 | |
| 1157 | | | | | | | | | | | | |
| 1158 | **Normal GOF Test on Detects Only** | | | | | | | | | | | |
| 1159 | | | | | | Shapiro Wilk Test Statistic | 0.853 | | | **Shapiro Wilk GOF Test** | | |
| 1160 | | | | | | 5% Shapiro Wilk Critical Value | 0.897 | | | Data Not Normal at 5% Significance Level | | |
| 1161 | | | | | | Lilliefors Test Statistic | 0.24 | | | **Lilliefors GOF Test** | | |
| 1162 | | | | | | 5% Lilliefors Critical Value | 0.202 | | | Data Not Normal at 5% Significance Level | | |
| 1163 | **Data Not Normal at 5% Significance Level** | | | | | | | | | | | |
| 1164 | | | | | | | | | | | | |
| 1165 | **Kaplan Meier (KM) Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 1166 | | | | | | KM Mean | 11.21 | | | KM SD | 13.16 | |
| 1167 | | | | | | 95% UTL95% Coverage | 40.78 | | | 95% KM UPL (t) | 34.03 | |
| 1168 | | | | | | 90% KM Percentile (z) | 28.08 | | | 95% KM Percentile (z) | 32.87 | |
| 1169 | | | | | | 99% KM Percentile (z) | 41.84 | | | 95% KM USL | 46.95 | |
| 1170 | | | | | | | | | | | | |
| 1171 | **DL/2 Substitution Background Statistics Assuming Normal Distribution** | | | | | | | | | | | |
| 1172 | | | | | | Mean | 11.25 | | | SD | 13.38 | |
| 1173 | | | | | | 95% UTL95% Coverage | 41.29 | | | 95% UPL (t) | 34.44 | |
| 1174 | | | | | | 90% Percentile (z) | 28.39 | | | 95% Percentile (z) | 33.25 | |
| 1175 | | | | | | 99% Percentile (z) | 42.37 | | | 95% USL | 47.56 | |
| 1176 | **DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons** | | | | | | | | | | | |
| 1177 | | | | | | | | | | | | |
| 1178 | **Gamma GOF Tests on Detected Observations Only** | | | | | | | | | | | |
| 1179 | | | | | | A-D Test Statistic | 1.869 | | | **Anderson-Darling GOF Test** | | |
| 1180 | | | | | | 5% A-D Critical Value | 0.768 | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 1181 | | | | | | K-S Test Statistic | 0.312 | | | **Kolmogorov-Smirnov GOF** | | |
| 1182 | | | | | | 5% K-S Critical Value | 0.21 | | | Data Not Gamma Distributed at 5% Significance Level | | |
| 1183 | **Data Not Gamma Distributed at 5% Significance Level** | | | | | | | | | | | |
| 1184 | | | | | | | | | | | | |
| 1185 | **Gamma Statistics on Detected Data Only** | | | | | | | | | | | |
| 1186 | | | | | | k hat (MLE) | 0.975 | | | k star (bias corrected MLE) | 0.85 | |
| 1187 | | | | | | Theta hat (MLE) | 17.53 | | | Theta star (bias corrected MLE) | 20.11 | |
| 1188 | | | | | | nu hat (MLE) | 35.11 | | | nu star (bias corrected) | 30.59 | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1189 | | | | | MLE Mean (bias corrected) | 17.09 | | | | | | |
| 1190 | | | | | MLE Sd (bias corrected) | 18.54 | | | | 95% Percentile of Chisquare (2kstar) | | 5.395 |
| 1191 | | | | | | | | | | | | |
| 1192 | **Gamma ROS Statistics using Imputed Non-Detects** | | | | | | | | | | | |
| 1193 | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | | | | | | | | | |
| 1194 | GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | | | | | | | | | |
| 1195 | For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | | | | | | | | | |
| 1196 | This is especially true when the sample size is small. | | | | | | | | | | | |
| 1197 | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | | | | | | | | | |
| 1198 | | | | | Minimum | 0.01 | | | | Mean | | 11.23 |
| 1199 | | | | | Maximum | 45 | | | | Median | | 2 |
| 1200 | | | | | SD | 13.4 | | | | CV | | 1.194 |
| 1201 | | | | | k hat (MLE) | 0.369 | | | | k star (bias corrected MLE) | | 0.353 |
| 1202 | | | | | Theta hat (MLE) | 30.42 | | | | Theta star (bias corrected MLE) | | 31.78 |
| 1203 | | | | | nu hat (MLE) | 20.67 | | | | nu star (bias corrected) | | 19.78 |
| 1204 | | | | | MLE Mean (bias corrected) | 11.23 | | | | MLE Sd (bias corrected) | | 18.89 |
| 1205 | | | | | 95% Percentile of Chisquare (2kstar) | 3.063 | | | | 90% Percentile | | 32.37 |
| 1206 | | | | | 95% Percentile | 48.66 | | | | 99% Percentile | | 90.19 |
| 1207 | **The following statistics are computed using Gamma ROS Statistics on Imputed Data** | | | | | | | | | | | |
| 1208 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 1209 | | | | | | WH | HW | | | | WH | HW |
| 1210 | | | | | 95% Approx. Gamma UTL with 95% Coverage | 74.3 | 95.66 | | | 95% Approx. Gamma UPL | 47.95 | 56.21 |
| 1211 | | | | | 95% Gamma USL | 105.5 | 147.2 | | | | | |
| 1212 | | | | | | | | | | | | |
| 1213 | **Estimates of Gamma Parameters using KM Estimates** | | | | | | | | | | | |
| 1214 | | | | | Mean (KM) | 11.21 | | | | SD (KM) | | 13.16 |
| 1215 | | | | | Variance (KM) | 173.3 | | | | SE of Mean (KM) | | 2.56 |
| 1216 | | | | | k hat (KM) | 0.726 | | | | k star (KM) | | 0.672 |
| 1217 | | | | | nu hat (KM) | 40.63 | | | | nu star (KM) | | 37.61 |
| 1218 | | | | | theta hat (KM) | 15.45 | | | | theta star (KM) | | 16.69 |
| 1219 | | | | | 80% gamma percentile (KM) | 18.45 | | | | 90% gamma percentile (KM) | | 28.42 |
| 1220 | | | | | 95% gamma percentile (KM) | 38.74 | | | | 99% gamma percentile (KM) | | 63.46 |
| 1221 | | | | | | | | | | | | |
| 1222 | **The following statistics are computed using gamma distribution and KM estimates** | | | | | | | | | | | |
| 1223 | **Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods** | | | | | | | | | | | |
| 1224 | | | | | | WH | HW | | | | WH | HW |
| 1225 | | | | | 95% Approx. Gamma UTL with 95% Coverage | 63.9 | 73.39 | | | 95% Approx. Gamma UPL | 42.55 | 45.7 |
| 1226 | | | | | 95% KM Gamma Percentile | 39.42 | 41.85 | | | 95% Gamma USL | 88.79 | 108.3 |
| 1227 | | | | | | | | | | | | |
| 1228 | **Lognormal GOF Test on Detected Observations Only** | | | | | | | | | | | |
| 1229 | | | | | Shapiro Wilk Test Statistic | 0.779 | | | | **Shapiro Wilk GOF Test** | | |
| 1230 | | | | | 5% Shapiro Wilk Critical Value | 0.897 | | | | Data Not Lognormal at 5% Significance Level | | |
| 1231 | | | | | Lilliefors Test Statistic | 0.332 | | | | **Lilliefors GOF Test** | | |
| 1232 | | | | | 5% Lilliefors Critical Value | 0.202 | | | | Data Not Lognormal at 5% Significance Level | | |
| 1233 | **Data Not Lognormal at 5% Significance Level** | | | | | | | | | | | |
| 1234 | | | | | | | | | | | | |
| 1235 | **Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects** | | | | | | | | | | | |
| 1236 | | | | | Mean in Original Scale | 11.26 | | | | Mean in Log Scale | | 1.266 |
| 1237 | | | | | SD in Original Scale | 13.37 | | | | SD in Log Scale | | 1.758 |
| 1238 | | | | | 95% UTL95% Coverage | 183.9 | | | | 95% BCA UTL95% Coverage | | 41.05 |
| 1239 | | | | | 95% Bootstrap (%) UTL95% Coverage | 45 | | | | 95% UPL (t) | | 74.69 |
| 1240 | | | | | 90% Percentile (z) | 33.75 | | | | 95% Percentile (z) | | 63.92 |
| 1241 | | | | | 99% Percentile (z) | 211.8 | | | | 95% USL | | 419 |
| 1242 | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1243 | **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | | | | | | | | | |
| 1244 | | | | KM Mean of Logged Data | | 1.237 | | | 95% KM UTL (Lognormal)95% Coverage | | | 164.2 |
| 1245 | | | | KM SD of Logged Data | | 1.72 | | | 95% KM UPL (Lognormal) | | | 68 |
| 1246 | | | | 95% KM Percentile Lognormal (z) | | 58.39 | | | 95% KM USL (Lognormal) | | | 367.6 |
| 1247 | | | | | | | | | | | | |
| 1248 | **Background DL/2 Statistics Assuming Lognormal Distribution** | | | | | | | | | | | |
| 1249 | | | | Mean in Original Scale | | 11.25 | | | Mean in Log Scale | | | 1.26 |
| 1250 | | | | SD in Original Scale | | 13.38 | | | SD in Log Scale | | | 1.747 |
| 1251 | | | | 95% UTL95% Coverage | | 178.5 | | | 95% UPL (t) | | | 72.89 |
| 1252 | | | | 90% Percentile (z) | | 33.09 | | | 95% Percentile (z) | | | 62.43 |
| 1253 | | | | 99% Percentile (z) | | 205.4 | | | 95% USL | | | 404.7 |
| 1254 | **DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.** | | | | | | | | | | | |
| 1255 | | | | | | | | | | | | |
| 1256 | **Nonparametric Distribution Free Background Statistics** | | | | | | | | | | | |
| 1257 | **Data do not follow a Discernible Distribution (0.05)** | | | | | | | | | | | |
| 1258 | | | | | | | | | | | | |
| 1259 | **Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)** | | | | | | | | | | | |
| 1260 | | | | Order of Statistic, r | | 28 | | | 95% UTL with95% Coverage | | | 45 |
| 1261 | | | | Approx, f used to compute achieved CC | | 1.474 | | | Approximate Actual Confidence Coefficient achieved by UTL | | | 0.762 |
| 1262 | | | | Approximate Sample Size needed to achieve specified CC | | 59 | | | 95% UPL | | | 39.92 |
| 1263 | | | | 95% USL | | 45 | | | 95% KM Chebyshev UPL | | | 69.61 |
| 1264 | | | | | | | | | | | | |
| 1265 | Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. | | | | | | | | | | | |
| 1266 | Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers | | | | | | | | | | | |
| 1267 | and consists of observations collected from clean unimpacted locations. | | | | | | | | | | | |
| 1268 | The use of USL tends to provide a balance between false positives and false negatives provided the data | | | | | | | | | | | |
| 1269 | represents a background data set and when many onsite observations need to be compared with the BTV. | | | | | | | | | | | |
| 1270 | | | | | | | | | | | | |
| 1271 | **Thallium** | | | | | | | | | | | |
| 1272 | | | | | | | | | | | | |
| 1273 | **General Statistics** | | | | | | | | | | | |
| 1274 | | | | Total Number of Observations | | 28 | | | Number of Missing Observations | | | 3 |
| 1275 | | | | Number of Distinct Observations | | 6 | | | | | | |
| 1276 | | | | Number of Detects | | 0 | | | Number of Non-Detects | | | 28 |
| 1277 | | | | Number of Distinct Detects | | 0 | | | Number of Distinct Non-Detects | | | 6 |
| 1278 | | | | Minimum Detect | | N/A | | | Minimum Non-Detect | | | 0.1 |
| 1279 | | | | Maximum Detect | | N/A | | | Maximum Non-Detect | | | 5 |
| 1280 | | | | Variance Detected | | N/A | | | Percent Non-Detects | | | 100% |
| 1281 | | | | Mean Detected | | N/A | | | SD Detected | | | N/A |
| 1282 | | | | Mean of Detected Logged Data | | N/A | | | SD of Detected Logged Data | | | N/A |
| 1283 | | | | | | | | | | | | |
| 1284 | **Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!** | | | | | | | | | | | |
| 1285 | **Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!** | | | | | | | | | | | |
| 1286 | **The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).** | | | | | | | | | | | |
| 1287 | | | | | | | | | | | | |
| 1288 | **The data set for variable Thallium was not processed!** | | | | | | | | | | | |
| 1289 | | | | | | | | | | | | |
| 1290 | | | | | | | | | | | | |