

# Groundwater Monitoring & Corrective Action Report CCR Landfill - Hunter Power Plant

Castle Dale, Utah

January 2022



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## ACRONYMS

AMSL	Above Mean Sea Level
bgs	Below Ground Surface
CCR	Coal Combustion Residuals
CFR	U.S. Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FGD	Flue-Gas Desulfurization
SAP	Sampling and Analysis Plan
SSL	Statistically Significant Level
UTL	Upper Tolerance Limit

## **1.0 CURRENT STATUS - § 257.90(e)(6)**

This Groundwater Monitoring and Corrective Action Report was prepared for PacifiCorp by Water and Environmental Technologies. It was prepared to comply with the requirements detailed in *Code of Federal Regulations § 257.90(e) (CCR Rule)*.

The Hunter Power Plant is located in Emery County, approximately three miles south of Castle Dale, Utah. After dewatering and treatment, Flue Gas De-sulfurization (FGD) waste, fly ash and bottom ash are disposed of in the CCR Landfill. As a result, it is considered a CCR unit. The following provides the status of the groundwater monitoring and corrective action program at the end of 2021.

- (i) The CCR Landfill was undergoing assessment / corrective measures monitoring at the start of 2021.
- (ii) The CCR Landfill remained in assessment / corrective measures monitoring at the end of 2021.
- (iii) Following completion of initial detection monitoring and prior to October 17, 2017, statistically significant levels (SSLs) above site-specific background concentrations were noted for the following Appendix III constituents:
  - (A) Boron, calcium, chloride, fluoride, pH, sulfate and TDS.
  - (B) The CCR Landfill program transitioned to assessment monitoring on January 15, 2018. SSLs above groundwater protection standards were noted in 2018, 2019, and 2020.
- (iv) SSLs above groundwater protection standards were noted for the following Appendix IV constituents in 2021.
  - (A) Cobalt, lithium, and molybdenum.
  - (B) An assessment of corrective measures was initiated on January 14, 2019.
  - (C) A public meeting was held July 23, 2019.
  - (D) The assessment of corrective measures was completed on June 11, 2019.
- (v) A remedy was selected on November 12, 2020.
- (vi) A supplemental investigation began in the summer of 2021 and will continue in the spring of 2022 to augment the remedy. The CCR Landfill groundwater monitoring program was transitioned to corrective measures monitoring in November 2020.

## **1.1 Summary of Previous Work**

Detection monitoring was initiated in September of 2015 to ensure a minimum of eight independent measurements were acquired, prior to the October 17, 2017 requirement in the CCR Rule. PacifiCorp met this requirement and provided the findings of initial detection monitoring in the first Groundwater Monitoring and Corrective Action Report for the CCR Landfill (WET 2018).

The results of detection monitoring revealed all Appendix III constituents exceeded site-specific background concentrations. Based on these findings, the CCR Landfill monitoring program transitioned to assessment monitoring in 2018. Two rounds of sampling were completed in 2018,



groundwater protection standards were established for the CCR Landfill, and assessment monitoring results were compared to these standards. These comparisons revealed Appendix IV constituents: lithium and molybdenum exhibited SSLs above their groundwater protection standards.

Once Appendix IV constituents exhibited SSLs, an investigation to characterize the nature and extent of the release was initiated. An assessment of corrective measures began January 14, 2019 and was completed on June 11, 2019. A public meeting was held in Huntington, Utah on July 23, 2019, to discuss the proposed alternatives and solicit public input. Based on the public input, additional sampling and investigation was conducted to delineate the nature and extent of impacts, and to support the assessment of corrective measures.

An inspection of the current condition and operation of the horizontal well capture system was completed on August 20, 2019, November 12, 2019 and November 2020. Additional groundwater collected in 2019 and 2020 was used to further evaluate the effectiveness of the current system and evaluate the need for any further actions.

The nature and extent report was updated with the additional data from the investigations and placed in the plant operating record on August 27, 2020. The corrective measures report was reviewed and based on the additional data a remedy was selected and placed on the BHE webpage on November 12, 2020. The corrective measures sampling and analysis plan (SAP) was completed in concert with the remedy selection report and was also placed in the Plant operating record October 12, 2020.

## **1.2 Report Purpose and Organization**

The following sections provide a status update for activities initiated or completed at the Hunter Power Plant CCR Landfill, during the 2021 monitoring period. They also summarize any issues or problems encountered, and their resolutions. Each required element of the annual report is displayed below and is referenced to specific sections of the report where the required information can be found:

- Document the status of the Groundwater Monitoring and Corrective Action Program;
- Summarize key actions completed;
- Describe any problems encountered;
- Discuss actions taken to resolve problems; and
- Define key activities for the upcoming year.

The Annual Groundwater Monitoring and Corrective Action Report also includes the following required elements:

- A map showing the CCR unit and all CCR Monitoring Program background (or upgradient) and downgradient monitoring wells, and their identification numbers (Figure 1).

- Identifies any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.
- A summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required for detection or assessment monitoring.
- A narrative discussion of any transition between monitoring programs (i.e. transitioning from detection monitoring to assessment monitoring) - in addition to identifying constituents detected at a statistically significant increase over background levels.
- Other information required to be included as specified in § 257.90 through § 257.98 of the *CCR Rule* not listed above, is also included in the report.

## **2.0 GROUNDWATER MONITORING NETWORK**

The detection / assessment monitoring network for the CCR Landfill was installed using appropriate spacing, location and depth as defined by the Code of Federal Regulations, 40 CFR, Part 257 and 261, *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; CCR Rule § 257.91 (a) (1) and § 257.91 (b)* to adequately monitor groundwater both hydraulically upgradient and downgradient of the site.

When installed in 2015, the CCR detection / assessment monitoring network consisted of four upgradient / background wells spanning the extent of the CCR Landfill east to west, and include: ELF-1D, ELF-2, ELF-9, and ELF-10. Downgradient monitoring wells for the CCR Landfill include seven locations placed to capture groundwater as it passes the waste unit boundary, along the groundwater flow path which generally travels from west to east as it passes across the CCR Landfill. The downgradient monitoring wells include the following: ELF-3, ELF-4, ELF-5, ELF-6, ELF-7, ELF-8, and ELF-11.

Once SSLs above groundwater protection standards were noted for the CCR Landfill in 2018, an investigation was initiated to determine the nature and extent of impacted groundwater. To augment the initial monitoring network, three new wells were installed in November of 2018 east and downgradient of the CCR Landfill at the Plant boundary. The three wells included: ELF-12, ELF-13, and ELF-14 (Figure 1). These wells were incorporated into the groundwater monitoring program in 2019 and continue to undergo semi-annual monitoring in accordance with the CCR Rule throughout remedy selection and implementation. in the monitoring network throughout active operations and until attainment is reached in downgradient water.

### **2.1 Monitoring Well Decommissioning & Replacement in 2021**

No wells were replaced or decommissioned for the Hunter Landfill monitoring network in 2021.

### **2.2 Additions to the Monitoring Network in 2021**

No new wells were added to the Hunter Landfill monitoring network in 2021.

### **3.0 GROUNDWATER MONITORING**

The CCR Landfill was transitioned to assessment monitoring in 2018. Two rounds of sampling and analysis annually in 2018 and 2019 to comply with the CCR Rule. Statistical analyses were completed comparing downgradient well results with groundwater protection standards. All of the samples underwent analysis in accordance with the requirements defined in the CCR Rule. In addition, water level and field data were acquired each time the wells were sampled, in accordance with the SAP.

With the implementation of the selected remedy, the CCR Landfill monitoring network was transitioned to corrective measures monitoring in November 2020. This program incorporates both the original monitoring network and the additional downgradient wells listed in Section 2.0. All of the network wells were used for the 2021 analysis of compliance with CCR requirements and will remain in the monitoring network throughout active operations and post-closure care / monitoring once the CCR Landfill is closed.

Table 1 provides assessment / corrective measures monitoring data collected for the CCR Landfill in 2021. Attachments A and B contain field summary reports for the March and October 2021 sampling events. They consist of groundwater contour maps, data validation, statistical analyses, field data sheets, and laboratory data packages for each event.

#### **3.1 Continuation - Assessment / Corrective Measures Monitoring**

In accordance with the CCR Rule, the CCR Landfill remains in assessment / corrective measures monitoring. Two rounds of groundwater monitoring were completed in 2021, to assess water quality, by comparing concentrations in downgradient wells to groundwater protection standards established during assessment monitoring. The comparisons for the March and October 2021 sampling events are summarized in Tables 2 and 3.

Table 2 indicates cobalt (ELF-8, and ELF-11) and molybdenum (ELF-8) exhibited SSLs above their groundwater protection standards for the March 2021 event. Table 3 indicates cobalt (ELF-8 and ELF-11), lithium (ELF-11, and ELF-14) and molybdenum (ELF-8) exhibited SSLs above their groundwater protection standards for the October 2021 event.

Monitoring well ELF-14 is a downgradient facility bounding well. The lithium concentration in ELF-14 has varied between 4.01 to 4.79 over its 3.5-yr monitoring period. With only seven measurements, monitoring data for this well has not achieved the EPA recommendation of 8 events for statistical significance. The fall lithium concentration (4.66 mg/l) in ELF-14 was not the maximum concentration recorded in this well (which was 4.79 mg/L in May of 2019) but exceeded the background UTL because concentrations in the background wells have reduced over time, possibly due to several factors effecting ground water at the facility. Additional investigation was planned and is underway as the exceedance could represent a natural variation in background water quality, residual contamination, or other possible scenarios.

## **4.0 SELECTION OF REMEDY**

The potential remedies for the CCR Landfill at the Hunter Power Plant were assessed in the Corrective Measures Assessment completed in 2019 utilizing the criteria in § 257.96 *Assessment of Corrective Measures*. A public meeting was conducted July 23, 2019 to present the findings of the Nature and Extent investigation and Corrective Measures Assessment. Public comments were solicited during the meeting and over the ensuing 30 days. Additional site characterization was conducted in 2019 to address the public concerns and to provide supplemental information to aid in selecting a remedy. The remedy for the CCR Landfill at the Plant was selected based on the criteria and evaluation factors in 40 CFR § 257.97 - *Selection of Remedy* and was posted to the Plant operating record on October 12, 2020.

The primary element of the selected remedy is the capture of groundwater through operation of horizontal wells installed beneath the landfill to collect leachate and impacted groundwater. The groundwater capture system at the CCR Landfill has operated since 2015 and has proven effective in reducing groundwater impacts and will remain in place. Existing groundwater monitoring data indicates the capture system has contained groundwater impacts to an area immediately downgradient of the waste unit boundary.

A supplemental investigation is underway to determine if the existing horizontal wells require augmentation in order to meet performance criteria. Initial drilling efforts completed in 2021 did not reach the desired depths to evaluate potential liquid in the landfill. Additional drilling will be completed during the first quarter of 2022 to determine if additional groundwater capture is needed. If deemed necessary, PacifiCorp will proceed with implementation of additional groundwater capture wells, in accordance with the remedy selection report.

## **5.0 REMEDY IMPLEMENTATION**

The horizontal well collection system at the Hunter CCR Landfill has been in operation since 2015 and has continued collection of leachate and impacted groundwater through 2021. Pending the findings of the 2022 supplemental investigation which will include drilling directly into the landfill to determine how much water is present, the current system may remain as the primary element of the remedy or additional groundwater capture wells will be installed to augment the existing system.

## **6.0 PROBLEMS & RESOLUTIONS**

Monitoring wells ELF-1D (spring), ELF-3 (spring and fall), ELF-5 (spring and fall), ELF-6 (spring and fall), ELF-7 (spring), and ELF-10 (spring) did not produce sufficient water to support sampling. No other problems were noted during the 2021 monitoring period.

## **7.0 UPCOMING YEAR**

During 2022, it is anticipated PacifiCorp will complete the following activities at the CCR Landfill:

### **Semi-Annual Monitoring**

- Conduct the first semi-annual assessment / corrective measures monitoring event;
- Perform statistical analysis of data;
- Conduct the second semi-annual assessment / corrective measures monitoring event;
- Perform statistical analysis of data; and
- Develop the Annual Groundwater Monitoring and Corrective Action Report.

### **Corrective Measures**

- Complete installation and sampling of additional monitoring wells;
- Continue operating existing horizontal wells;
- Drill vertical test wells into the landfill contents to assess potential water content;
- Install monitoring wells in the ash to monitor effectiveness of system;
- Evaluate data to determine if additional corrective measures are appropriate; and
- Implement additional corrective measures if necessary.

## **8.0 REFERENCES**


- EPA 2017. National Functional Guidelines for Inorganic Superfund Methods Data Review, EPA-540-R-201 7-001, January 2017.
- EPA 2010. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater from Monitoring Wells, EPASOP-GW 001, January 2010.
- EPA 1989. Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A), EPA/540/1-89/002, December 1989.
- WET, 2019. Corrective Measures Assessment, Hunter Power Plant, Castle Dale, Utah. June 2019.
- WET, 2017. Sampling and Analysis Plan & Well Documentation, CCR Landfill – Hunter Power Plant, Castle Dale, Utah, Revision 1, October 2017.

## FIGURES





Esri, USDA Farm Service Agency

 Monitoring Network Wells



0 400 800 1,600 2,400 Feet



HUNTER POWER PLANT	
CCR Sample Locations	
Job#: PERCM052	FIGURE 1
Date: 1/26/2022	
Path: M:\PERC\PERC_CCR\GIS\2021_CCR_Sampling\Hunter\GIS\Fall\Hunter_PERC_Fall_GWE.aprx, Author: jleprosse	



## TABLES







Table 1. Hunter Power Plant - Ash Landfill Assessment Monitoring Results

[illegible]

NS: Not Sampled  
NM: Not Measured  
GWE: Ground Water Elevation  
DTW: Depth to Water  
TOC: Top of Casing  
AMSL: Above Mean Sea Level

Q: Data Validation Qualifier  
J: Estimated  
J+: Overestimated  
UJ: Estimated Non-Detect  
J-: Underestimated

**Table 2.** Summary of Groundwater Quality Comparisons – March 2021 Event

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
Antimony	0.004	0.006	0.006	None Exceed
Arsenic	0.0117	0.01	0.0117	None Exceed
Barium	0.102	2.0	2.0	None Exceed
Beryllium	0.002	0.004	0.004	None Exceed
Cadmium	0.0011	0.0050	0.0050	None Exceed
Chromium	0.0201	0.1000	0.1000	None Exceed
Cobalt	0.0114	0.006	0.0114	ELF-8, ELF-11
Fluoride Appx IV	4.36	4.0	4.36	None Exceed
Lead	0.012	0.015	0.015	None Exceed
Lithium	4.54	0.04	4.54	None Exceed
Mercury	0.0002	0.002	0.002	None Exceed
Molybdenum	0.158	0.100	0.158	ELF-8
Radium	6.1	5.0	6.1	None Exceed
Selenium	0.608	0.050	0.608	None Exceed
Thallium	0.002	0.002	0.002	None Exceed



**Table 3.** Summary of Groundwater Quality Comparisons – October 2021 Event

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
Antimony	0.004	0.006	0.006	None Exceed
Arsenic	0.0117	0.01	0.0117	None Exceed
Barium	0.102	2.0	2.0	None Exceed
Beryllium	0.002	0.004	0.004	None Exceed
Cadmium	0.0011	0.0050	0.0050	None Exceed
Chromium	0.020	0.1000	0.1000	None Exceed
Cobalt	0.0114	0.006	0.0114	ELF-8, ELF-11
Fluoride Appx IV	4.36	4.0	4.36	None Exceed
Lead	0.012	0.015	0.015	None Exceed
Lithium	4.35	0.04	4.35	ELF-11, ELF-14
Mercury	0.0002	0.002	0.002	None Exceed
Molybdenum	0.158	0.100	0.158	ELF-8
Radium	6.3	5.0	6.3	None Exceed
Selenium	0.608	0.050	0.608	None Exceed
Thallium	0.002	0.002	0.002	None Exceed

**ATTACHMENT A:**

Field Summary Report – March 2021 Event

**Facility Name:** Hunter Power Plant – CCR Landfill  
**Event Description:** Assessment Monitoring  
**Event Dates:** March 24, 2021  
**Field Personnel:** Dennis Vanderbeek, Brad Giles

**ACTIVITY SUMMARY.** PacifiCorp personnel arrived onsite March 24, 2021 and performed groundwater sampling at Hunter CCR Landfill. Prior to collecting samples, field instruments were calibrated, followed by the collection of water levels in the CCR monitoring wells. After recording water levels, the wells were purged in accordance with the EPA low-flow method. Field parameters were monitored during well purging in accordance with the site-specific sampling and analysis plan (SAP). Once field parameters met the SAP stabilization requirements, groundwater samples were collected for Appendix III and Appendix IV constituents. All calibration data and field measurements were recorded on the WET electronic field form. The wells that underwent sampling during this sampling event included:

- ELF-10
- ELF-11
- ELF-12
- ELF-13
- ELF-14
- ELF-1D
- ELF-2
- ELF-3
- ELF-4
- ELF-5
- ELF-6
- ELF-7
- ELF-8
- ELF-9

The following details dates for conducting field work and post-field work data processing:

- Date fieldwork completed: 03/24/2021
- Dates unvalidated lab data received: 06/07/2021
- Data validation completion date: 06/28/2021

After collection, the samples were preserved in accordance with the SAP, placed on ice, chain of custody forms were completed, and the samples were transported to American West Analytical Laboratories (AWAL) in Salt Lake City, Utah for analysis. Samples arrived at AWAL on 03/26/2021. AWAL subcontracted Radium analyses to ALS Global in Fort Collins, Colorado. Samples arrived at ALS on 03/31/2021. The following information is attached to this summary as a supplement:

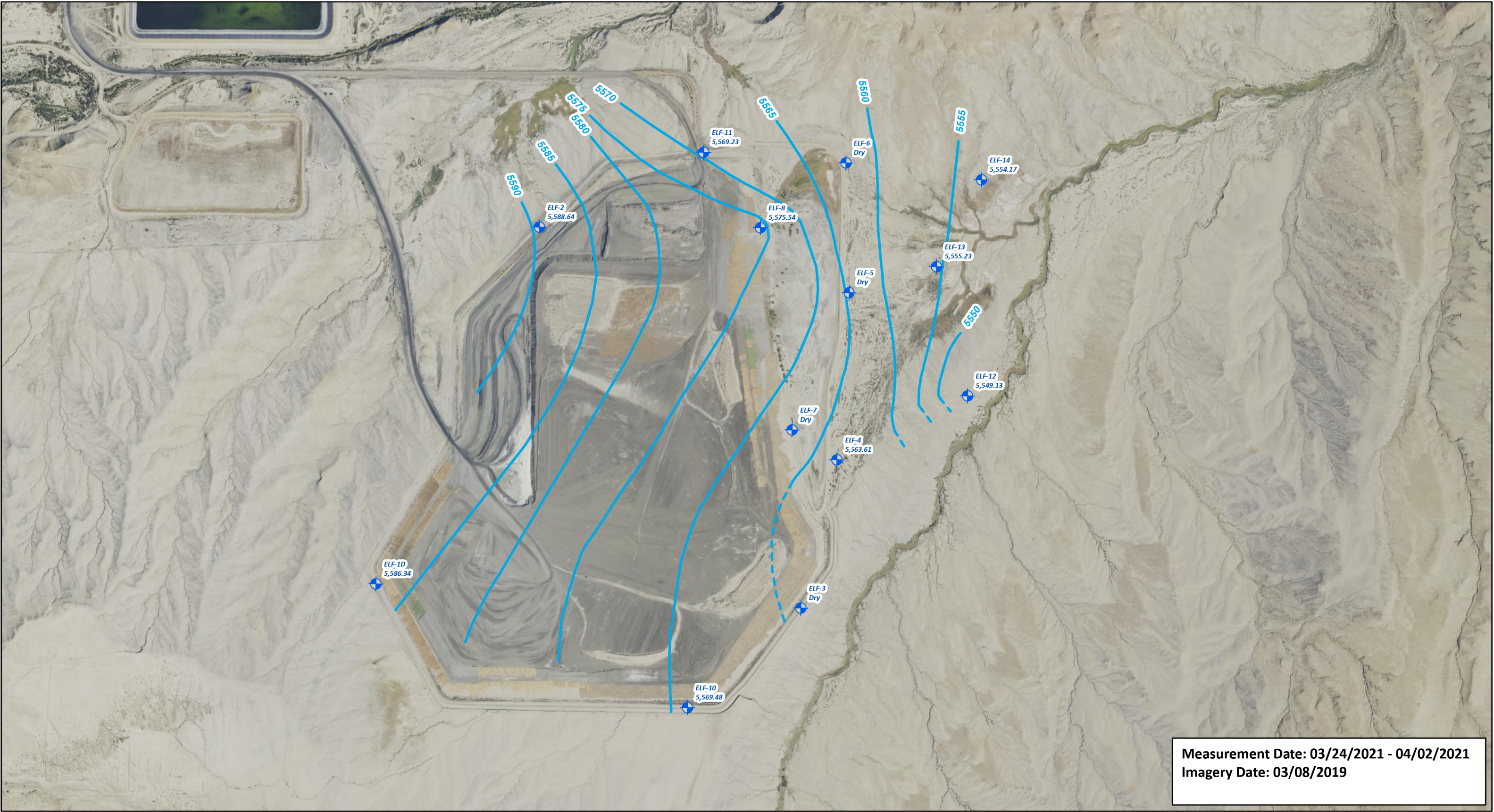
- Attachment A: Groundwater Contour Map
- Attachment B: Data Validation Summary
- Attachment C: Statistical Analysis
- Attachment D: Field Data Sheets
- Attachment E: Laboratory Analytical Reports

**SAP DEVIATIONS.** Wells ELF-3, ELF-5, ELF-6, ELF-7, ELF-10, and ELF-1D did not have enough water to sample.

**Attachment A:**


Groundwater Contour Map








Measurement Date: 03/24/2021 - 04/02/2021  
Imagery Date: 03/08/2019

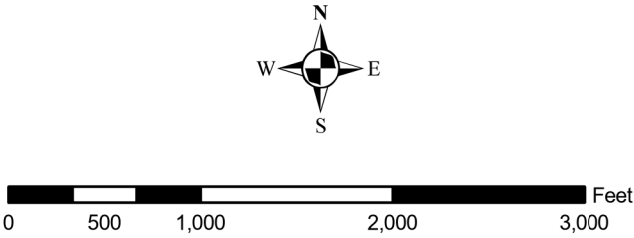
ELF-1D = Well ID  
5,586.34 = Water Level Elevation (Ft.)



 CCR Well

 CCR Well - For Water Quality Only

 Groundwater Elevation Contour (Contour Interval = 5 ft.)

 Inferred Groundwater Elevation Contour (Contour Interval = 5 ft.)





HUNTER POWER PLANT

Groundwater Elevation Map  
CCR Landfill

Job#: PERCM052

Date: 1/26/2022

Path: M:\PERC\PERC\_CCR\GIS\2021\_CCR\_Sampling\Hunter\GIS\Spring\Hunter\_PERC\_Spring\_GWE.aprx, Author:

Attachment A



**Attachment B:**

Data Validation Summary

**DATA VALIDATION SUMMARY  
CCR COMPLIANCE SAMPLING**

<b>Facility Name:</b>	Hunter Power Plant	
<b>Validator:</b>	Janelle Garza (6/26/2021)	
<b>Reviewer:</b>	Marcus Holland (06/28/2021)	
<b>Laboratory:</b>	American West Analytical Laboratories; Salt Lake City, UT ALS Laboratories; Fort Collins, CO (third party lab for Ra analyses)	
<b>Laboratory Work Order#:</b>	2103745	
<b>Sample Media:</b>	Aqueous	
<b>Review Element:</b>	<b>Complete / Criteria Met? (Yes/No)</b>	<b>If no, describe:</b>
<b>Chain of Custody:</b>	Yes	
<b>Field Documentation:</b>	Yes	
<b>Holding Times &amp; Sample Preservation:</b>	No	pH was analyzed past the 15-minute holding time. Laboratory pH was compared against field pH. All samples were qualified as estimated high (J+).
<b>Calibrations:</b>	Yes	
<b>Blanks:</b>	Yes	
<b>Laboratory Control Sample:</b>	Yes	
<b>Duplicates:</b>	No	<u>Laboratory</u> Lab ID 2103748-009ADUP ❖ TDS RPD was 12.2%, above the limit of 5%. The lab flagged this high RPD due to suspected sample non-homogeneity or matrix interference. No qualification required.
<b>Matrix Spike:</b>	No	Lab ID 2103745-002BMS/D (Sample ID ELF-4) ❖ Calcium was recovered at -90.8% (MS) and 207% (MSD), outside the limits of 70-130%. The lab flagged these poor recoveries, indicating the analyte concentration was too high for accurate MS recovery and/or RPD. No qualification required.
<b>Overall Assessment:</b>		
Out of 230 total data points, 220 data points (95.7%) remain unqualified and are considered quantitative data. The remaining 10 data points (4.3%) were qualified as estimated due to holding time exceedances and are considered qualitative data. No data points were rejected; thus, this sample delivery group is 100% complete and usable.		



**Attachment C:**  
Statistical Analysis

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Table C.2. Five-number summary for the CCR Landfill upgradient wells

Table C.3. Shapiro-Wilk Test for the CCR Landfill upgradient wells

Table C.4. Comparison of downgradient wells to the Groundwater Protection Standard

## 1.0 INTRODUCTION

This appendix contains a statistical analysis of the data collected from the groundwater monitoring wells associated with the CCR Landfill at the Hunter Power Plant in Castle Dale, Utah. Methods used to compare upgradient with downgradient wells vary depending on the characteristics of the upgradient well data. Upgradient well data were analyzed for outliers, normality, non-detects, and other characteristics that affect the comparison measures. A comprehensive statistical analysis is presented along with a discussion of the methods used to compare upgradient with downgradient water quality. Table C.1 lists the upgradient and downgradient wells that are used in this analysis. Note that if a well appears in Table C.1 and not in the tables and figures in this appendix it means that no samples were able to be collected from that well.

**Table C.1.** Upgradient and downgradient wells for the CCR Landfill.

Upgradient Well	Downgradient Well
ELF-1D	ELF-3
ELF-2	ELF-4
ELF-9	ELF-5
ELF-10	ELF-6
	ELF-7
	ELF-8
	ELF-11
	ELF-12
	ELF-13
	ELF-14

## 2.0 PRELIMINARY DATA ANALYSIS

The primary purpose of this statistical analysis was to establish background values from the upgradient well data, and compare these to the downgradient well data to determine if the downgradient water quality has been impacted by the CCR Landfill. Familiarity with numerical and distributional characteristics of the upgradient wells aids in computing appropriate limits and in correctly interpreting those limits. This section contains a statistical summary of the upgradient well data. It is essential to understand the statistical characteristics of the data, prior to making the upgradient / downgradient well comparison. This understanding helps to ensure the appropriate calculations have been done and comparisons are completed using the proper statistical measures. The mean, standard deviation, quartiles, and other statistical quantities and corresponding graphs are presented in the following sections.

### 2.1 Data Analysis Techniques

The following sections summarize the statistical tools and techniques, used to evaluate upgradient well data from the CCR Landfill.

### 2.1.1 Mean

One measure of primary interest is the center of the data. The average ( $\bar{x}$ ), or the mean, is the most commonly used measure of the central tendency of the data. However, it can be heavily influenced by outliers and by asymmetric data. The mean is calculated using Equation (1):

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} \quad (1)$$

Where:

$\bar{x}$  = mean

$n$  = number of observations

$x_i$  =  $i^{th}$  observation.

### 2.1.2 Standard Deviation

Another quantity of interest is the spread of the data. The standard deviation ( $s$ ) is the most commonly used measure of spread, as it is easy to interpret and is used in many other statistical methods. Because it is calculated using the average, it is also sensitive to outliers and affected by data that are not symmetric. The standard deviation is calculated using Equation (2):

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}} \quad (2)$$

Where:

$s$  = standard deviation

$n$  = number of observations

$x_i$  =  $i^{th}$  observation

$\bar{x}$  = mean of the observations.

### 2.1.3 Coefficient of Variance

The coefficient of variance (CV) is a relative measure of variation in the sample data which expresses the standard deviation relative to the mean. The CV is expressed as a percentage and provides a direct comparison to the standard deviations of two different data sets. It is important to note the mean of the data may be very close to or very far away from zero and the spread may be independent of the distance from the mean to zero. Therefore, no firm guidelines have been established for interpreting the CV.

The CV was calculated for each detected analyte in each data grouping using Equation (3):

$$CV = \frac{s}{\bar{X}} \times 100\% \quad (3)$$

Where:

s = standard deviation

$\bar{X}$  = mean of the observations

#### 2.1.4 Quartiles and the Five Number Summary

The five-number summary is a set of five numbers that are used to assess the spread of the data. It consists of the minimum value, first quartile, median, third quartile, and maximum of the data value. The first quartile is the 25<sup>th</sup> percentile of the data, the median is the 50<sup>th</sup> percentile of the data, and the third quartile is the 75<sup>th</sup> percentile of the data. The 25<sup>th</sup> percentile of the data is the number such that 25% of the data are less than that number and 75% of the data are above the 25<sup>th</sup> percentile. The median and third quartiles are found in a similar manner.

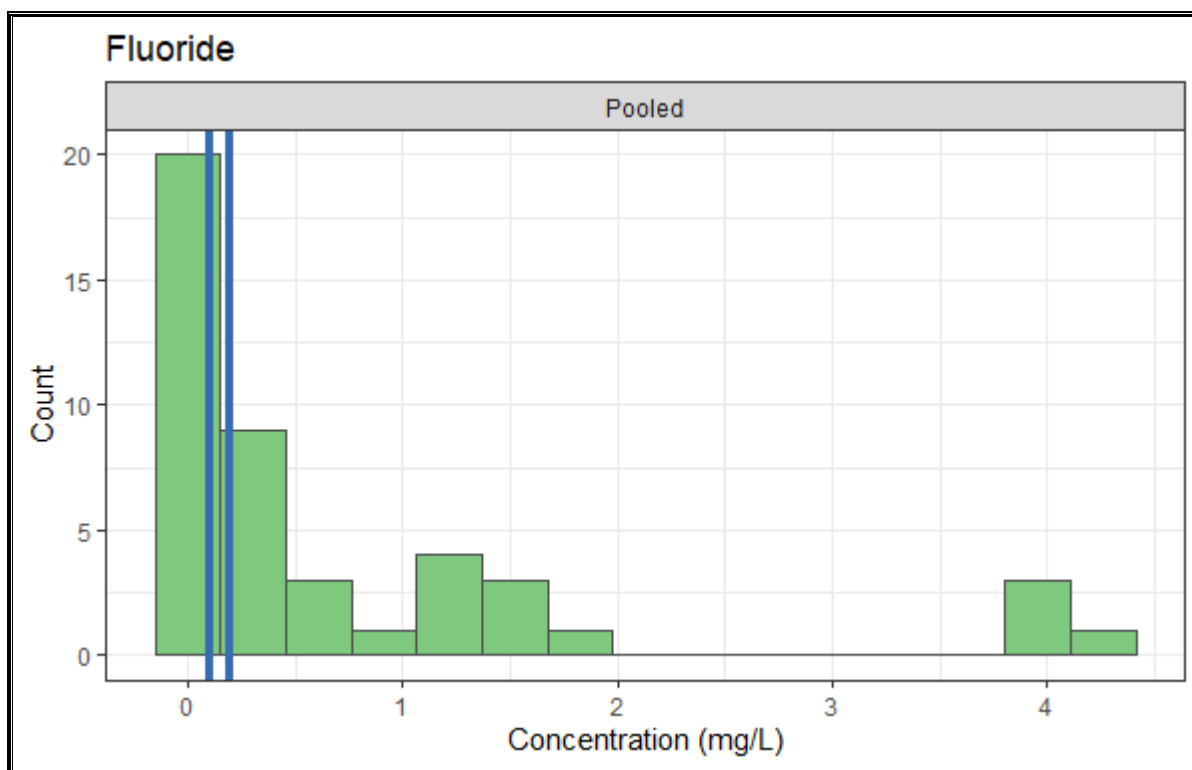
## 2.2 Visual Tools

It is difficult to review numerical summary statistics and identify the degree of symmetry or normality of data without the aid of visual tools. In completing the statistical analysis for the CCR Landfill, histograms and dot plots were developed for each of the analytes with at least one detectable observation. All graphs were developed using the R Statistical Package (R Core Team 2021).

### 2.2.1 Histograms

Histograms display the distribution and symmetry of the data. The data are displayed in such a way, that deviations from a normal (i.e., bell shaped) distribution can easily be observed. Outliers are also often identifiable in a histogram. Histograms for the upgradient wells were generated using both non-detects and detected results. The method detection limits (MDL) are plotted on the histogram with a blue line to show which observations are non-detects.

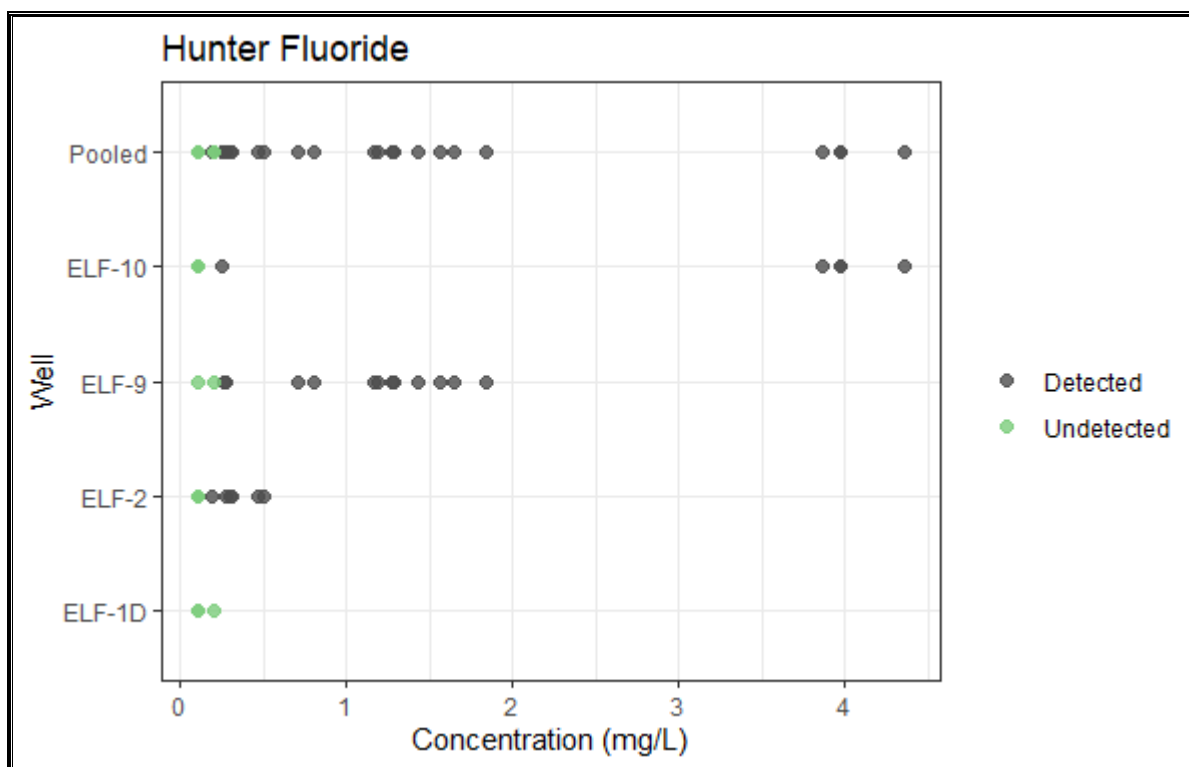
If an analyte has more than one MDL there will be more than one blue line on the histogram. Figure C.1 below is a histogram of fluoride data for the upgradient wells for the CCR Landfill. It is provided here to illustrate data distribution using a histogram. All of the histograms used to examine the analytes from the CCR Landfill upgradient well data, are provided at the end of this appendix in Figure C.3.



**Figure C.1.** Histogram of fluoride data from the CCR Landfill upgradient wells.

### 2.2.2 Dot Plots

A dot plot is a graphical tool used to determine the spread of the data and to look for outliers. Each measured concentration is plotted on the graph so that non-detects and outliers are clearly visible. The MDL for non-detects are shown as green points on the plot. Figure C.2 uses the same fluoride data points used to develop the Figure C.1. Several of the points are non-detects and the concentrations in well ELF-10 are larger than those in the other wells. All of the dot plots used to examine the CCR Landfill upgradient well data are provided at the end of this appendix in Figure C.3.



**Figure C.2.** Dot plot of fluoride data the CCR Landfill upgradient wells

### 2.2.3 Outliers

Outliers are data points that are notably larger or smaller than the rest of the data set and may indicate a problem with the data point or the data set as a whole. Examples which may be indicative of outliers include: 1) a misreported or erroneous concentration, 2) analytical error(s), or 3) natural variations in groundwater concentrations. Outliers are generally not omitted from project data simply because they are outliers. Rather, the result is examined individually or by project, to ensure the outlier does not represent an erroneous result or another concern warranting either additional sampling or omission of the outlier from the data analysis. There are reasonable situations when it is appropriate to remove outliers. For example, if outliers which represent exceedingly low concentrations are used to compute background concentrations, they may result in background levels which are too conservative. Conversely, use of excessively high outlier concentrations to compute background values, may result in an overestimation of background concentrations resulting in false-negative comparisons for downgradient groundwater quality.

Outliers were detected in the cadmium, cobalt, lead, and radium data CCR Landfill data. However, none of the outliers are extreme enough to warrant removal from the dataset. The MDLs for the non-detects in the boron upgradient data were 5 mg/L and the largest detected value was less than 4 mg/L. This is an unusually large MDL and its inclusion would have resulted in a Groundwater Protection Standard (GWPS) that was larger than any concentration detected in the upgradient wells. Thus, the non-detects were removed from the upgradient boron data and are not included in any tables or graphs in this appendix.



## 2.2.4 Treatment of Non-Detects

Non-detect values are common in environmental data. When present in data sets, non-detects produce difficulties in computing statistical metrics because reliable values cannot be assigned. Substituting a value such as the MDL or one-half of the MDL for non-detects are common practices. However, use of the detection limit, or one-half of the detection limit, can produce unstable or unreliable results (EPA 2009). Statistical methods, such as Kaplan-Meier (Helsel 2004), can be used to appropriately evaluate data sets containing significant quantities of non-detects, by producing estimates of the survival probability function for non-detects. These estimates can then be used to compute summary statistics on the data set. However, Kaplan-Meier does not perform well if more than 50% of the results are non-detects or if fewer than eight detections are available for evaluation.

The arsenic, cadmium, chromium, cobalt, and lead data have more than 50% non-detects. Antimony, beryllium, mercury, and thallium were not detected in any of the samples. Thus, statistical analysis cannot be done for those analytes. The fluoride and selenium data have more than 15% non-detects, but more than half of the data are detected. As a result, Kaplan-Meier was used to compute means, standard deviations, and statistical limits used to compare the upgradient to downgradient water quality for fluoride and selenium.

## 2.3 Summary Results

Table C.2 provides summary statistics for the CCR Landfill upgradient well data. Although the data from the upgradient wells were combined when compared to the downgradient wells, the summary statistics presented in this section are separated by well and are presented as pooled data. The data are presented in this way, due to observed differences between the different wells for many of the analytes. These tables in conjunction with the histograms and normal-quantile plots, provide information about differences between wells and the data properties of the combined data. Note that summary stats were only computed for analytes and wells with at least 50% detects and at least eight detected samples. Analytes that were not detected in any upgradient well samples are not listed in Table C.2.

**Table C.2.** Summary statistics for the CCR Landfill upgradient wells

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Arsenic	ELF-1D	4	0	<0.002	NA	NA	NA
Arsenic	ELF-2	17	0	<0.002	NA	NA	NA
Arsenic	ELF-9	15	15	0.007	0.007	0.002	29
Arsenic	ELF-10	13	3	<0.002	NA	NA	NA
Arsenic	Pooled	49	18	<0.002	NA	NA	NA
Barium	ELF-1D	4	4	0.0094	NA	NA	NA
Barium	ELF-2	17	16	0.0100	0.0133	0.0099	74

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Barium	ELF-9	15	15	0.0189	0.0382	0.0329	86
Barium	ELF-10	13	13	0.0353	0.0402	0.0220	55
Barium	Pooled	49	48	0.0138	0.0278	0.0255	92
Boron	ELF-1D	3	3	2.19	NA	NA	NA
Boron	ELF-2	16	16	3.33	3.36	0.175	5
Boron	ELF-9	13	13	1.45	1.49	0.205	14
Boron	ELF-10	12	12	1.61	1.66	0.174	10
Boron	Pooled	44	44	1.86	2.26	0.872	39
Cadmium	ELF-1D	4	0	<0.0005	NA	NA	NA
Cadmium	ELF-2	17	0	<0.0005	NA	NA	NA
Cadmium	ELF-9	15	1	<0.0005	NA	NA	NA
Cadmium	ELF-10	13	6	<0.0005	NA	NA	NA
Cadmium	Pooled	49	7	<0.0005	NA	NA	NA
Calcium	ELF-1D	3	3	366	NA	NA	NA
Calcium	ELF-2	16	16	401	400	22.7	6
Calcium	ELF-9	14	14	59.5	73.7	31.9	43
Calcium	ELF-10	12	12	472	474	34.7	7
Calcium	Pooled	45	45	394	316	170	54
Chloride	ELF-1D	3	3	6640	NA	NA	NA
Chloride	ELF-2	16	16	435	359	118	33
Chloride	ELF-9	14	14	404	408	90.1	22
Chloride	ELF-10	12	12	7530	8254	2012	24
Chloride	Pooled	45	45	461	2899	3758	130
Chromium	ELF-1D	4	1	<0.002	NA	NA	NA
Chromium	ELF-2	17	2	<0.002	NA	NA	NA
Chromium	ELF-9	15	7	<0.002	NA	NA	NA
Chromium	ELF-10	13	10	0.0030	0.005	0.004	84
Chromium	Pooled	49	20	<0.002	NA	NA	NA
Cobalt	ELF-1D	4	1	<0.004	NA	NA	NA
Cobalt	ELF-2	17	10	0.0048	0.0054	0.0019	36
Cobalt	ELF-9	15	2	<0.004	NA	NA	NA
Cobalt	ELF-10	13	10	0.0043	0.0050	0.0014	28
Cobalt	Pooled	49	23	<0.004	NA	NA	NA
Fluoride	ELF-1D	3	0	<0.1	NA	NA	NA
Fluoride	ELF-2	16	8	0.100	0.19	0.14	72

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Fluoride	ELF-9	14	12	1.18	0.98	0.59	60
Fluoride	ELF-10	12	5	<0.1	NA	NA	NA
Fluoride	Pooled	45	25	0.20	0.76	1.15	151
Lead	ELF-1D	4	0	<0.002	NA	NA	NA
Lead	ELF-2	17	1	<0.002	NA	NA	NA
Lead	ELF-9	15	4	<0.002	NA	NA	NA
Lead	ELF-10	13	6	<0.002	NA	NA	NA
Lead	Pooled	49	11	<0.002	NA	NA	NA
Lithium	ELF-1D	4	4	2.16	NA	NA	NA
Lithium	ELF-2	17	17	1.61	2.32	1.21	52
Lithium	ELF-9	15	15	0.888	1.04	0.457	44
Lithium	ELF-10	13	13	2.17	2.33	1.06	45
Lithium	Pooled	49	49	1.60	1.92	1.09	57
Molybdenum	ELF-1D	4	4	0.0163	NA	NA	NA
Molybdenum	ELF-2	17	16	0.0031	0.0032	0.0007	23
Molybdenum	ELF-9	15	15	0.113	0.1074	0.0293	27
Molybdenum	ELF-10	13	13	0.0855	0.0827	0.0333	40
Molybdenum	Pooled	49	48	0.0546	0.0573	0.0516	90
pH	ELF-1D	3	3	7.27	NA	NA	NA
pH	ELF-2	16	16	7.26	7.30	0.165	2
pH	ELF-9	14	14	7.94	7.91	0.149	2
pH	ELF-10	12	12	7.18	7.27	0.429	6
pH	Pooled	45	45	7.30	7.47	0.388	5
Radium	ELF-1D	4	4	1.72	NA	NA	NA
Radium	ELF-2	17	17	1.49	1.91	1.73	90
Radium	ELF-9	15	15	1.38	1.49	0.60	40
Radium	ELF-10	13	13	2.41	3.06	3.50	114
Radium	Pooled	49	49	1.56	2.08	2.14	103
Selenium	ELF-1D	4	0	<0.002	NA	NA	NA
Selenium	ELF-2	17	17	0.366	0.280	0.229	82
Selenium	ELF-9	15	1	<0.002	NA	NA	NA
Selenium	ELF-10	13	9	0.009	0.088	0.132	149
Selenium	Pooled	49	27	0.0042	0.121	0.192	158
Sulfate	ELF-1D	3	3	8640	NA	NA	NA
Sulfate	ELF-2	16	16	7925	7661	727	9

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Sulfate	ELF-9	14	14	6640	6566	772	12
Sulfate	ELF-10	12	12	17050	15428	4817	31
Sulfate	Pooled	45	45	7950	9444	4450	47
TDS	ELF-1D	3	3	27000	NA	NA	NA
TDS	ELF-2	16	16	12000	11913	405	3
TDS	ELF-9	14	14	10650	10759	773	7
TDS	ELF-10	12	12	38000	37267	2478	7
TDS	Pooled	45	45	12000	19354	11726	61

Table C.3 provides the five-number summaries for the CCR Landfill upgradient wells. As with the summary statistics, a five-number summary was computed for each well as well as for the pooled data. If a minimum or a quartile falls within the range of non-detects it is denoted using a less-than (<) symbol. Analytes that were not detected in any of the upgradient well samples are not listed in Table C.3.

**Table C.3.** Five-number summary for the CCR Landfill upgradient wells.

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Arsenic	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-2	<0.001	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-9	0.005	0.006	0.007	0.008	0.0117
Arsenic	ELF-10	<0.002	<0.002	<0.002	<0.002	0.0093
Arsenic	Pooled	<0.001	<0.002	<0.002	0.0055	0.0117
Barium	ELF-1D	0.0084	0.0084	0.0094	0.0103	0.0103
Barium	ELF-2	<0.0084	0.0095	0.0100	0.012	0.050
Barium	ELF-9	0.0122	0.0131	0.0189	0.0589	0.102
Barium	ELF-10	0.0145	0.0205	0.0353	0.0519	0.0863
Barium	Pooled	<0.0084	0.0103	0.0138	0.0353	0.102
Boron	ELF-1D	2.10	2.15	2.19	2.21	2.23
Boron	ELF-2	3.11	3.25	3.33	3.49	3.77
Boron	ELF-9	1.27	1.35	1.45	1.57	1.91
Boron	ELF-10	1.48	1.56	1.61	1.69	2.12
Boron	Pooled	1.27	1.54	1.86	3.26	3.77
Cadmium	ELF-1D	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cadmium	ELF-2	<0.0005	<0.0005	<0.0005	<0.0005	<0.001

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Cadmium	ELF-9	<0.0005	<0.0005	<0.0005	<0.0005	0.0005
Cadmium	ELF-10	<0.0005	<0.0005	<0.0005	0.0006	0.0011
Cadmium	Pooled	<0.0005	<0.0005	<0.0005	<0.0005	0.0011
Calcium	ELF-1D	353	360	366	372	377
Calcium	ELF-2	356	390	401	419	430
Calcium	ELF-9	48.9	57.1	59.5	79.9	166
Calcium	ELF-10	407	454	472	488	543
Calcium	Pooled	48.9	91.9	394	430	543
Chloride	ELF-1D	6430	6535	6640	6760	6880
Chloride	ELF-2	197	221	435	458	473
Chloride	ELF-9	282	354	404	460	595
Chloride	ELF-10	5710	7080	7530	9068	12100
Chloride	Pooled	197	363	461	6790	12100
Chromium	ELF-1D	<0.002	<0.002	<0.002	0.0021	0.0023
Chromium	ELF-2	<0.001	<0.002	<0.002	<0.002	0.011
Chromium	ELF-9	<0.002	<0.002	<0.002	0.0096	0.0201
Chromium	ELF-10	<0.002	0.0020	0.0030	0.0057	0.0164
Chromium	Pooled	<0.001	<0.002	<0.002	0.0050	0.0201
Cobalt	ELF-1D	<0.004	<0.004	<0.004	0.0044	0.0054
Cobalt	ELF-2	<0.004	<0.004	0.0048	0.0060	0.0114
Cobalt	ELF-9	<0.004	<0.004	<0.004	<0.004	0.0052
Cobalt	ELF-10	<0.004	0.0041	0.0043	0.0055	0.0079
Cobalt	Pooled	<0.004	<0.004	<0.004	0.0052	0.0114
Fluoride	ELF-1D	<0.1	<0.1	<0.1	<0.15	<0.2
Fluoride	ELF-2	<0.1	<0.1	0.100	0.2825	0.500
Fluoride	ELF-9	<0.1	0.384	1.18	1.395	1.84
Fluoride	ELF-10	<0.1	<0.1	<0.1	3.90	4.36
Fluoride	Pooled	<0.1	<0.1	0.20	1.16	4.36
Lead	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Lead	ELF-2	<0.001	<0.002	<0.002	<0.002	0.0020
Lead	ELF-9	<0.002	<0.002	<0.002	0.0032	0.0077
Lead	ELF-10	<0.002	<0.002	<0.002	0.0031	0.012
Lead	Pooled	<0.001	<0.002	<0.002	<0.002	0.012
Lithium	ELF-1D	1.96	2.08	2.16	2.19	2.20
Lithium	ELF-2	1.34	1.50	1.61	3.50	4.93
Lithium	ELF-9	0.724	0.771	0.888	1.06	2.48

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Lithium	ELF-10	0.841	1.76	2.17	2.90	4.59
Lithium	Pooled	0.724	1.06	1.60	2.19	4.93
Molybdenum	ELF-1D	0.0153	0.0159	0.0163	0.0175	0.0207
Molybdenum	ELF-2	<0.002	0.0028	0.0031	0.0034	0.0050
Molybdenum	ELF-9	0.0569	0.0875	0.113	0.125	0.158
Molybdenum	ELF-10	0.0331	0.0546	0.0855	0.115	0.124
Molybdenum	Pooled	<0.002	0.0034	0.0546	0.109	0.158
pH	ELF-1D	7.02	7.15	7.27	7.29	7.30
pH	ELF-2	7.12	7.20	7.26	7.36	7.76
pH	ELF-9	7.51	7.86	7.94	8.03	8.06
pH	ELF-10	6.85	7.00	7.18	7.31	8.37
pH	Pooled	6.85	7.21	7.30	7.86	8.37
Radium	ELF-1D	1.09	1.20	1.72	2.31	2.63
Radium	ELF-2	0.61	0.94	1.49	2.17	8.10
Radium	ELF-9	0.64	1.15	1.38	1.88	2.60
Radium	ELF-10	0.46	1.14	2.41	3.10	14.2
Radium	Pooled	0.46	1.10	1.56	2.30	14.2
Selenium	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Selenium	ELF-2	0.0031	0.034	0.366	0.463	0.608
Selenium	ELF-9	<0.002	<0.002	<0.002	<0.002	0.0042
Selenium	ELF-10	<0.002	<0.002	0.009	0.146	0.410
Selenium	Pooled	<0.002	<0.002	0.0042	0.157	0.608
Sulfate	ELF-1D	7730	8185	8640	8790	8940
Sulfate	ELF-2	6030	7130	7925	8158	8720
Sulfate	ELF-9	5460	5855	6640	7035	8030
Sulfate	ELF-10	8610	10225	17050	19825	20700
Sulfate	Pooled	5460	6850	7950	8940	20700
TDS	ELF-1D	26800	26900	27000	27850	28700
TDS	ELF-2	11300	11575	12000	12225	12600
TDS	ELF-9	9420	10325	10650	11125	12000
TDS	ELF-10	32900	35275	38000	38850	40300
TDS	Pooled	9420	11300	12000	32900	40300

### 3.0 UPGRAIDENT AND DOWNGRAIDENT WELL COMPARISON

Groundwater quality was assessed using upper tolerance limits (UTLs) and the Maximum Contaminant Levels (MCL) for each of the Appendix III and IV analytes. The data measured from the upgradient/background wells were used to compute a UTL, which serves as the background value. The larger of the UTL and MCL was used as the Groundwater Protection Standard (GWPS). Data obtained from the downgradient wells were compared point-by-point to the GWPSs to determine if the site complies with the *Final Rule*. The software package Sanitas© v.2016, was used to compute the UTLs. As part of this evaluation, groundwater data were examined for characteristics that impact how the UTL was computed. These characteristics include the:

- Number of non-detect results
- Data distribution
- Site-wide false-positive rate (SWFPR)
- Spatial and seasonal variability.

Summary statistics and other statistical characteristics of the data are discussed in the previous section. These characteristics were used to compute the appropriate UTL for each analyte.

#### 3.1 Groundwater Protection Standards

The shape or distribution of the data was assessed to ensure that the most appropriate UTL was used for comparison purposes. The most efficient UTL is a parametric UTL that assumes the data follow a normal distribution. If the data do not follow a normal distribution, a non-parametric UTL is typically used. Thus, the data for each analyte are assessed to determine if a parametric UTL can be computed from the data. The parametric UTL is computed using the formula below:

$$UTL = \bar{X} + \kappa \times S$$

Where:

$\bar{X}$  = the average of the background data

$\kappa$  = multiplier from EPA Unified Guidance, March 2009

$S$  = standard deviation of the background data

##### 3.1.1 Normal Distribution

Histograms and dot plots were used to visually inspect the data for deviations from normality and to determine if outliers are present. This examination reveals the outliers are present in the cadmium, cobalt, lead, and radium data. The Shapiro-Wilk test was used to assess normality in conjunction with the normal quantile plots. If the p-value associated with the test was greater than or equal to 0.05, the data are considered normally distributed and a parametric UTL was computed using the upgradient measurements. If the p-value is less than 0.05, then the maximum detected value was used as the UTL.

**Note:** The 0.05 p-value is not a hard and fast rule. Parametric UTLs were computed for analytes whose p-values were sufficiently close to 0.05 as determined by the Sanitas software (Sanitas 2016).

If the data for an analyte were not normally distributed, the ladder of powers method was used to determine if a reasonable transformation existed that would produce normal data. The ladder of powers tests different monotonic transformations of the data, such as the natural logarithm or square, to see if the transformed data have a normal distribution. If a transformation within the ladder of powers can be found that produces normal data, a parametric UTL was computed using the transformed data. If a transformation was identified, it was applied to both upgradient / background and downgradient groundwater data prior to comparison.

A non-parametric UTL was computed for data that are not normally distributed and cannot be transformed. The non-parametric UTL is the largest value measured in the upgradient / background wells. Table C.4 summarizes the results of the Shapiro-Wilk test for each of the Appendix III and IV analytes where at least 50% of the measurements were detects. An appropriate transformation was found for lithium and radium. Non-parametric UTLs were computed for all of the analytes except for lithium and radium.

**Table C.4.** Shapiro-Wilk Test for the CCR Landfill upgradient wells.

Analyte	W-Statistic	P-Value	Normal
Barium	0.7500	<0.0001	No
Boron	0.8188	<0.0001	No
Calcium	0.7961	<0.0001	No
Chloride	0.6976	<0.0001	No
Fluoride	0.6249	<0.0001	No
Lithium	0.8675	<0.0001	No
Cube Root of Lithium	0.9401	0.0149	Yes
Molybdenum	0.8545	<0.0001	No
pH	0.9233	0.0055	No
Radium	0.5299	<0.0001	No
LN of Radium	0.9475	0.0293	Yes
Selenium	0.6650	<0.0001	No
Sulfate	0.7034	<0.0001	No
TDS	0.7031	<0.0001	No

### 3.1.2 Upper Tolerance Limits and Groundwater Protection Standard

This section contains the GWPS computed for each analyte. Table C.5 lists the UTL, MCL, and GWPS for each of the analytes in the upgradient wells. The following criteria were used for determining each GWPS:

- If more than 50% of the data were detected and have a normal distribution, a parametric UTL was computed.



- If the data were not normally distributed or more than 50% of the data were non-detects, the greater of the largest MDL and maximum detected value was used as the UTL.
- If all of the upgradient samples were non-detects, the largest MDL was used as the UTL.
- The larger of the MCL and the UTL was used as the GWPS.
- Fluoride is compared to both the MCL and the UTL if the MCL exceeds the UTL, to meet the criteria for Appendix III constituents.

Figure C.4 shows graphs that were constructed for each of the analytes that had at least one detectable measurement in the downgradient wells. The graphs illustrate the GWPS as a horizontal line with the measurements from each of the downgradient wells plotted on the same graph. Non-detects are represented by hollow gray circles on the graphs. These graphs clearly depict how the downgradient measurements compare to the GWPS.

Results above the GWPS line represent values exceeding the GWPS. As the graphs illustrate, boron, calcium, cobalt, and molybdenum exceed the GWPS. Table C.5 list the GWPSs and the wells that exceed the GWPS for each analyte (Figure C.4). GWPS plots are not provided for analytes that were not detected in any downgradient samples.

**Table C.5.** Comparison of downgradient wells to the Groundwater Protection Standard

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
Antimony	0.004	0.006	0.006	Within Limit
Arsenic	0.0117	0.01	0.0117	Within Limit
Barium	0.102	2.0	2.0	Within Limit
Beryllium	0.002	0.004	0.004	Within Limit
Boron	3.77	NA	3.77	ELF-4, ELF-8, ELF-11
Cadmium	0.0011	0.0050	0.0050	Within Limit
Calcium	543	NA	543	ELF-8
Chloride	12100	NA	12100	Within Limit
Chromium	0.0201	0.1000	0.1000	Within Limit
Cobalt	0.0114	0.006	0.0114	ELF-8, ELF-11
Fluoride	4.36	4.0	4.36	Within Limit
Fluoride Appendix III	4.36	NA	4.36	Within Limit
Lead	0.012	0.015	0.015	Within Limit
Lithium	4.54	0.04	4.54	Within Limit
Mercury	0.0002	0.002	0.002	Within Limit
Molybdenum	0.158	0.100	0.158	ELF-8

<b>Analyte</b>	<b>Upper Tolerance Limit (mg/L)</b>	<b>Maximum Contaminant Level (mg/L)</b>	<b>Groundwater Protection Standard (mg/L)</b>	<b>Downgradient Wells that Exceed Groundwater Protection Standard</b>
pH Acidic Range	6.85	NA	6.85	Within Limit
pH Basic Range	8.37	NA	8.37	Within Limit
Radium	6.1	5.0	6.1	Within Limit
Selenium	0.608	0.050	0.608	Within Limit
Sulfate	20700	NA	20700	Within Limit
TDS	40300	NA	40300	Within Limit
Thallium	0.002	0.002	0.002	Within Limit

#### 4.0 CONCLUSIONS

Groundwater data was collected from the CCR Landfill monitoring network at the Hunter Power Plant. A comprehensive data analysis was completed on the upgradient wells to ensure that comparisons between upgradient and downgradient wells were done correctly.

During the March 2021 sampling event, statistically significant increases (SSIs) above background were noted for Appendix III constituents:

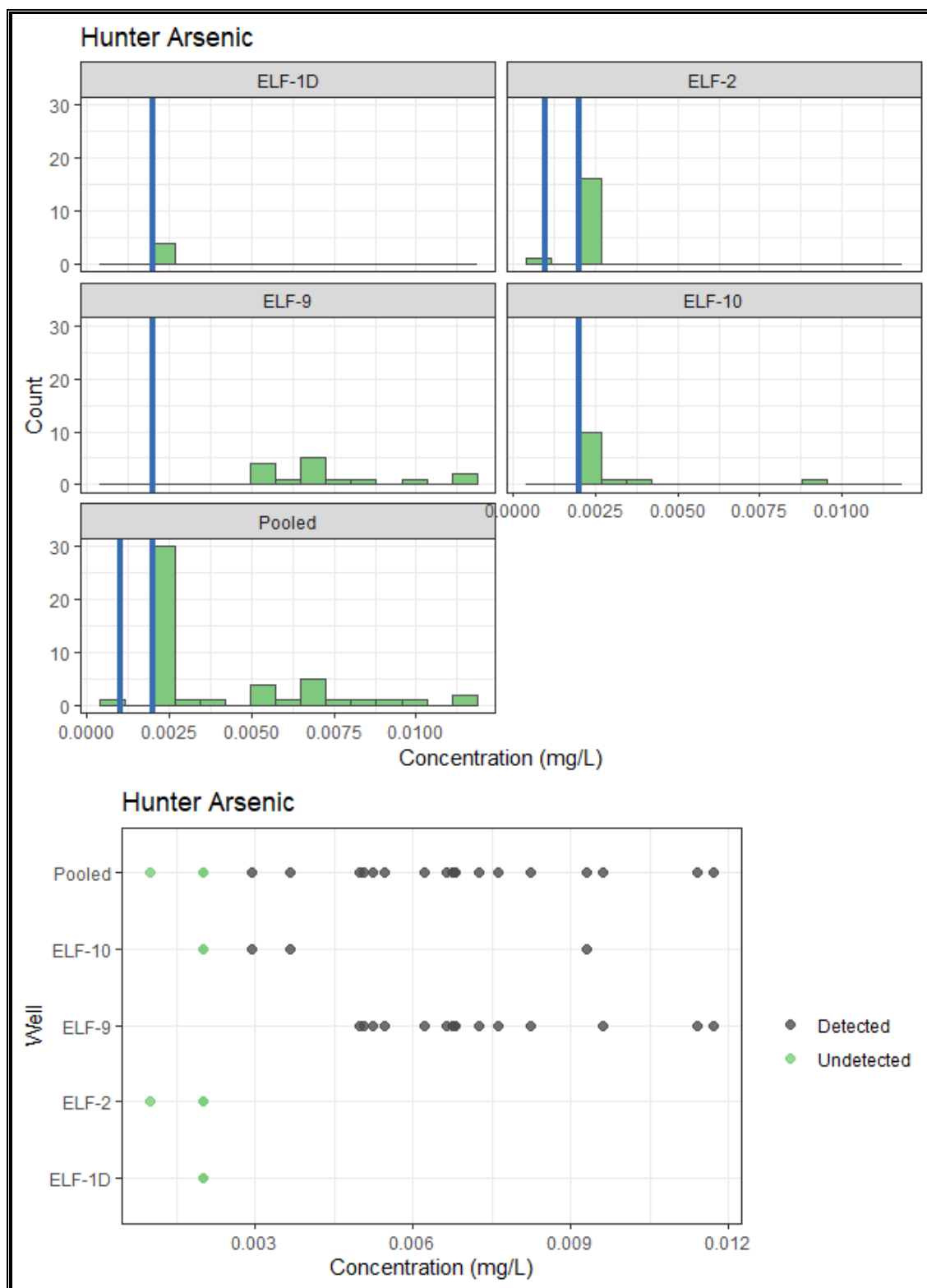
- Boron
- Calcium

SSIs above groundwater protection standards were noted for Appendix IV constituents:

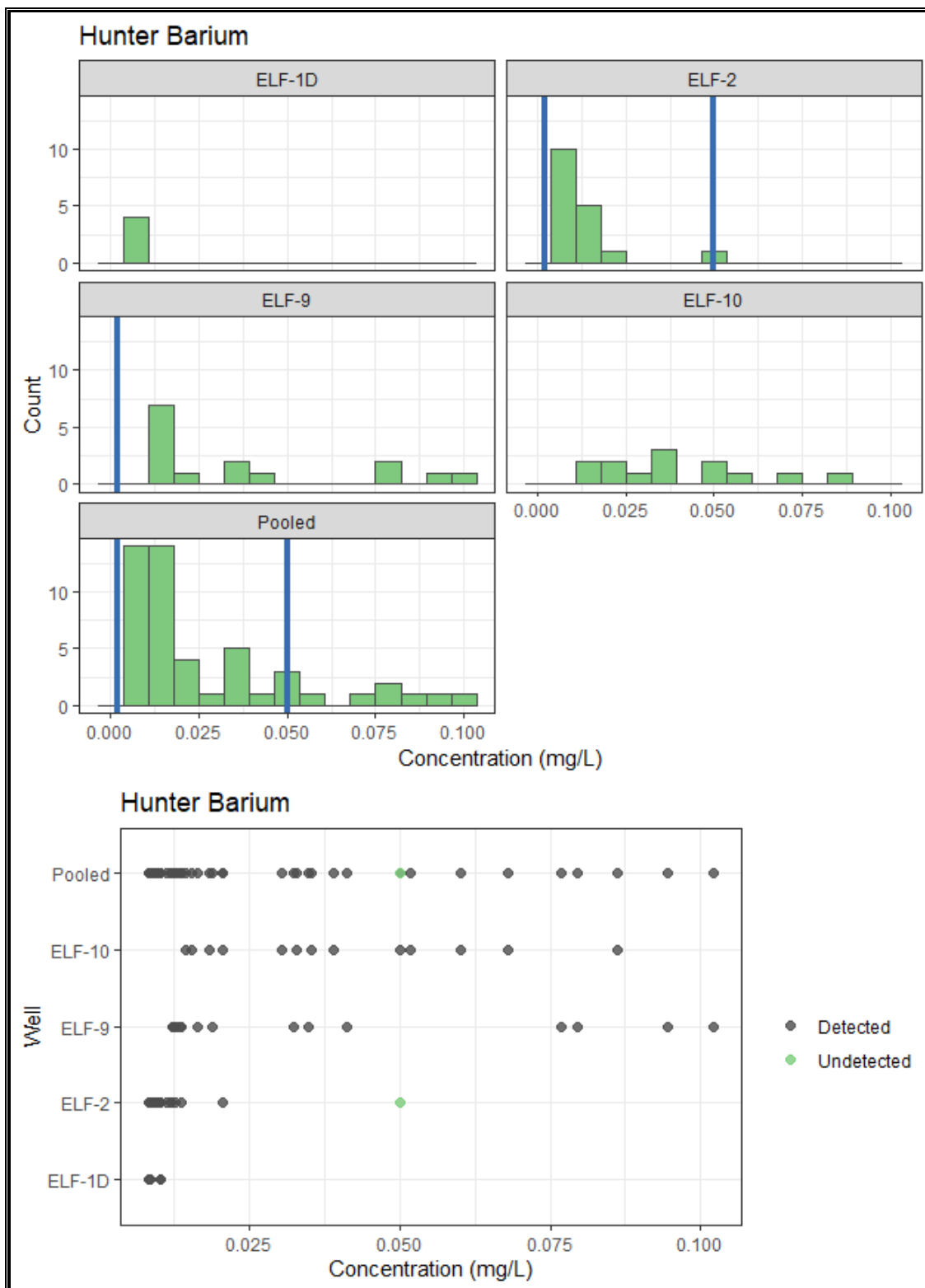
- Cobalt
- Molybdenum

## 5.0 REFERENCES

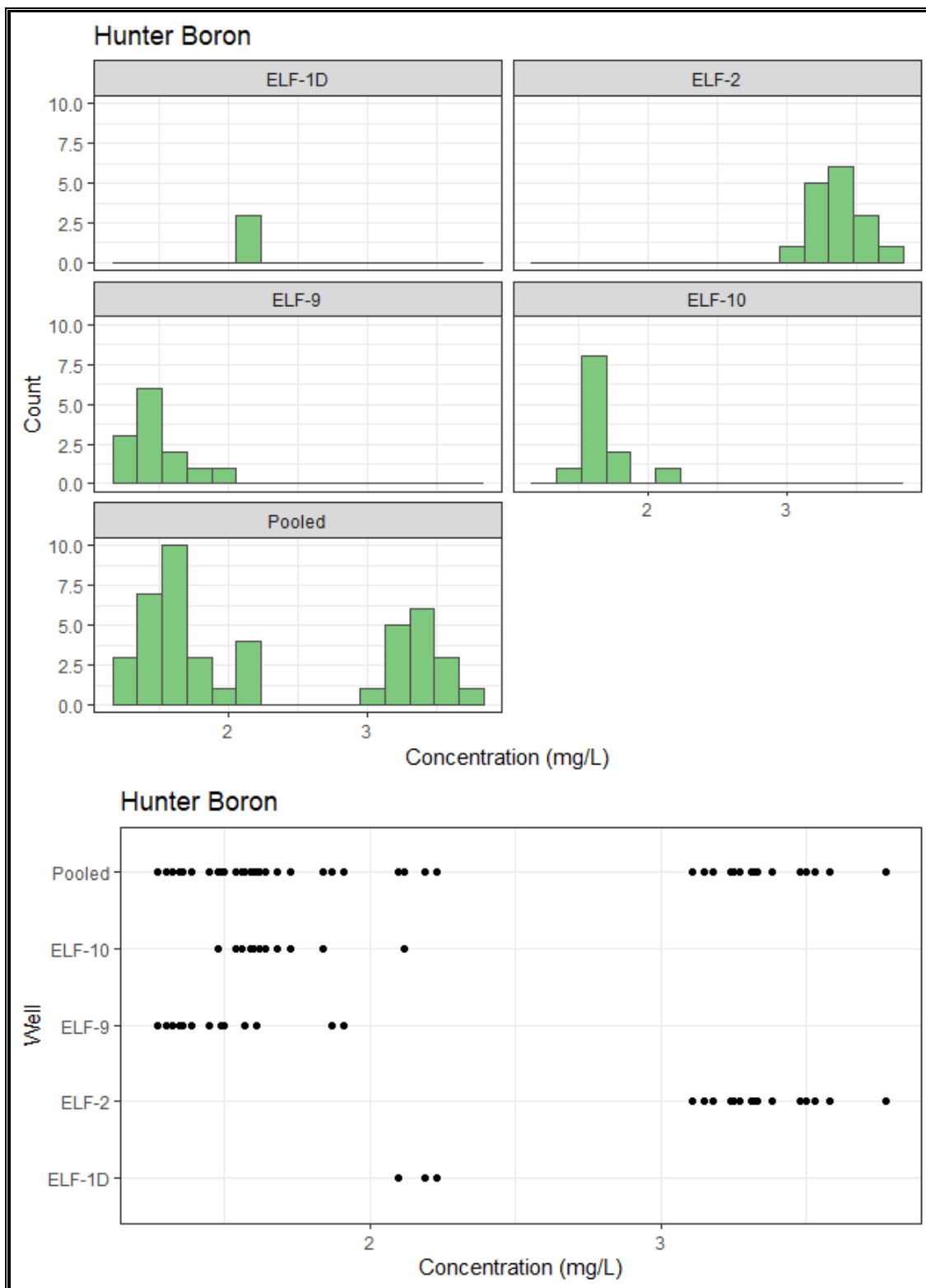
- EPA, 2009, “Statistical Analysis of Groundwater Monitoring Data At RCRA Facilities Unified Guidance,” EPA 530/R-09-007, U.S. Environmental Protection Agency, March 2009.
- Helsel, Dennis, 2004, *Nondetects and Data Analysis: Statistic for Censored Environmental Data*, New York: Wiley Interscience.
- R Core Team, 2021, *R: A Language and Environment for Statistical Computing*, <https://www.R-project.org>, R Foundation for Statistical Computing, Vienna, Austria.
- Sanitas Technologies, 2016, Sanitas, [www.sanitastech.com](http://www.sanitastech.com), Shawnee, Kansas.



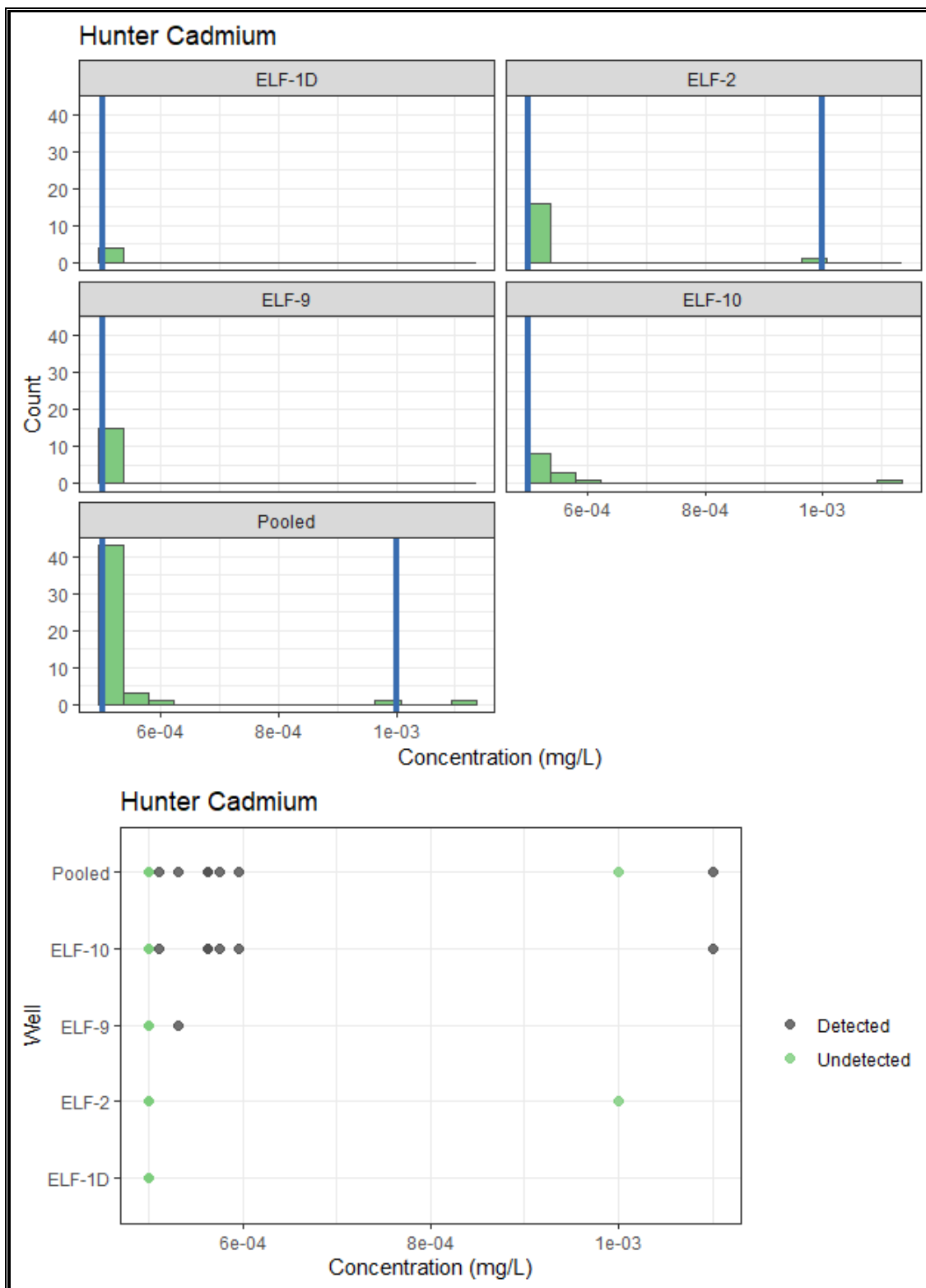
**Figure C.3.** Histograms and dot plots for the upgradient Ash Landfill data.



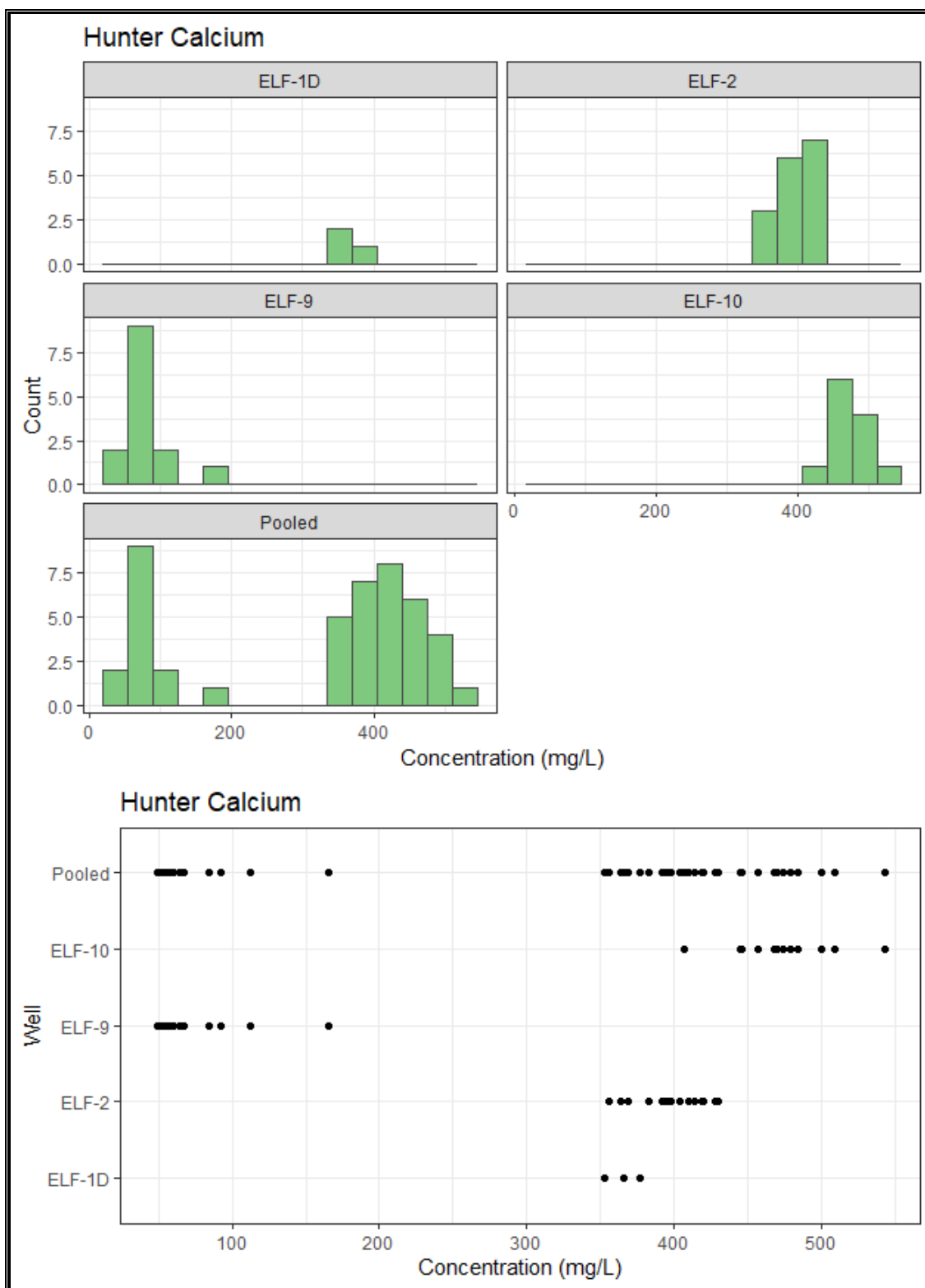
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.

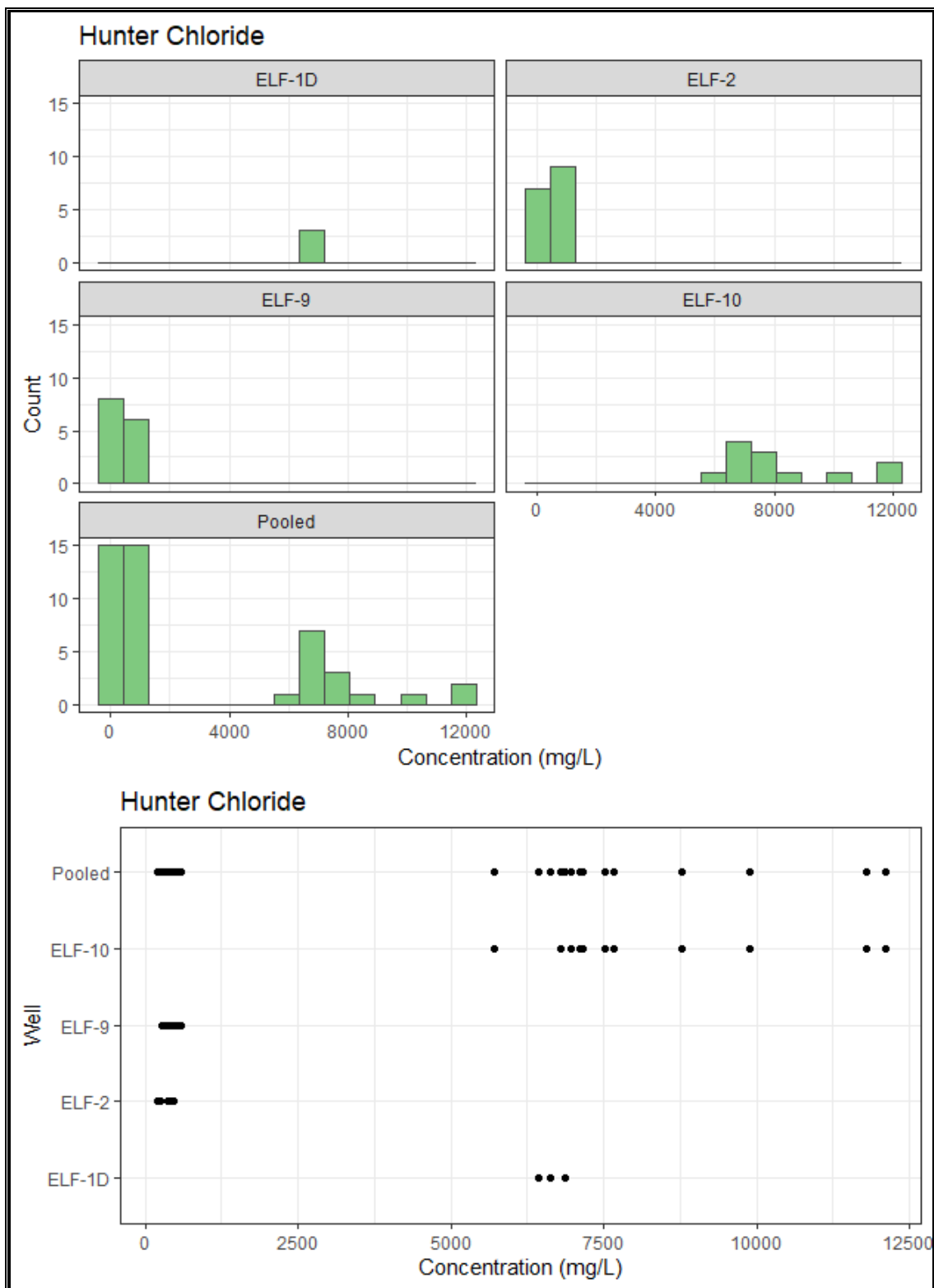


**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.

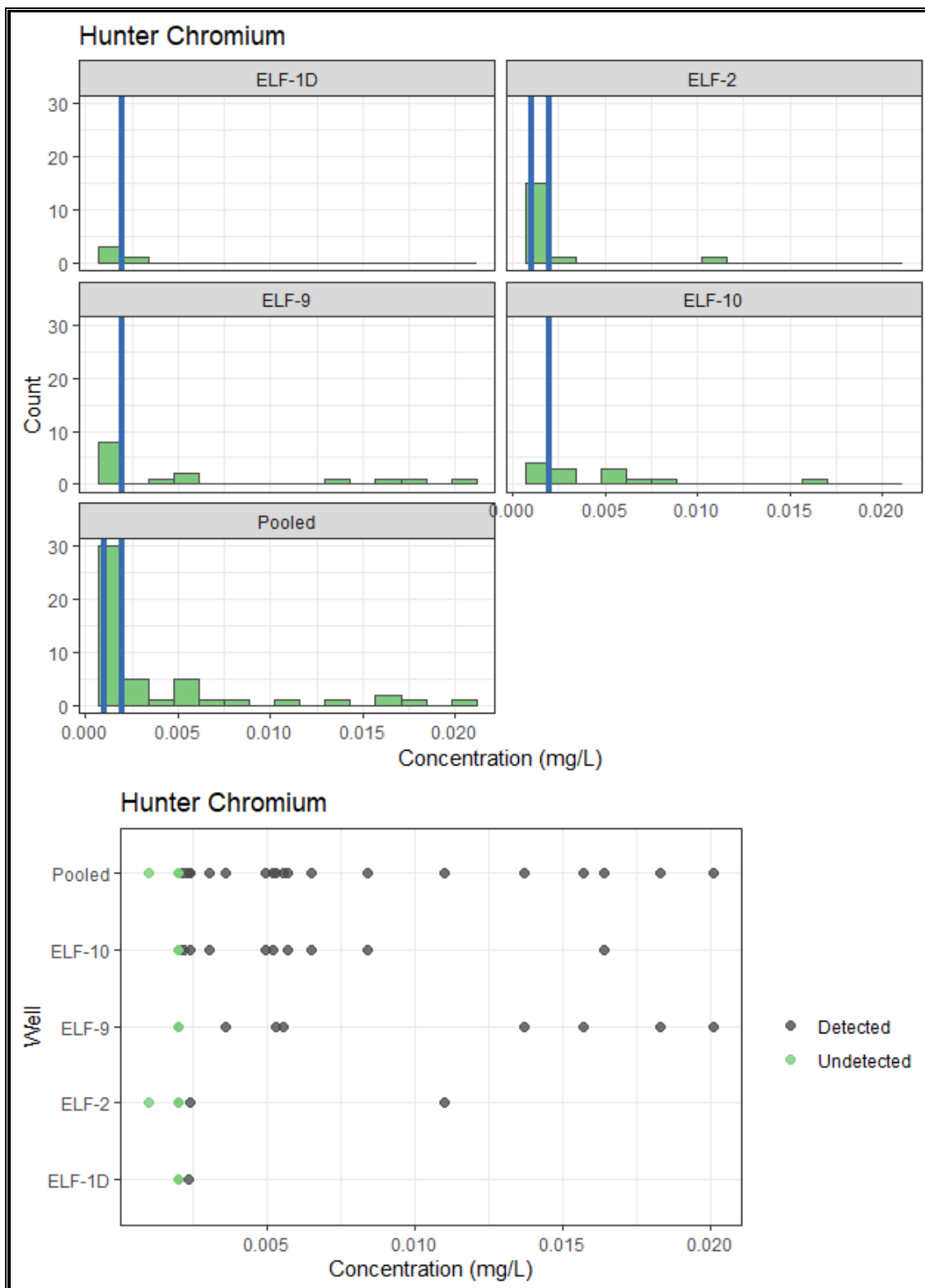


**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.

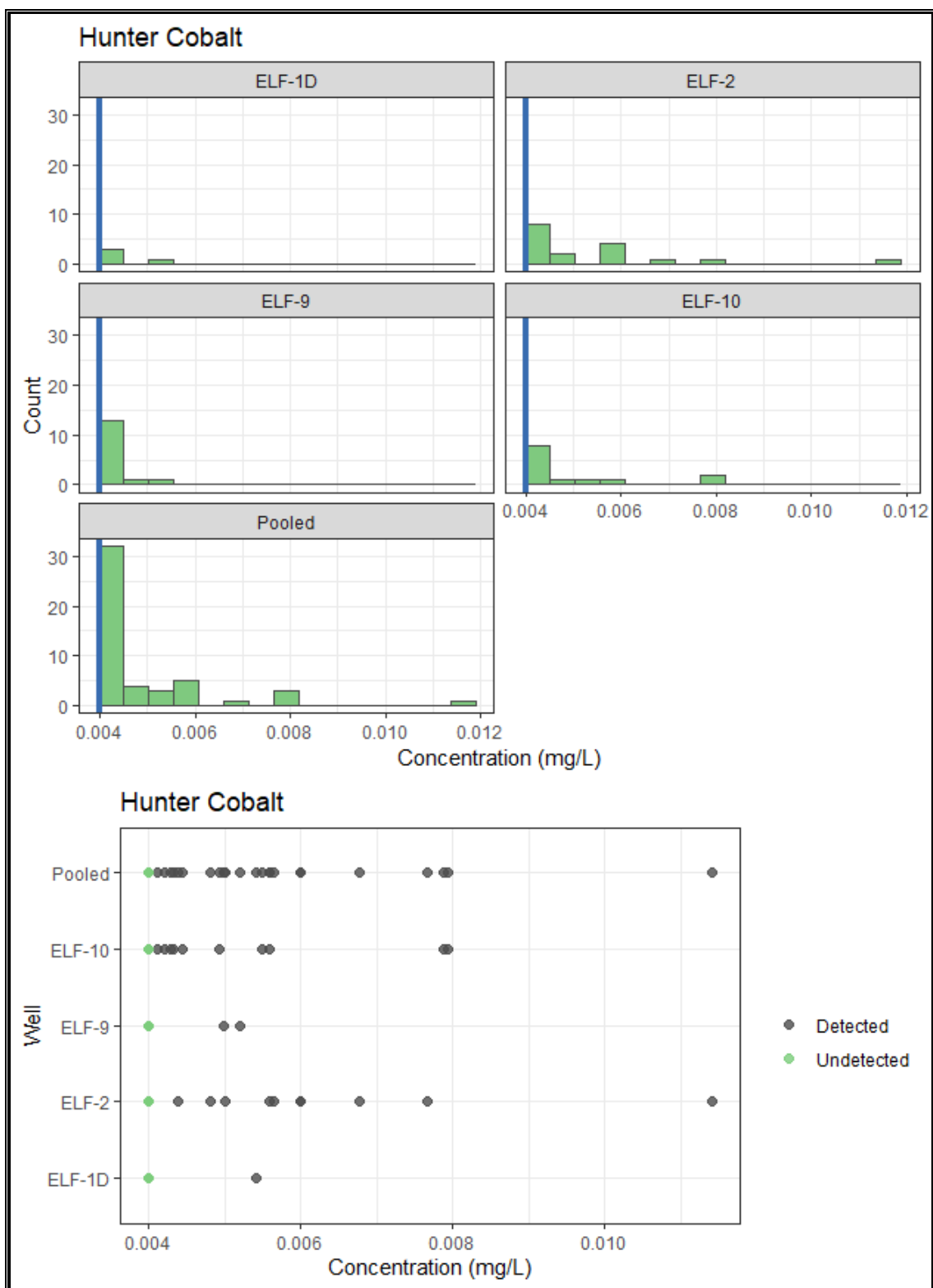




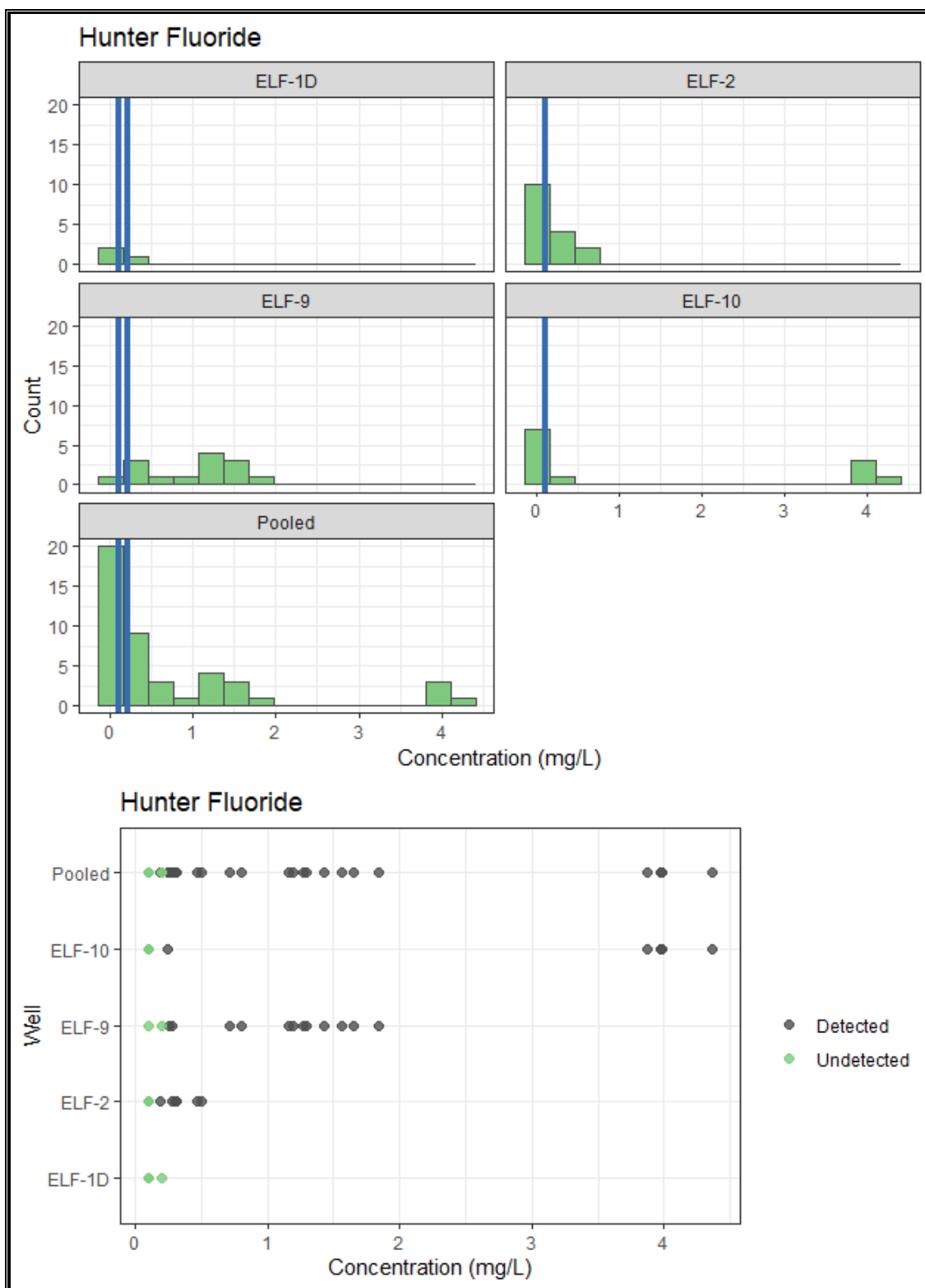
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



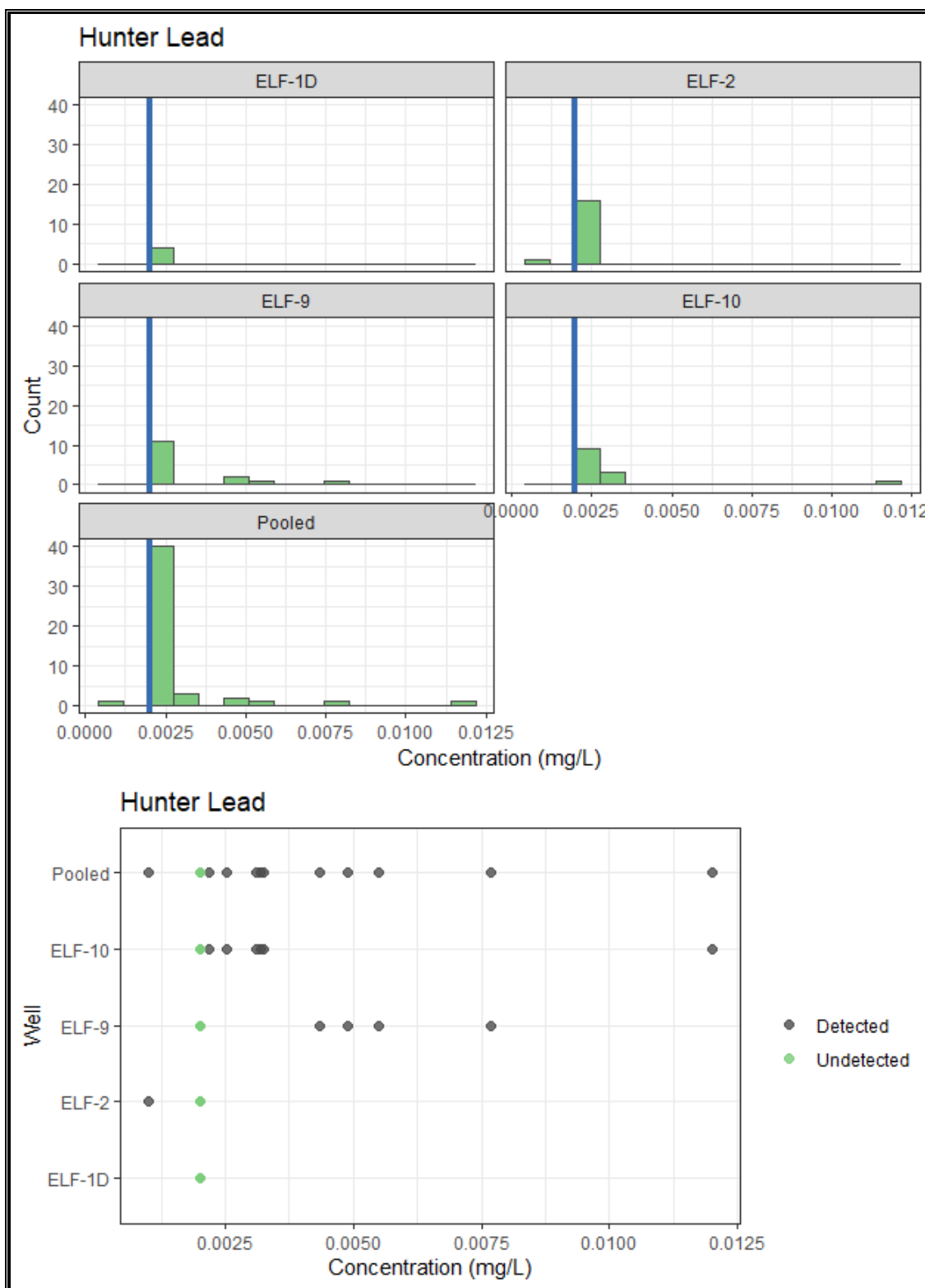
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



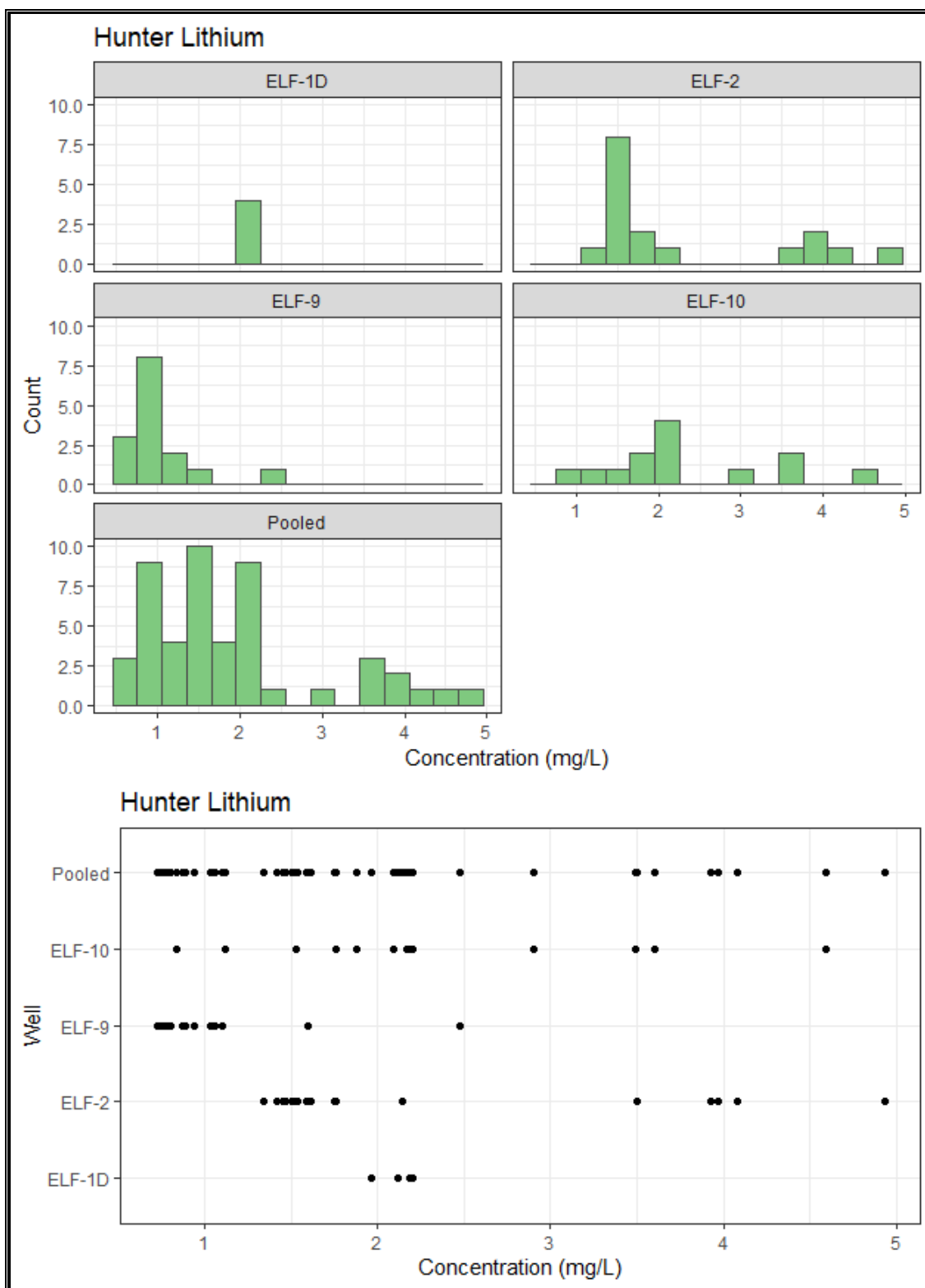
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



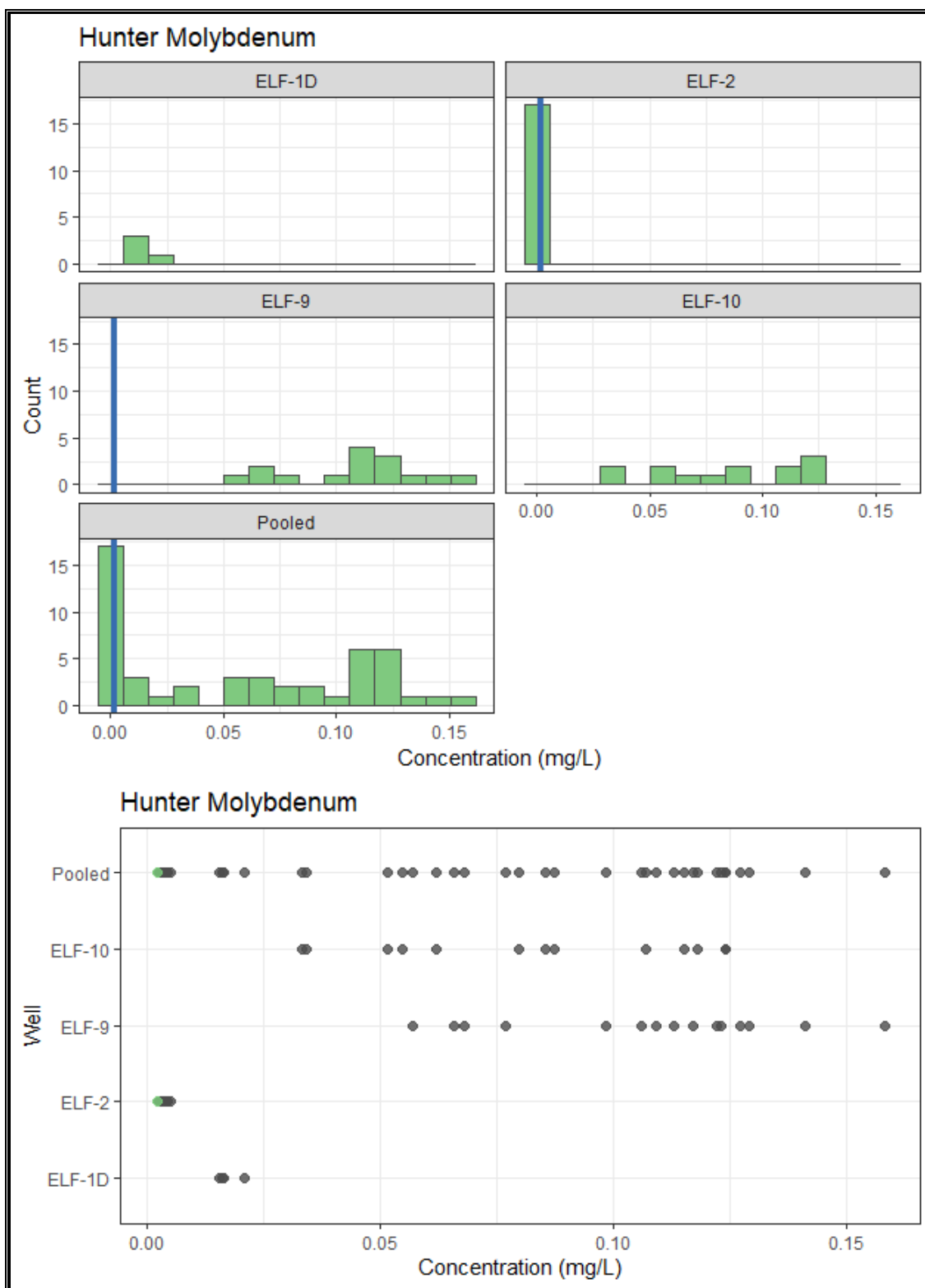
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



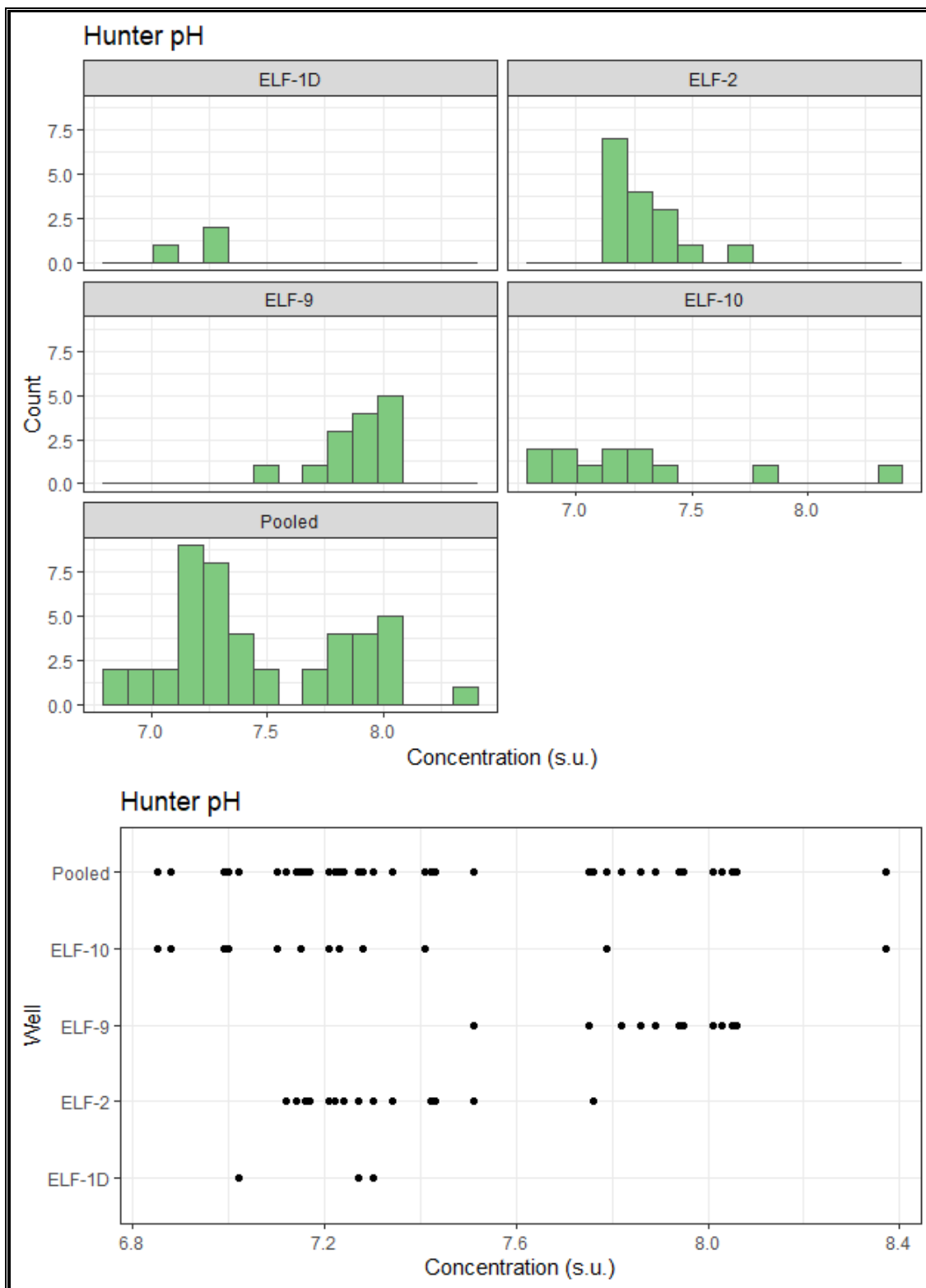
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



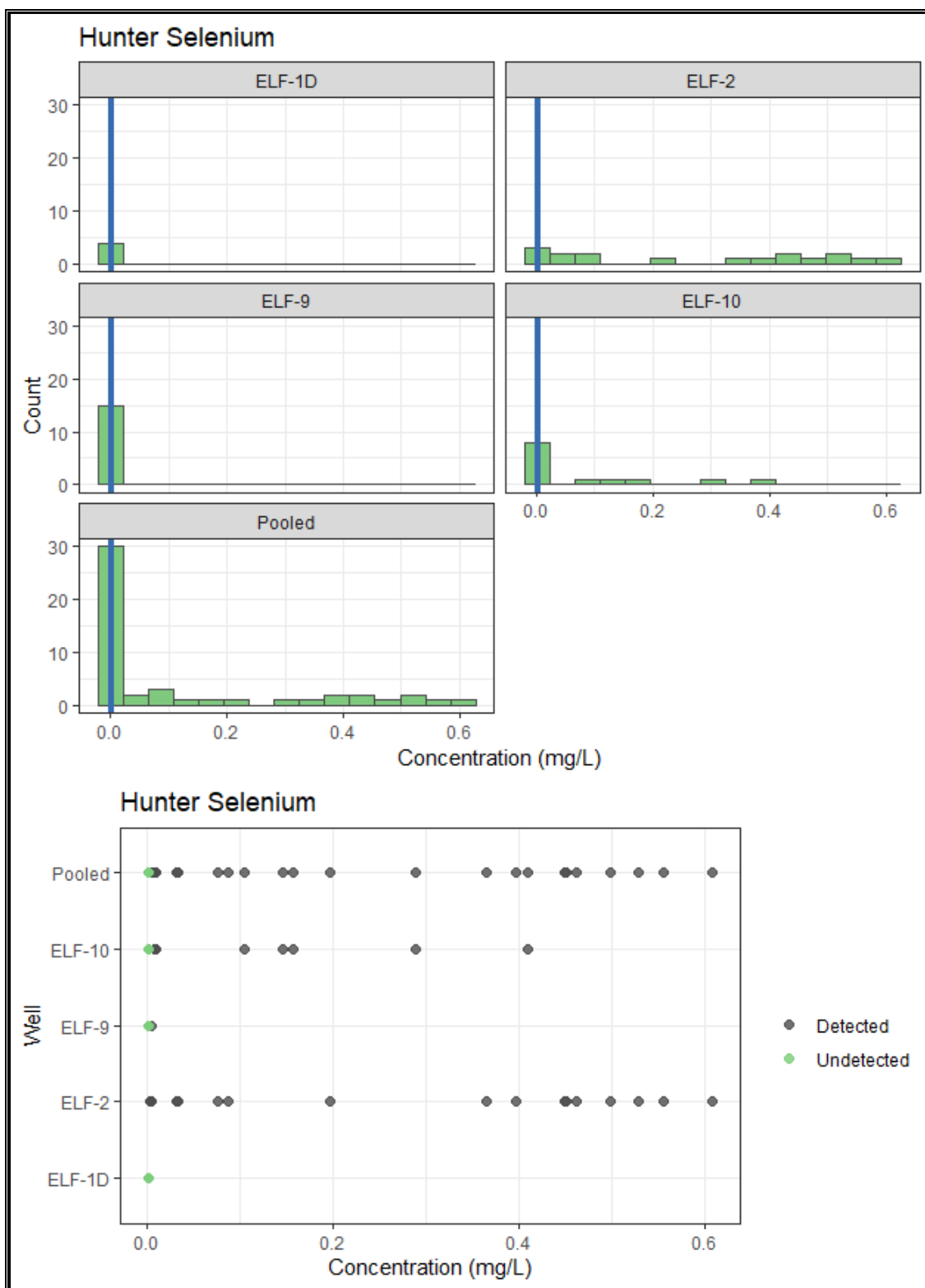
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



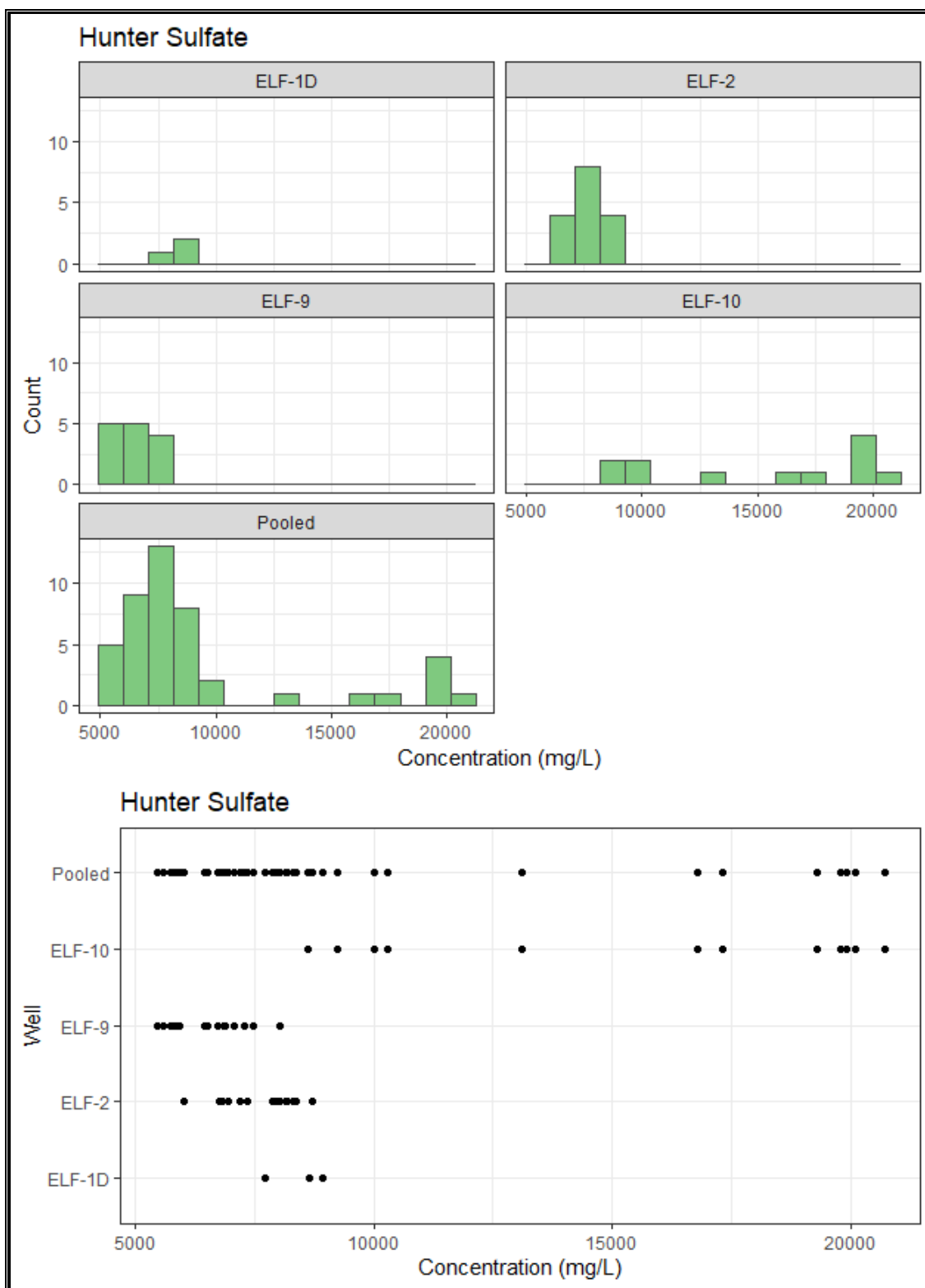
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



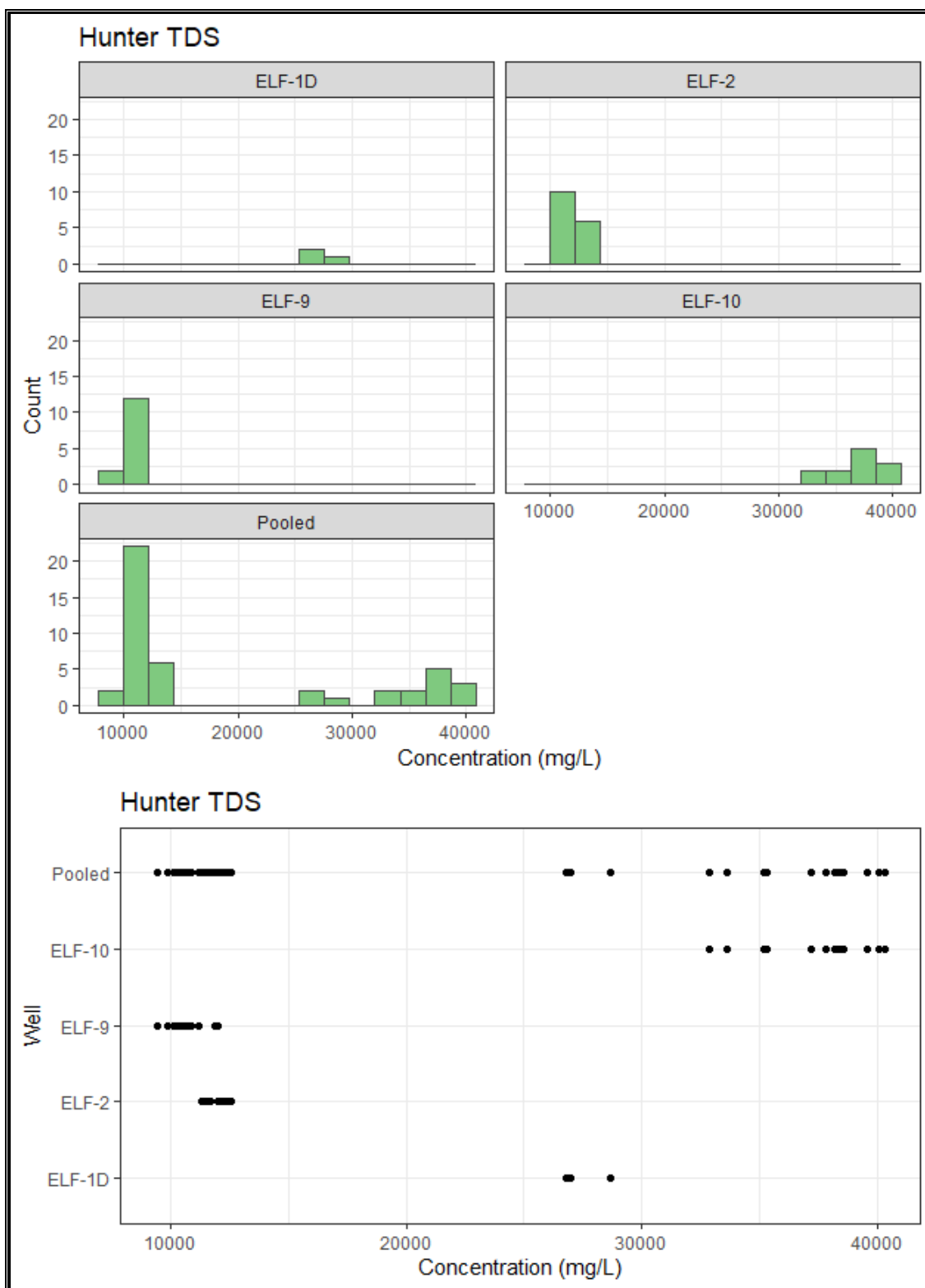




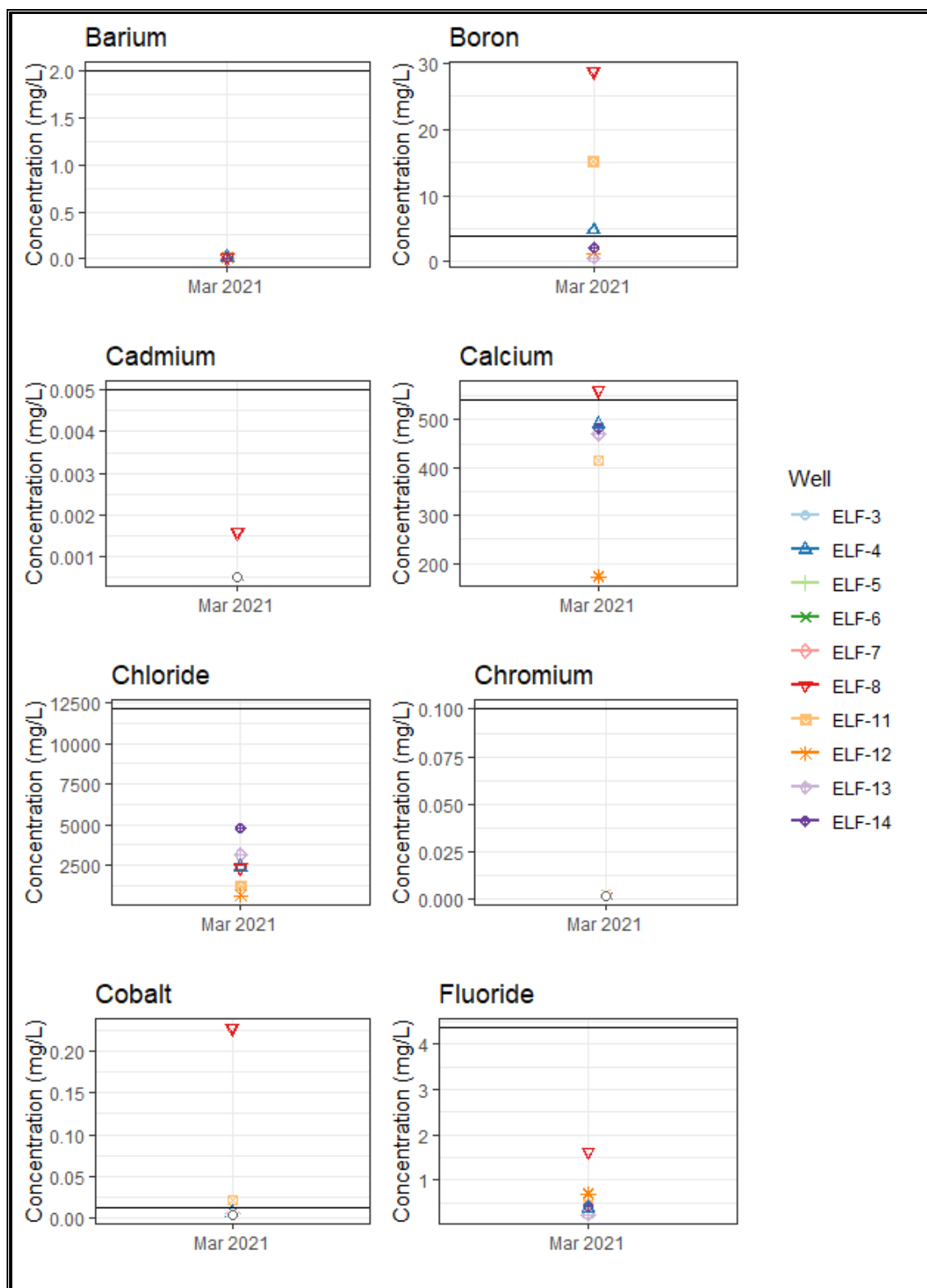
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.4.** Background upper tolerance limit plots for the CCR Landfill.

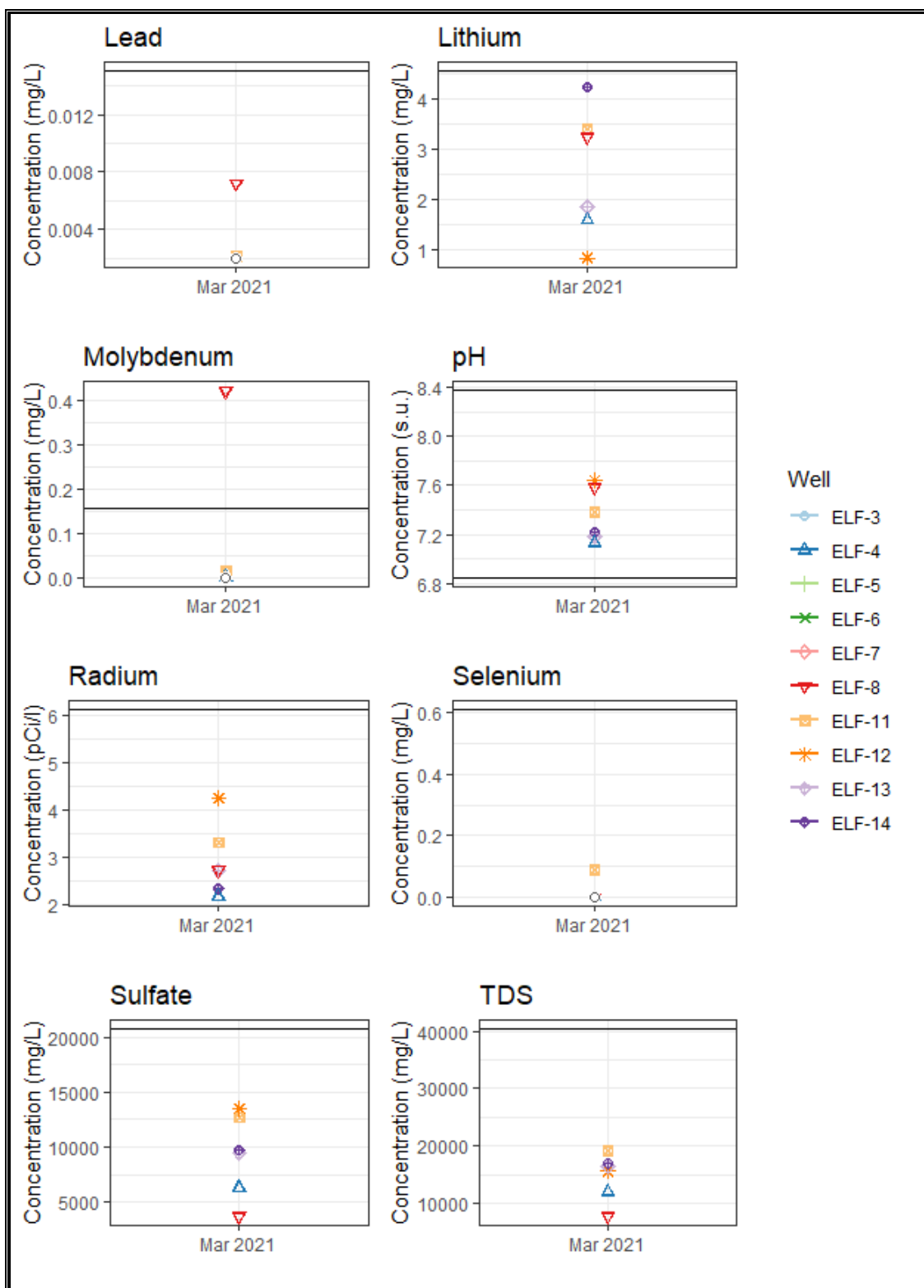


Figure C.4 (cont.). Background upper tolerance limit plots for the CCR Landfill.

**Attachment D:**

Field Data Sheets



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-11
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	10:36
Sampler(s) Initials	DV	Depth to Water (ft.)	28.09
Field Conditions	Windy, 33°F, Mostly clear		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1008	13.0	19,600	2.55	7.04	221	53
1018	13.0	19,800	1.49	7.08	216	34.2
1030	13.0	19,900	1.46	7.08	214	33.6
1036	13.0	20,100	1.44	7.06	209	34.1

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Like yellow water. Mostly clear. Filled four bottles.





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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-8
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	11:16
Sampler(s) Initials	DV	Depth to Water (ft.)	8.96
Field Conditions	Clear, 36°F, Windy.		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1049	11.9	11,100	1.43	7.41	215	56.3
1058	11.9	11,100	0.88	7.41	215	3.5
1109	11.9	11,100	0.87	7.42	213	2.1
1116	12.0	11,100	0.84	7.42	211	0

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Good producer, water cleared nice.



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-14
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	12:20
Sampler(s) Initials	DV	Depth to Water (ft.)	6.74
Field Conditions	Clear, 36°F, Windy.		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1140	10.2	23,200	1.20	7.11	206	1,000
1148	10.1	23,200	0.92	7.08	204	169
1159	10.1	23,300	0.87	7.07	203	151
1210	10.0	23,300	0.84	7.06	202	142
1220	10.0	23,300	0.82	7.06	201	139

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Was very muddy to begin with but cleared up. Good producer



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#### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-13
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	March 24, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	13:05
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	4.20
<b>Field Conditions</b>	Windy, 38°F, Clear skies		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1232	10.2	20,400	0.96	6.88	213	0
1245	10.3	20,400	0.92	6.87	214	0
1255	10.3	20,400	0.86	6.87	215	0
1305	10.4	20,400	0.83	6.86	215	0

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Group B duplicate taken at this well. Filled eight bottles



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-6
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	14:13
Sampler(s) Initials	DV	Depth to Water (ft.)	0
Field Conditions	Clear skies, 40°F, Windy		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

This well is dry.



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-4
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	14:40
Sampler(s) Initials	DV	Depth to Water (ft.)	17.89
Field Conditions	Clear and sunny, 40°F, Windy		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1410	12.8	14,800	1.01	6.84	221	4
1420	12.8	14,800	0.96	6.86	222	2.3
1430	12.8	14,800	0.94	6.87	223	1.2
1440	12.8	14,800	0.95	6.88	223	0.5

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Good producer. Clearwater.



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#### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-12
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	March 24, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	15:30
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	20.86
<b>Field Conditions</b>	Clear skies, 42°F, Light wind		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1450	13.1	22,100	1.16	7.38	-1	311
1500	12.8	22,200	1.13	7.41	-42	164
1510	13.0	22,300	1.09	7.42	-44	143
1520	12.7	22,400	1.08	7.41	-49	147
1530	12.7	22,400	1.05	7.42	-52	139

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Good producer. Water level continues to drop slightly. Water clearing up



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-7
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	15:57
Sampler(s) Initials	DV	Depth to Water (ft.)	NA
Field Conditions	Clear skies, 42°F		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

This well is dry.



Consulting Scientists and Engineers  
480 East Park Street  
Butte, Montana 59701  
Phone: 406-782-5220  
Fax: 406-723-1537

#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-3
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	16:25
Sampler(s) Initials	DV	Depth to Water (ft.)	NA
Field Conditions	Clear skies, 42°F, No wind		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Water in well almost completely dry after first field measurements. Waited approximately 45 minutes no water for samples.





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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-9
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	18:10
Sampler(s) Initials	DV	Depth to Water (ft.)	23.01
Field Conditions	Windy, 42°F, Partly cloudy		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1720	12.7	15,700	1.11	7.79	173	0
1730	12.4	14,800	0.89	7.76	164	0
1740	12.3	14,600	0.86	7.75	139	0
1750	12.2	14,500	0.79	7.78	140	0
1810	12.2	14,400	0.78	7.81	130	0

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Well water level dropping. Clear water.



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-2
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	19:10
Sampler(s) Initials	DV	Depth to Water (ft.)	23.38
Field Conditions	Windy, 36°F, Mostly cloudy		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1830	12.3	13,300	0.96	7.07	195	9.1
1840	12.3	13,400	0.94	7.04	204	8.4
1850	12.3	13,400	0.91	7.01	206	8.9
1910	12.3	13,400	0.90	7.02	207	8.6

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Good producer, mostly clear.



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-10
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	12:00
Sampler(s) Initials	DV	Depth to Water (ft.)	51.09
Field Conditions	NA		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3&4	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Not enough water to sample.



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-5
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	12:05
Sampler(s) Initials	DV	Depth to Water (ft.)	NA
Field Conditions	NA		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3&4	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

No water above pump - water level at bottom of pump - roots held pump in well



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#### GROUNDWATER SAMPLING FORM

Project Name	Hunter Power Plant	Project Location	Castle Dale UT
Job number(s)	PERCM052	Sample ID	ELF-1D
Sampling Method	Low Flow Bladder Pump	Sample Date	March 24, 2021
Decon Method	Dedicated Equipment	Sample Time	12:10
Sampler(s) Initials	DV	Depth to Water (ft.)	83.21
Field Conditions	NA		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		3&4	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Not enough water to sample.

**Attachment E:**

Laboratory Analytical Reports



Jeff Tucker  
PacifiCorp  
1407 West North Temple, # 280  
Salt Lake City, UT 84116  
TEL: (801) 220-2989

RE: Hunter Power Plant - CCR

3440 South 700 West  
Salt Lake City, UT 84119

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web: www.awal-labs.com

Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

Lab Set ID: 2103745

Dear Jeff Tucker:

American West Analytical Laboratories received sample(s) on 3/26/2021 for the analyses presented in the following report.

American West Analytical Laboratories (AWAL) is accredited by The National Environmental Laboratory Accreditation Program (NELAP) in Utah and Texas; and is state accredited in Colorado, Idaho, New Mexico, Wyoming, and Missouri.

All analyses were performed in accordance to the NELAP protocols unless noted otherwise. Accreditation scope documents are available upon request. If you have any questions or concerns regarding this report please feel free to call.

The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction, and/or purging efficiency. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Approved by: 

<b>Kyle F. Gross</b>	Digitally signed by Kyle F. Gross Date: 2021.04.16 12:50:00 -06'00'
----------------------	---

  
Laboratory Director or designee

Sample(s) were subcontracted for the following analyses:

Radiological Testing



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-001  
**Client Sample ID:** ELF-2  
**Collection Date:** 3/24/2021 1910h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 857h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	<b>0.00988</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/6/2021 1808h	E200.7	0.500	<b>3.32</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1612h	E200.7	10.0	<b>394</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00400	<b>0.00481</b>	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/6/2021 1808h	E200.7	0.100	<b>1.47</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1249h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	<b>0.00268</b>	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	<b>0.00309</b>	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1118h	E200.8	0.00200	< 0.00200	

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Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer





## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-002  
**Client Sample ID:** ELF-4  
**Collection Date:** 3/24/2021 1440h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 901h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	<b>0.0119</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/6/2021 1810h	E200.7	0.500	<b>4.77</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1614h	E200.7	10.0	<b>491</b>	<sup>2</sup>
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00400	<b>0.00594</b>	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/6/2021 1810h	E200.7	0.100	<b>1.58</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1307h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	<b>0.00210</b>	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1122h	E200.8	0.00200	< 0.00200	

<sup>2</sup> - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-003  
**Client Sample ID:** ELF-8  
**Collection Date:** 3/24/2021 1116h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 912h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	<b>0.0112</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/6/2021 1627h	E200.7	5.00	<b>28.8</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.000500	<b>0.00158</b>	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1627h	E200.7	10.0	<b>562</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00400	<b>0.228</b>	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	<b>0.00719</b>	
Lithium	mg/L	3/30/2021 1203h	4/6/2021 1818h	E200.7	0.100	<b>3.24</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1309h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	<b>0.421</b>	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1142h	E200.8	0.00200	< 0.00200	

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Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-004  
**Client Sample ID:** ELF-9  
**Collection Date:** 3/24/2021 1810h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 915h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	<b>0.00506</b>	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	<b>0.0122</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/6/2021 1630h	E200.7	0.500	<b>1.45</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1659h	E200.7	5.00	<b>67.1</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00400	< 0.00400	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/6/2021 1630h	E200.7	0.100	<b>0.944</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1311h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	<b>0.0569</b>	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1146h	E200.8	0.00200	< 0.00200	

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Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-005  
**Client Sample ID:** ELF-11  
**Collection Date:** 3/24/2021 1036h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 919h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	<b>0.0219</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/6/2021 1640h	E200.7	5.00	<b>15.2</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1640h	E200.7	10.0	<b>415</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	<b>0.00258</b>	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00400	<b>0.0213</b>	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	<b>0.00210</b>	
Lithium	mg/L	3/30/2021 1203h	4/7/2021 1733h	E200.7	0.100	<b>3.40</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1314h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	<b>0.0164</b>	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	<b>0.0883</b>	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1203h	E200.8	0.00200	< 0.00200	

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Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-006  
**Client Sample ID:** ELF-12  
**Collection Date:** 3/24/2021 1530h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 923h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	<b>0.00990</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/7/2021 1736h	E200.7	0.500	<b>1.25</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1643h	E200.7	10.0	<b>172</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00400	< 0.00400	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/7/2021 1736h	E200.7	0.100	<b>0.820</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1316h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1207h	E200.8	0.00200	< 0.00200	

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Laboratory Director

Jose Rocha

QA Officer





# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-007  
**Client Sample ID:** ELF-13  
**Collection Date:** 3/24/2021 1305h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

## Analytical Results

## TOTAL METALS

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Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 937h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	<b>0.00916</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/7/2021 1738h	E200.7	0.500	<b>0.580</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1646h	E200.7	10.0	<b>471</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00400	<b>0.00432</b>	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/7/2021 1738h	E200.7	0.100	<b>1.84</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1318h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1211h	E200.8	0.00200	< 0.00200	



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-008  
**Client Sample ID:** ELF-14  
**Collection Date:** 3/24/2021 1220h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 941h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	<b>0.0106</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/7/2021 1741h	E200.7	0.500	<b>2.15</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1648h	E200.7	10.0	<b>482</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00400	<b>0.00701</b>	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/7/2021 1741h	E200.7	0.100	<b>4.23</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1320h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	<b>0.00303</b>	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	<b>0.00314</b>	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1215h	E200.8	0.00200	< 0.00200	

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Laboratory Director

Jose Rocha

QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-009  
**Client Sample ID:** Duplicate (CCR)  
**Collection Date:** 3/24/2021  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

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Jose Rocha  
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 945h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	<b>0.00894</b>	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/7/2021 1744h	E200.7	0.500	<b>0.574</b>	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1651h	E200.7	10.0	<b>460</b>	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00400	<b>0.00418</b>	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/7/2021 1744h	E200.7	0.100	<b>1.85</b>	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1322h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1219h	E200.8	0.00200	< 0.00200	





## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-010  
**Client Sample ID:** Field Blank (CCR)  
**Collection Date:** 3/24/2021 1930h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### Analytical Results

### TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	3/30/2021 1203h	4/6/2021 948h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	
Barium	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	
Beryllium	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	
Boron	mg/L	3/30/2021 1203h	4/6/2021 1709h	E200.7	0.500	< 0.500	
Cadmium	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	3/30/2021 1203h	4/6/2021 1709h	E200.7	1.00	< 1.00	
Chromium	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00400	< 0.00400	
Lead	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	3/30/2021 1203h	4/6/2021 1709h	E200.7	0.100	< 0.100	
Mercury	mg/L	3/31/2021 1210h	4/5/2021 1324h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	3/30/2021 1203h	4/1/2021 1223h	E200.8	0.00200	< 0.00200	

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QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-001  
**Client Sample ID:** ELF-2  
**Collection Date:** 3/24/2021 1910h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 1810h	E300.0	200	213	
Fluoride	mg/L		4/5/2021 040h	E300.0	0.100	0.464	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	7.34	H
Sulfate	mg/L		4/4/2021 1810h	E300.0	1,000	8,720	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	100	11,700	

*H - Sample was received outside of the holding time.*

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-002  
**Client Sample ID:** ELF-4  
**Collection Date:** 3/24/2021 1440h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 1838h	E300.0	100	<b>2,420</b>	
Fluoride	mg/L		4/5/2021 108h	E300.0	0.200	<b>0.396</b>	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	<b>7.13</b>	H
Sulfate	mg/L		4/4/2021 1838h	E300.0	500	<b>6,290</b>	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	100	<b>12,000</b>	

*H - Sample was received outside of the holding time.*

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-003  
**Client Sample ID:** ELF-8  
**Collection Date:** 3/24/2021 1116h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 1906h	E300.0	100	<b>2,340</b>	
Fluoride	mg/L		4/5/2021 136h	E300.0	0.200	<b>1.63</b>	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	<b>7.58</b>	H
Sulfate	mg/L		4/4/2021 1906h	E300.0	500	<b>3,720</b>	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	100	<b>7,820</b>	

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Jose Rocha  
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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-004  
**Client Sample ID:** ELF-9  
**Collection Date:** 3/24/2021 1810h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 1934h	E300.0	40.0	<b>464</b>	
Fluoride	mg/L		4/5/2021 204h	E300.0	0.200	<b>1.56</b>	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	<b>8.01</b>	H
Sulfate	mg/L		4/4/2021 1934h	E300.0	200	<b>7,470</b>	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	100	<b>10,800</b>	

*H - Sample was received outside of the holding time.*

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QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-005  
**Client Sample ID:** ELF-11  
**Collection Date:** 3/24/2021 1036h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 2057h	E300.0	200	1,230	
Fluoride	mg/L		4/5/2021 231h	E300.0	0.100	0.435	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	7.38	H
Sulfate	mg/L		4/4/2021 2057h	E300.0	1,000	12,700	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	500	19,100	

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-006  
**Client Sample ID:** ELF-12  
**Collection Date:** 3/24/2021 1530h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 2125h	E300.0	200	<b>640</b>	
Fluoride	mg/L		4/5/2021 259h	E300.0	0.100	<b>0.700</b>	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	<b>7.64</b>	H
Sulfate	mg/L		4/4/2021 2125h	E300.0	1,000	<b>13,500</b>	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	500	<b>15,600</b>	

*H - Sample was received outside of the holding time.*

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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-007  
**Client Sample ID:** ELF-13  
**Collection Date:** 3/24/2021 1305h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 2249h	E300.0	100	<b>3,160</b>	
Fluoride	mg/L		4/5/2021 423h	E300.0	0.200	<b>0.243</b>	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	<b>7.18</b>	H
Sulfate	mg/L		4/4/2021 2249h	E300.0	500	<b>9,410</b>	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	500	<b>16,500</b>	

*H - Sample was received outside of the holding time.*

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QA Officer





## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-008  
**Client Sample ID:** ELF-14  
**Collection Date:** 3/24/2021 1220h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 2316h	E300.0	100	4,770	
Fluoride	mg/L		4/5/2021 451h	E300.0	0.200	0.413	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	7.22	H
Sulfate	mg/L		4/4/2021 2316h	E300.0	500	9,740	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	500	16,900	

*H - Sample was received outside of the holding time.*

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-009  
**Client Sample ID:** Duplicate (CCR)  
**Collection Date:** 3/24/2021  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/4/2021 2344h	E300.0	100	<b>3,130</b>	
Fluoride	mg/L		4/5/2021 519h	E300.0	0.100	<b>0.207</b>	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	<b>7.17</b>	H
Sulfate	mg/L		4/4/2021 2344h	E300.0	500	<b>9,400</b>	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	100	<b>15,200</b>	

*H - Sample was received outside of the holding time.*

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2103745-010  
**Client Sample ID:** Field Blank (CCR)  
**Collection Date:** 3/24/2021 1930h  
**Received Date:** 3/26/2021 1225h

**Contact:** Jeff Tucker

### **Analytical Results**

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		4/5/2021 547h	E300.0	0.100	< 0.100	
Fluoride	mg/L		4/5/2021 547h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		3/26/2021 1503h	SM4500-H+B	1.00	<b>8.03</b>	H
Sulfate	mg/L		4/5/2021 547h	E300.0	0.500	< 0.500	
Total Dissolved Solids	mg/L		3/29/2021 1300h	SM2540C	10.0	< 10.0	

*H - Sample was received outside of the holding time.*

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Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** ME

**QC Type:** LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: LCS-76284</b>													
Date Analyzed:		04/06/2021 1609h											
Test Code:		200.7-W											
Boron	1.12	mg/L	E200.7	0.0449	0.500	1.000	0	112	85 - 115				
Calcium	9.59	mg/L	E200.7	0.170	1.00	10.00	0	95.9	85 - 115				
Lithium	1.03	mg/L	E200.7	0.0239	0.100	1.000	0	103	80 - 120				
<b>Lab Sample ID: LCS-76283</b>													
Date Analyzed:		04/01/2021 1114h											
Test Code:		200.8-W											
Arsenic	0.205	mg/L	E200.8	0.000298	0.00200	0.2000	0	103	85 - 115				
Barium	0.195	mg/L	E200.8	0.000544	0.00200	0.2000	0	97.7	85 - 115				
Beryllium	0.211	mg/L	E200.8	0.000198	0.00200	0.2000	0	106	85 - 115				
Cadmium	0.195	mg/L	E200.8	0.0000742	0.000500	0.2000	0	97.6	85 - 115				
Chromium	0.201	mg/L	E200.8	0.000920	0.00200	0.2000	0	100	85 - 115				
Cobalt	0.203	mg/L	E200.8	0.000300	0.00400	0.2000	0	102	85 - 115				
Lead	0.205	mg/L	E200.8	0.000588	0.00200	0.2000	0	102	85 - 115				
Molybdenum	0.198	mg/L	E200.8	0.000884	0.00200	0.2000	0	99.2	85 - 115				
Selenium	0.204	mg/L	E200.8	0.000508	0.00200	0.2000	0	102	85 - 115				
Thallium	0.206	mg/L	E200.8	0.000418	0.00200	0.2000	0	103	85 - 115				
<b>Lab Sample ID: LCS-76283</b>													
Date Analyzed:		04/06/2021 853h											
Test Code:		200.8-W											
Antimony	0.191	mg/L	E200.8	0.000734	0.00400	0.2000	0	95.7	85 - 115				
<b>Lab Sample ID: LCS-76316</b>													
Date Analyzed:		04/05/2021 1247h											
Test Code:		HG-DW-245.1											
Mercury	0.00340	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	102	85 - 115				



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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** ME

**QC Type:** MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: MB-76284</b>													
Test Code:	200.7-W		Date Analyzed: 04/06/2021 1607h Date Prepared: 03/30/2021 1203h										
Boron	< 0.500	mg/L	E200.7	0.0449	0.500								
Calcium	< 1.00	mg/L	E200.7	0.170	1.00								
Lithium	< 0.100	mg/L	E200.7	0.0239	0.100								
<b>Lab Sample ID: MB-76283</b>													
Test Code:	200.8-W		Date Analyzed: 04/01/2021 1110h Date Prepared: 03/30/2021 1203h										
Arsenic	< 0.00200	mg/L	E200.8	0.000298	0.00200								
Barium	< 0.00200	mg/L	E200.8	0.000544	0.00200								
Beryllium	< 0.00200	mg/L	E200.8	0.000198	0.00200								
Cadmium	< 0.000500	mg/L	E200.8	0.0000742	0.000500								
Chromium	< 0.00200	mg/L	E200.8	0.000920	0.00200								
Cobalt	< 0.00400	mg/L	E200.8	0.000300	0.00400								
Lead	< 0.00200	mg/L	E200.8	0.000588	0.00200								
Molybdenum	< 0.00200	mg/L	E200.8	0.000884	0.00200								
Selenium	< 0.00200	mg/L	E200.8	0.000508	0.00200								
Thallium	< 0.00200	mg/L	E200.8	0.000418	0.00200								
<b>Lab Sample ID: MB-76283</b>													
Test Code:	200.8-W		Date Analyzed: 04/06/2021 850h Date Prepared: 03/30/2021 1203h										
Antimony	< 0.00400	mg/L	E200.8	0.000734	0.00400								
<b>Lab Sample ID: MB-76316</b>													
Test Code:	HG-DW-245.1		Date Analyzed: 04/05/2021 1245h Date Prepared: 03/31/2021 1210h										
Mercury	< 0.0000900	mg/L	E245.1	0.0000396	0.0000900								





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## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** ME

**QC Type:** MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 2103745-002BMS													
Date Analyzed:		04/06/2021 1622h											
Date Prepared:		03/30/2021 1203h											
Test Code:		200.7-W											
Calcium	482	mg/L	E200.7	1.70	10.0	10.00	491	-90.8	70 - 130				2
Lab Sample ID: 2103745-002BMS													
Date Analyzed:		04/06/2021 1813h											
Date Prepared:		03/30/2021 1203h											
Test Code:		200.7-W											
Boron	5.93	mg/L	E200.7	0.0449	0.500	1.000	4.77	116	70 - 130				
Lithium	2.59	mg/L	E200.7	0.0239	0.100	1.000	1.58	101	75 - 125				
Lab Sample ID: 2103745-002BMS													
Date Analyzed:		04/01/2021 1134h											
Date Prepared:		03/30/2021 1203h											
Test Code:		200.8-W											
Arsenic	0.238	mg/L	E200.8	0.000298	0.00200	0.2000	0.00041	119	75 - 125				
Barium	0.212	mg/L	E200.8	0.000544	0.00200	0.2000	0.0119	100	75 - 125				
Beryllium	0.207	mg/L	E200.8	0.000198	0.00200	0.2000	0	103	75 - 125				
Cadmium	0.201	mg/L	E200.8	0.0000742	0.000500	0.2000	0.000335	100	75 - 125				
Chromium	0.200	mg/L	E200.8	0.000920	0.00200	0.2000	0.000988	99.5	75 - 125				
Cobalt	0.201	mg/L	E200.8	0.000300	0.00400	0.2000	0.00594	97.3	75 - 125				
Lead	0.198	mg/L	E200.8	0.000588	0.00200	0.2000	0	98.9	75 - 125				
Molybdenum	0.227	mg/L	E200.8	0.000884	0.00200	0.2000	0.0021	112	75 - 125				
Selenium	0.224	mg/L	E200.8	0.000508	0.00200	0.2000	0.00144	111	75 - 125				
Thallium	0.194	mg/L	E200.8	0.000418	0.00200	0.2000	0.00064	96.8	75 - 125				
Lab Sample ID: 2103748-008DMS													
Date Analyzed:		04/01/2021 1235h											
Date Prepared:		03/30/2021 1203h											
Test Code:		200.8-W											
Arsenic	0.215	mg/L	E200.8	0.000298	0.00200	0.2000	0	108	75 - 125				
Barium	0.275	mg/L	E200.8	0.000544	0.00200	0.2000	0.0759	99.6	75 - 125				
Beryllium	0.220	mg/L	E200.8	0.000198	0.00200	0.2000	0	110	75 - 125				
Cadmium	0.200	mg/L	E200.8	0.0000742	0.000500	0.2000	0	99.9	75 - 125				
Chromium	0.201	mg/L	E200.8	0.000920	0.00200	0.2000	0	100	75 - 125				
Cobalt	0.202	mg/L	E200.8	0.000300	0.00400	0.2000	0	101	75 - 125				



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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** ME

**QC Type:** MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: 2103748-008DMS</b>													
Date Analyzed:		04/01/2021 1235h											
Date Prepared:		03/30/2021 1203h											
Lead	0.206	mg/L	E200.8	0.000588	0.00200	0.2000	0	103	75 - 125				
Molybdenum	0.208	mg/L	E200.8	0.000884	0.00200	0.2000	0	104	75 - 125				
Selenium	0.210	mg/L	E200.8	0.000508	0.00200	0.2000	0	105	75 - 125				
Thallium	0.209	mg/L	E200.8	0.000418	0.00200	0.2000	0	105	75 - 125				
<b>Lab Sample ID: 2103745-002BMS</b>													
Date Analyzed:		04/06/2021 904h											
Date Prepared:		03/30/2021 1203h											
Antimony	0.214	mg/L	E200.8	0.000734	0.00400	0.2000	0	107	75 - 125				
<b>Lab Sample ID: 2103745-001BMS</b>													
Date Analyzed:		04/05/2021 1258h											
Date Prepared:		03/31/2021 1210h											
Mercury	0.00330	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	99.0	80 - 120				

*2 - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.*



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QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** ME

**QC Type:** MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 2103745-002BMSD													
Test Code: 200.7-W	Date Analyzed:	04/06/2021 1625h											
	Date Prepared:	03/30/2021 1203h											
Calcium	512	mg/L	E200.7	1.70	10.0	10.00	491	207	70 - 130	482	5.98	20	2
Lab Sample ID: 2103745-002BMSD													
Test Code: 200.7-W	Date Analyzed:	04/06/2021 1816h											
	Date Prepared:	03/30/2021 1203h											
Boron	5.86	mg/L	E200.7	0.0449	0.500	1.000	4.77	110	70 - 130	5.93	1.14	20	
Lithium	2.56	mg/L	E200.7	0.0239	0.100	1.000	1.58	97.6	75 - 125	2.59	1.36	20	
Lab Sample ID: 2103745-002BMSD													
Test Code: 200.8-W	Date Analyzed:	04/01/2021 1138h											
	Date Prepared:	03/30/2021 1203h											
Arsenic	0.235	mg/L	E200.8	0.000298	0.00200	0.2000	0.00041	117	75 - 125	0.238	1.42	20	
Barium	0.208	mg/L	E200.8	0.000544	0.00200	0.2000	0.0119	97.8	75 - 125	0.212	2.14	20	
Beryllium	0.207	mg/L	E200.8	0.000198	0.00200	0.2000	0	103	75 - 125	0.207	0.0796	20	
Cadmium	0.198	mg/L	E200.8	0.0000742	0.000500	0.2000	0.000335	98.9	75 - 125	0.201	1.47	20	
Chromium	0.199	mg/L	E200.8	0.000920	0.00200	0.2000	0.000988	98.9	75 - 125	0.2	0.661	20	
Cobalt	0.200	mg/L	E200.8	0.000300	0.00400	0.2000	0.00594	97.3	75 - 125	0.201	0.0270	20	
Lead	0.195	mg/L	E200.8	0.000588	0.00200	0.2000	0	97.3	75 - 125	0.198	1.64	20	
Molybdenum	0.226	mg/L	E200.8	0.000884	0.00200	0.2000	0.0021	112	75 - 125	0.227	0.179	20	
Selenium	0.218	mg/L	E200.8	0.000508	0.00200	0.2000	0.00144	108	75 - 125	0.224	2.78	20	
Thallium	0.190	mg/L	E200.8	0.000418	0.00200	0.2000	0.00064	94.8	75 - 125	0.194	2.14	20	

Lab Sample ID: 2103748-008DMSD													
Date Analyzed:		04/01/2021 1239h											
Date Prepared:		03/30/2021 1203h											
Test Code:		200.8-W											
Arsenic	0.223	mg/L	E200.8	0.000298	0.00200	0.2000	0	111	75 - 125	0.215	3.45	20	
Barium	0.278	mg/L	E200.8	0.000544	0.00200	0.2000	0.0759	101	75 - 125	0.275	1.03	20	
Beryllium	0.222	mg/L	E200.8	0.000198	0.00200	0.2000	0	111	75 - 125	0.22	0.740	20	
Cadmium	0.201	mg/L	E200.8	0.0000742	0.000500	0.2000	0	101	75 - 125	0.2	0.771	20	
Chromium	0.207	mg/L	E200.8	0.000920	0.00200	0.2000	0	104	75 - 125	0.201	3.18	20	
Cobalt	0.207	mg/L	E200.8	0.000300	0.00400	0.2000	0	104	75 - 125	0.202	2.67	20	





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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** ME

**QC Type:** MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: 2103748-008DMSD</b>													
Test Code:	200.8-W												
Lead	0.209	mg/L	E200.8	0.000588	0.00200	0.2000	0	104	75 - 125	0.206	1.23	20	
Molybdenum	0.212	mg/L	E200.8	0.000884	0.00200	0.2000	0	106	75 - 125	0.208	1.94	20	
Selenium	0.214	mg/L	E200.8	0.000508	0.00200	0.2000	0	107	75 - 125	0.21	2.08	20	
Thallium	0.213	mg/L	E200.8	0.000418	0.00200	0.2000	0	106	75 - 125	0.209	1.55	20	
<b>Lab Sample ID: 2103745-002BMSD</b>													
Test Code:	200.8-W												
Antimony	0.216	mg/L	E200.8	0.000734	0.00400	0.2000	0	108	75 - 125	0.214	1.02	20	
<b>Lab Sample ID: 2103745-001BMSD</b>													
Test Code:	HG-DW-245.1												
Mercury	0.00336	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	101	80 - 120	0.0033	1.80	20	

*2 - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.*



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Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** WC

**QC Type:** DUP

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Date Analyzed: 03/26/2021 1503h													
Lab Sample ID: 2103748-004ADUP													
Test Code: PH-4500H+B													
pH @ 25° C	7.27	pH Units	SM4500-H+B	1.00	1.00					7.26	0.138	5	H
Date Analyzed: 03/26/2021 1503h													
Lab Sample ID: 2103745-003ADUP													
Test Code: PH-4500H+B													
pH @ 25° C	7.57	pH Units	SM4500-H+B	1.00	1.00					7.58	0.132	5	H
Date Analyzed: 03/29/2021 1300h													
Lab Sample ID: 2103745-001ADUP													
Test Code: TDS-W-2540C													
Total Dissolved Solids	11,800	mg/L	SM2540C	80.0	100					11700	0.850	5	
Date Analyzed: 03/29/2021 1300h													
Lab Sample ID: 2103748-009ADUP													
Test Code: TDS-W-2540C													
Total Dissolved Solids	216	mg/L	SM2540C	16.0	20.0					244	12.2	5	@

@ - High RPD due to suspected sample non-homogeneity or matrix interference.

H - Sample was received outside of the holding time.



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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** WC

**QC Type:** LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Date Analyzed: 04/04/2021 1742h													
Lab Sample ID: LCS-R150566													
Test Code: 300.0-W													
Chloride	5.42	mg/L	E300.0	0.0198	0.100	5.000	0	108	90 - 110				
Fluoride	5.41	mg/L	E300.0	0.00260	0.100	5.000	0	108	90 - 110				
Sulfate	5.41	mg/L	E300.0	0.0750	0.500	5.000	0	108	90 - 110				
Date Analyzed: 03/26/2021 1503h													
Lab Sample ID: LCS-R150175													
Test Code: PH-4500H+B													
pH @ 25° C	9.02	pH Units	SM4500-H+B	1.00	1.00	9.000	0	100	98 - 102				
Date Analyzed: 03/29/2021 1300h													
Lab Sample ID: LCS-R150278													
Test Code: TDS-W-2540C													
Total Dissolved Solids	186	mg/L	SM2540C	8.00	10.0	205.0	0	90.7	80 - 120				



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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** WC

**QC Type:** MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Date Analyzed: 04/04/2021 1714h													
Lab Sample ID: MB-R150566													
Test Code: 300.0-W													
Chloride	< 0.100	mg/L	E300.0	0.0198	0.100								
Fluoride	< 0.100	mg/L	E300.0	0.00260	0.100								
Sulfate	< 0.500	mg/L	E300.0	0.0750	0.500								
Date Analyzed: 03/29/2021 1300h													
Lab Sample ID: MB-R150278													
Test Code: TDS-W-2540C													
Total Dissolved Solids	< 10.0	mg/L	SM2540C	8.00	10.0								



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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** WC

**QC Type:** MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 2103745-004AMS													
Test Code: 300.0-W													
Date Analyzed: 04/04/2021 2001h													
Chloride	5,830	mg/L	E300.0	19.8	100	5,000	464	107	90 - 110				
Fluoride	5,340	mg/L	E300.0	2.60	100	5,000	2.16	107	90 - 110				
Sulfate	12,900	mg/L	E300.0	75.0	500	5,000	7470	108	90 - 110				





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Kyle F. Gross  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2103745

**Project:** Hunter Power Plant - CCR

**Contact:** Jeff Tucker

**Dept:** WC

**QC Type:** MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 2103745-004AMSD													
Test Code: 300.0-W													
Date Analyzed: 04/04/2021 2029h													
Chloride	5,850	mg/L	E300.0	19.8	100	5,000	464	108	90 - 110	5830	0.278	20	
Fluoride	5,350	mg/L	E300.0	2.60	100	5,000	2.16	107	90 - 110	5340	0.307	20	
Sulfate	12,900	mg/L	E300.0	75.0	500	5,000	7470	109	90 - 110	12900	0.611	20	

# American West Analytical Laboratories

Rpt Emailed: HC  
OL: GenericEDD QC

## WORK ORDER Summary

Client: PacifiCorp

Client ID: PAC900

Project: Hunter Power Plant - CCR

Comments:

QC2+, Include EDD. Footnote report. pH received outside of hold. RADS sent to ALS-Ft Collins. Cc dennis.vanderbeek@pacificorp.com and brad.giles@pacificorp.com.;

Work Order: 2103745

Due Date: 4/9/2021

Contact: Jeff Tucker

QC Level: II+

WO Type: Project

DB

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
2103745-001A	ELF-2	3/24/2021 1910h	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	1	DF-WC
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2103745-001B				200.7-W 3 SEL Analytes: B CA LI			DF-Metals
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2103745-001C				OUTSIDE LAB		2	ALS
2103745-002A	ELF-4	3/24/2021 1440h	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	1	DF-WC
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2103745-002B				200.7-W 3 SEL Analytes: B CA LI			DF-Metals
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2103745-002C				OUTSIDE LAB		2	ALS
2103745-003A	ELF-8	3/24/2021 1116h	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	1	DF-WC
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC

## Page 2 of 4

Due Date: 4/9/2021

[illegible]



# WORK ORDER Summary

Work Order: **2103745**

Page 3 of 4

Client: PacifiCorp

Due Date: 4/9/2021

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
2103745-006A	ELF-12	3/24/2021 1530h	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
2103745-006B				200.7-W 3 SEL Analytes: B CA LI		DF-Metals	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
2103745-006C				OUTSIDE LAB		ALS	2
2103745-007A	ELF-13	3/24/2021 1305h	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
				200.7-W 3 SEL Analytes: B CA LI		DF-Metals	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
2103745-007C				OUTSIDE LAB		ALS	2
2103745-008A	ELF-14	3/24/2021 1220h	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
				200.7-W 3 SEL Analytes: B CA LI		DF-Metals	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
2103745-008B				OUTSIDE LAB		ALS	2
				200.7-W 3 SEL Analytes: B CA LI		DF-Metals	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	

# WORK ORDER SUMMARY

Work Order: **2103745**

Page 4 of 4

Client: PacifiCorp

Due Date: 4/9/2021

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
2103745-008B	ELF-14	3/24/2021 1220h	3/26/2021 1225h	HG-DW-PR	Aqueous		DF-Metals
2103745-008C				OUTSIDE LAB		ALS	
2103745-009A	Duplicate (CCR)	3/24/2021	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4 PH-4500H-B	Aqueous		DF-WC
				TDS-W-2540C			DF-WC
2103745-009B				200.7-W 3 SEL Analytes: B CA LI			DF-Metals
				200.7-W-PR			DF-Metals
				200.8-W 11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2103745-009C				OUTSIDE LAB		ALS	
2103745-010A	Field Blank (CCR)	3/24/2021 1930h	3/26/2021 1225h	300.0-W 3 SEL Analytes: CL F SO4 PH-4500H-B	Aqueous		DF-WC
				TDS-W-2540C			DF-WC
				200.7-W 3 SEL Analytes: B CA LI			DF-Metals
				200.7-W-PR			DF-Metals
				200.8-W 11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2103745-010C				OUTSIDE LAB		ALS	

AWAL Use Only - One or more samples expired upon receipt:

Test Code  
PH-4500H-B

Printed: 03/31/21 10:11

LABORATORY CHECK: %M ☐ RT ☐ CN ☐ TAT ☐ QC ☐ LUO ☐

HOK ☐ HOK ☐ HOK ☐ COC Emailed ☐



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## CHAIN OF CUSTODY

All analysis will be conducted using NELAP accredited methods and all data will be reported using AWAL's standard analyte lists and reporting limits (PQL) unless specifically requested otherwise on this Chain of Custody and/or attached documentation.

QC Level:	Turn Around Time:	Rush fees received after 4:00 pm are considered received on the next business day.
2+	Standard	
<div>Report down to the MDL Include EDD: Lab Filter for: Metals Field Filtered For:</div> <div>For Compliance With: <input type="checkbox"/> NELAP <input type="checkbox"/> RCRA <input type="checkbox"/> CWA <input type="checkbox"/> SDWA <input type="checkbox"/> ELAP / A2LA <input type="checkbox"/> NLLAP <input type="checkbox"/> Non-Compliance <input type="checkbox"/> Other:</div> <div>Known Hazards &amp; Sample Comments</div>		
<div>COC Type Was: 1 Present on Outer Package? <input type="checkbox"/> Y <input type="checkbox"/> N 2 Unbroken on Outer Package? <input type="checkbox"/> Y <input type="checkbox"/> N 3 Present on Sample? <input type="checkbox"/> Y <input type="checkbox"/> N 4 Unbroken on Sample? <input type="checkbox"/> Y <input type="checkbox"/> N Samples Were: 1 Shipped hand delivered 2 Ambient or Cooled 3 Temperature 4 Received Intact 5 Properly Preserved 6 Received Within Holding Times pH and/or other parameters Sample Labels and COC Record Match?</div>		

Sample ID	Date Sampled	Time Sampled	# of Containers	Sample Matrix	TDS A2540C	pH A4500-H B	Chloride / Sulfate E300.0	Fluoride E300.0	Total Metals: Sb, As, Ba, Be, B, Br, Cd, Ca, Co, Cr, Cu, Pb, Li, Mo, Se, Ti, Hg, E2007 / E200.8 / E245.1	(separate & combined)	Special Instructions:
ELF-1D	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-2	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-3	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-4	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-5	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-6	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-7	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-8	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-9	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-10	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-11	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-12	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-13	3/24/21	19:10	4	W	X	X	X	X	X	X	
ELF-14	3/24/21	19:10	4	W	X	X	X	X	X	X	

Received by: Dennis Vanderbeek Date: 3-26-21 Time: 12:25  
Print Name: Dennis Vanderbeek Signature: [Signature]  
Received by: Dennis Vanderbeek Date: 3-26-21 Time: 12:25  
Print Name: Dennis Vanderbeek Signature: [Signature]  
Received by: Dennis Vanderbeek Date: 3-26-21 Time: 12:25  
Print Name: Dennis Vanderbeek Signature: [Signature]  
Received by: Dennis Vanderbeek Date: 3-26-21 Time: 12:25  
Print Name: Dennis Vanderbeek Signature: [Signature]

Special Instructions: CCR

By signing this Chain of Custody you are agreeing to permit AWAL to subcontract any analyses not normally performed at AWAL.



Lab Set ID: 2103745  
pH Lot #: 66612

## Preservation Check Sheet

[illegible]

- 1) Pour a small amount of sample in the sample lid
- 2) Pour sample from lid gently over wide range pH paper
- 3) **Do Not** dip the pH paper in the sample bottle or lid
- 4) If sample is not preserved, properly list its extension and receiving pH in the appropriate column above
- 5) Flag COC, notify client if requested
- 6) Place client conversation on COC
- 7) Samples may be adjusted

Frequency:

All samples requiring preservation

- \* The sample required additional preservative upon receipt.
- + The sample was received unpreserved.
- ▲ The sample was received unpreserved and therefore preserved upon receipt.
- # The sample pH was unadjustable to a  $\text{pH} < 2$  due to the sample matrix.
- The sample pH was unadjustable to a  $\text{pH} > \rule{1cm}{0.4pt}$  due to the sample matrix interference.



# Radium-226

## Case Narrative

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### **American West Analytical Labs**

#### **Hunter CCR Sampling -- 2103745**

Work Order Number: 2103613

1. This report consists of the analytical results and supporting documentation for ten water samples received by ALS on 3/31/2021.
2. These samples were prepared and analyzed according to the current revisions of SOP 783 and SOP 736. The analyses were completed on 4/22/2021.
3. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
4. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate.
5. Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for the laboratory control sample fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. This sample is identified with a "Y1" flag on the final reports.
6. ALS uses the following convention for reporting significant digits in the TPU and MDC results. The TPU value is rounded to two significant digits. The MDC value is rounded to the same decimal place as the TPU value. In practice, this could result in an MDC reported value of zero for samples with significant activity, including the batch laboratory control sample.
7. No further anomalous situations were encountered during the preparation or analysis of these samples. All remaining quality control criteria were met.



The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

  
\_\_\_\_\_  
Dakota Wylde  
Radiochemistry Primary Data Reviewer

4/26/21  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Radiochemistry Final Data Reviewer

4/28/21  
\_\_\_\_\_  
Date

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

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**OrderNum:** 2103613

**Client Name:** American West Analytical Labs

**Client Project Name:** Hunter CCR Sampling

**Client Project Number:** 2103745

**Client PO Number:** 2103745

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-2	2103613-1		WATER	24-Mar-21	19:10
ELF-4	2103613-2		WATER	24-Mar-21	14:40
ELF-8	2103613-3		WATER	24-Mar-21	11:16
ELF-9	2103613-4		WATER	24-Mar-21	18:10
ELF-11	2103613-5		WATER	24-Mar-21	10:36
ELF-12	2103613-6		WATER	24-Mar-21	15:30
ELF-13	2103613-7		WATER	24-Mar-21	13:05
ELF-14	2103613-8		WATER	24-Mar-21	12:20
Duplicate (CCR)	2103613-9		WATER	24-Mar-21	
Field Blank (CCR)	2103613-10		WATER	24-Mar-21	19:30







**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client: AWAL Workorder No: 2103613  
 Project Manager: KMO Initials: TEM Date: 3/31/21

	N/A	YES	NO
1. Are airbills / shipping documents present and/or removable? Tracking number: 1Z 9E7 258 03 9848 2693		x	
2. Are custody seals on <b>shipping</b> containers intact?	x		
3. Are custody seals on <b>sample</b> containers intact?	x		
4. Is there a COC (chain-of-custody) present?		x	
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		x	
6. Are short-hold samples present?			x
7. Are all samples within holding times for the requested analyses?		x	
8. Were all sample containers received intact? (not broken or leaking)		x	
9. Is there sufficient sample for the requested analyses?		x	
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )		x	
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		x	
12. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	x		
13. Were the samples shipped on ice?			x
14. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #5		x
Cooler #: <u>1</u> Temperature (°C): <u>amb</u> # of custody seals on cooler: <u>0</u> External µR/hr reading: <u>9</u> Background µR/hr reading: <u>11</u> Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES			

**\* Please provide details here for NO responses to boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.**

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Were unpreserved bottles pH checked? N/A All client bottle ID's vs ALS lab ID's double-checked by: TM

If applicable, was the client contacted? **YES / NO / NA** Contact: \_\_\_\_\_ Date/Time: \_\_\_\_\_

**Project Manager Signature / Date:**  4/01/21

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Lab ID: RE210402-1MB

Sample Matrix: WATER

Prep Batch: RE210402-1

Final Aliquot: 995 ml

Prep SOP: PAI 783 Rev 15

QCBatchID: RE210402-1-2

Result Units: pCi/l

Date Collected: 02-Apr-21

Run ID: RE210402-1A

File Name: Manual Entry

Date Prepared: 02-Apr-21

Count Time: 15 minutes

Date Analyzed: 22-Apr-21

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.09 +/- 0.11	0.16	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15920	15580	ug	97.8	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Lab ID: RE210402-1LCS

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 02-Apr-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Final Aliquot: 995 ml

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	45 +/- 11	0	46.79	96.0	67 - 120	P,Y1

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15920	16190	ug	102	40 - 110 %	Y1

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE2103613-1

Date Printed: Monday, April 26, 2021

ALS -- Fort Collins

LIMS Version: 7.015

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# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Lab ID: RE210402-1LCSD

Sample Matrix: WATER

Prep Batch: RE210402-1

Final Aliquot: 995 ml

Prep SOP: PAI 783 Rev 15

QCBatchID: RE210402-1-2

Result Units: pCi/l

Date Collected: 02-Apr-21

Run ID: RE210402-1A

File Name: Manual Entry

Date Prepared: 02-Apr-21

Count Time: 15 minutes

Date Analyzed: 22-Apr-21

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	38.9 +/- 9.7	0.2	46.79	83.2	67 - 120	P

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15920	15310	ug	96.1	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE2103613-1

Date Printed: Monday, April 26, 2021

ALS -- Fort Collins

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LIMS Version: 7.015

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID:		Sample Matrix: WATER	Prep Batch: RE210402-1	Final Aliquot: 995 ml
Lab ID:	RE210402-1LCSD	Prep SOP: PAI 783 Rev 15	QCBatchID: RE210402-1-2	Prep Basis: Unfiltered
		Date Collected: 02-Apr-21	Run ID: RE210402-1A	Moisture(%): NA
		Date Prepared: 02-Apr-21	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 22-Apr-21		File Name: Manual Entry

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
13982-63-3	Ra-226	45 +/-	11	0	P,Y1	45 +/-	11	0.2	P	0.406	2.13

### Comments:

#### Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2.13

LT - Result is less than Request MDC, greater than sample specific MDC

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

#### Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-2  
Lab ID: 2103613-1

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 24-Mar-21  
Date Prepared: 02-Apr-21  
Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1  
QCBatchID: RE210402-1-2  
Run ID: RE210402-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.07 +/- 0.15	0.26	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15930	15430	ug	96.8	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-4  
Lab ID: 2103613-2

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 24-Mar-21  
Date Prepared: 02-Apr-21  
Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1  
QCBatchID: RE210402-1-2  
Run ID: RE210402-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.32 +/- 0.20	0.19	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15940	14090	ug	88.4	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1



# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-8  
Lab ID: 2103613-3

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 24-Mar-21  
Date Prepared: 02-Apr-21  
Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1  
QCBatchID: RE210402-1-2  
Run ID: RE210402-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.70 +/- 0.28	0.17	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15940	15890	ug	99.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-9  
Lab ID: 2103613-4

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 24-Mar-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.26 +/- 0.18	0.22	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15940	14590	ug	91.5	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-11

Lab ID: 2103613-5

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 24-Mar-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.24 +/- 0.19	0.20	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15950	11750	ug	73.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-12

Lab ID: 2103613-6

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 24-Mar-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.70 +/- 0.42	0.40	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15930	10090	ug	63.3	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-13

Lab ID: 2103613-7

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 24-Mar-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.33 +/- 0.20	0.22	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15930	14830	ug	93.1	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-14

Lab ID: 2103613-8

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 24-Mar-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.19 +/- 0.23	0.35	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15940	11950	ug	75.0	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: Duplicate (CCR)

Lab ID: 2103613-9

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 24-Mar-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.33 +/- 0.21	0.26	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15930	15200	ug	95.4	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS – Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: Field Blank (CCR)

Lab ID: 2103613-10

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 24-Mar-21

Date Prepared: 02-Apr-21

Date Analyzed: 22-Apr-21

Prep Batch: RE210402-1

QCBatchID: RE210402-1-2

Run ID: RE210402-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.033 +/- 0.081	0.152	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15920	15780	ug	99.1	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2103613-1





# Radium-228

## Case Narrative

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### **American West Analytical Labs**

#### **Hunter CCR Sampling -- 2103745**

Work Order Number: 2103613

1. This report consists of the analytical results for ten water samples received by ALS on 03/31/2021.
2. These samples were prepared according to the current revision of SOP 749.
3. The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724. The analyses were completed on 04/26/2021.
4. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
5. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate.
6. Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for RA210421-2MB and -2LCS fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. These samples are identified with a "Y1" flag on the final reports.
7. No further anomalous situations were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.



The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Jean Anderson  
Jean Anderson  
Radiochemistry Primary Data Reviewer

4/27/21  
Date

[Signature]  
Radiochemistry Final Data Reviewer

4/28/21  
Date

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

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**OrderNum:** 2103613

**Client Name:** American West Analytical Labs

**Client Project Name:** Hunter CCR Sampling

**Client Project Number:** 2103745

**Client PO Number:** 2103745

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-2	2103613-1		WATER	24-Mar-21	19:10
ELF-4	2103613-2		WATER	24-Mar-21	14:40
ELF-8	2103613-3		WATER	24-Mar-21	11:16
ELF-9	2103613-4		WATER	24-Mar-21	18:10
ELF-11	2103613-5		WATER	24-Mar-21	10:36
ELF-12	2103613-6		WATER	24-Mar-21	15:30
ELF-13	2103613-7		WATER	24-Mar-21	13:05
ELF-14	2103613-8		WATER	24-Mar-21	12:20
Duplicate (CCR)	2103613-9		WATER	24-Mar-21	
Field Blank (CCR)	2103613-10		WATER	24-Mar-21	19:30





**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client: AWAL Workorder No: 2103613  
 Project Manager: KMO Initials: TEM Date: 3/31/21

	N/A	YES	NO
1. Are airbills / shipping documents present and/or removable? Tracking number: 1Z 9E7 258 03 9848 2693		x	
2. Are custody seals on <b>shipping</b> containers intact?	x		
3. Are custody seals on <b>sample</b> containers intact?	x		
4. Is there a COC (chain-of-custody) present?		x	
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		x	
6. Are short-hold samples present?			x
7. Are all samples within holding times for the requested analyses?		x	
8. Were all sample containers received intact? (not broken or leaking)		x	
9. Is there sufficient sample for the requested analyses?		x	
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )		x	
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		x	
12. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	x		
13. Were the samples shipped on ice?			x
14. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #5		x
Cooler #: <u>1</u> Temperature (°C): <u>amb</u> # of custody seals on cooler: <u>0</u> External µR/hr reading: <u>9</u> Background µR/hr reading: <u>11</u> Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES			

**\* Please provide details here for NO responses to boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.**

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Were unpreserved bottles pH checked? N/A All client bottle ID's vs ALS lab ID's double-checked by: TM

If applicable, was the client contacted? **YES / NO / NA** Contact: \_\_\_\_\_ Date/Time: \_\_\_\_\_

**Project Manager Signature / Date:**  4/01/21

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Lab ID: RA210421-2MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 21-Apr-21

Date Prepared: 21-Apr-21

Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2

QCBatchID: RA210421-2-2

Run ID: RA210421-2A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAA0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	0.58 +/- 0.40	0.78	1	NA	Y1,U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31560	32380	ug	103	40 - 110 %	Y1

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Data Package ID: RA2103613-1

Date Printed: Tuesday, April 27, 2021

ALS -- Fort Collins

LIMS Version: 7.015

Page 1 of 1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Lab ID: RA210421-2LCS

Sample Matrix: WATER

Prep Batch: RA210421-2

Final Aliquot: 997 ml

Prep SOP: SOP749 Rev 7

QCBatchID: RA210421-2-2

Result Units: pCi/l

Date Collected: 21-Apr-21

Run ID: RA210421-2A

File Name: RAA0426

Date Prepared: 21-Apr-21

Count Time: 150 minutes

Date Analyzed: 26-Apr-21

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	24.0 +/- 5.6	0.8	22.11	109	70 - 130	P,Y1

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31560	31830	ug	101	40 - 110 %	Y1

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Lab ID: RA210421-2LCSD

Sample Matrix: WATER

Prep Batch: RA210421-2

Final Aliquot: 997 ml

Prep SOP: SOP749 Rev 7

QCBatchID: RA210421-2-2

Result Units: pCi/l

Date Collected: 21-Apr-21

Run ID: RA210421-2A

File Name: RAA0426

Date Prepared: 21-Apr-21

Count Time: 150 minutes

Date Analyzed: 26-Apr-21

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	23.9 +/- 5.6	0.9	22.11	108	70 - 130	P

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31560	29370	ug	93.1	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA2103613-1

Date Printed: Tuesday, April 27, 2021

ALS -- Fort Collins

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LIMS Version: 7.015



# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID:	
Lab ID:	RA210421-2LCSD

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 21-Apr-21  
Date Prepared: 21-Apr-21  
Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2  
QCBatchID: RA210421-2-2  
Run ID: RA210421-2A  
Count Time: 150 minutes

Final Aliquot: 997 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAA0426

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	24.0 +/-	5.6	0.8	P,Y1	24.0 +/-	5.6	0.9	P	0.0198	2.13

### Comments:

#### Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.  
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.  
Y2 - Chemical Yield outside default limits.  
W - DER is greater than Warning Limit of 1.42  
D - DER is greater than Control Limit of 2.13  
LT - Result is less than Request MDC, greater than sample specific MDC  
M - Requested MDC not met.  
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.  
L - LCS Recovery below lower control limit.  
H - LCS Recovery above upper control limit.  
P - LCS, Matrix Spike Recovery within control limits.  
N - Matrix Spike Recovery outside control limits

#### Abbreviations:

TPU - Total Propagated Uncertainty  
DER - Duplicate Error Ratio  
BDL - Below Detection Limit  
NR - Not Reported

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-2  
Lab ID: 2103613-1

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 24-Mar-21  
Date Prepared: 21-Apr-21  
Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2  
QCBatchID: RA210421-2-2  
Run ID: RA210421-2A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 997 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.63	0.75	1	NA	
15262-20-1	Ra-228	1.63 +/- 0.56	0.75	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31570	29540	ug	93.6	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-4  
Lab ID: 2103613-2

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 24-Mar-21  
Date Prepared: 21-Apr-21  
Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2  
QCBatchID: RA210421-2-2  
Run ID: RA210421-2A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 997 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.17	0.75	1	NA	
15262-20-1	Ra-228	1.85 +/- 0.61	0.75	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31570	30290	ug	95.9	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-8  
Lab ID: 2103613-3

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 24-Mar-21  
Date Prepared: 21-Apr-21  
Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2  
QCBatchID: RA210421-2-2  
Run ID: RA210421-2A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 997 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.74	0.71	1	NA	
15262-20-1	Ra-228	2.04 +/- 0.63	0.71	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31570	30240	ug	95.8	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-9  
Lab ID: 2103613-4

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 24-Mar-21  
Date Prepared: 21-Apr-21  
Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2  
QCBatchID: RA210421-2-2  
Run ID: RA210421-2A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 997 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.26	0.79	1	NA	
15262-20-1	Ra-228	2.00 +/- 0.65	0.79	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31570	27680	ug	87.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-11

Lab ID: 2103613-5

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 24-Mar-21

Date Prepared: 21-Apr-21

Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2

QCBatchID: RA210421-2-2

Run ID: RA210421-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	3.32	0.81	1	NA	
15262-20-1	Ra-228	3.08 +/- 0.87	0.81	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31580	29090	ug	92.1	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-12  
Lab ID: 2103613-6

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 24-Mar-21  
Date Prepared: 21-Apr-21  
Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2  
QCBatchID: RA210421-2-2  
Run ID: RA210421-2A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 997 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	4.26	0.79	1	NA	
15262-20-1	Ra-228	3.56 +/- 0.97	0.79	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31570	29630	ug	93.9	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-13

Lab ID: 2103613-7

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 24-Mar-21

Date Prepared: 21-Apr-21

Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2

QCBatchID: RA210421-2-2

Run ID: RA210421-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.72	0.75	1	NA	
15262-20-1	Ra-228	2.39 +/- 0.71	0.75	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31570	29890	ug	94.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1



# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: ELF-14

Lab ID: 2103613-8

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 24-Mar-21

Date Prepared: 21-Apr-21

Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2

QCBatchID: RA210421-2-2

Run ID: RA210421-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.34	0.77	1	NA	
15262-20-1	Ra-228	2.34 +/- 0.71	0.77	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31580	29900	ug	94.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: Duplicate (CCR)

Lab ID: 2103613-9

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 24-Mar-21

Date Prepared: 21-Apr-21

Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2

QCBatchID: RA210421-2-2

Run ID: RA210421-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.72	0.75	1	NA	
15262-20-1	Ra-228	2.39 +/- 0.71	0.75	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31570	30740	ug	97.4	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2103613

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2103745

Field ID: Field Blank (CCR)

Lab ID: 2103613-10

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 24-Mar-21

Date Prepared: 21-Apr-21

Date Analyzed: 26-Apr-21

Prep Batch: RA210421-2

QCBatchID: RA210421-2-2

Run ID: RA210421-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0426

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	0	0.77	1	NA	U
15262-20-1	Ra-228	0.76 +/- 0.42	0.77	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31560	31290	ug	99.1	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2103613-1

**ATTACHMENT B:**

Field Summary Report – October 2021 Event

**Facility Name:** Hunter Power Plant – CCR Landfill  
**Event Description:** Assessment Monitoring  
**Event Dates:** October 25-26, 2021  
**Field Personnel:** Dennis Vanderbeek

**ACTIVITY SUMMARY.** PacifiCorp personnel arrived onsite October 25, 2021 and performed groundwater sampling at Hunter CCR Landfill. Prior to collecting samples, field instruments were calibrated, followed by the collection of water levels in the CCR monitoring wells. After recording water levels, the wells were purged in accordance with the EPA low-flow method. Field parameters were monitored during well purging in accordance with the site-specific sampling and analysis plan (SAP). Once field parameters met the SAP stabilization requirements, groundwater samples were collected for Appendix III and Appendix IV constituents. All calibration data and field measurements were recorded on the WET electronic field form. The wells that underwent sampling during this sampling event included:

- ELF-10
- ELF-11
- ELF-12
- ELF-13
- ELF-14
- ELF-1D
- ELF-2
- ELF-3
- ELF-4
- ELF-5
- ELF-6
- ELF-7
- ELF-8
- ELF-9

The following details dates for conducting field work and post-field work data processing:

- Date fieldwork completed: 10/26/2021
- Dates unvalidated lab data received: 12/20/2021
- Data validation completion date: 01/12/2022

After collection, the samples were preserved in accordance with the SAP, placed on ice, chain of custody forms were completed, and the samples were transported to American West Analytical Laboratories (AWAL) in Salt Lake City, Utah for analysis. Samples arrived at AWAL on 10/28/2021. AWAL subcontracted Radium analyses to ALS Global in Fort Collins, Colorado. Samples arrived at ALS on 11/01/2021. The following information is attached to this summary as a supplement:

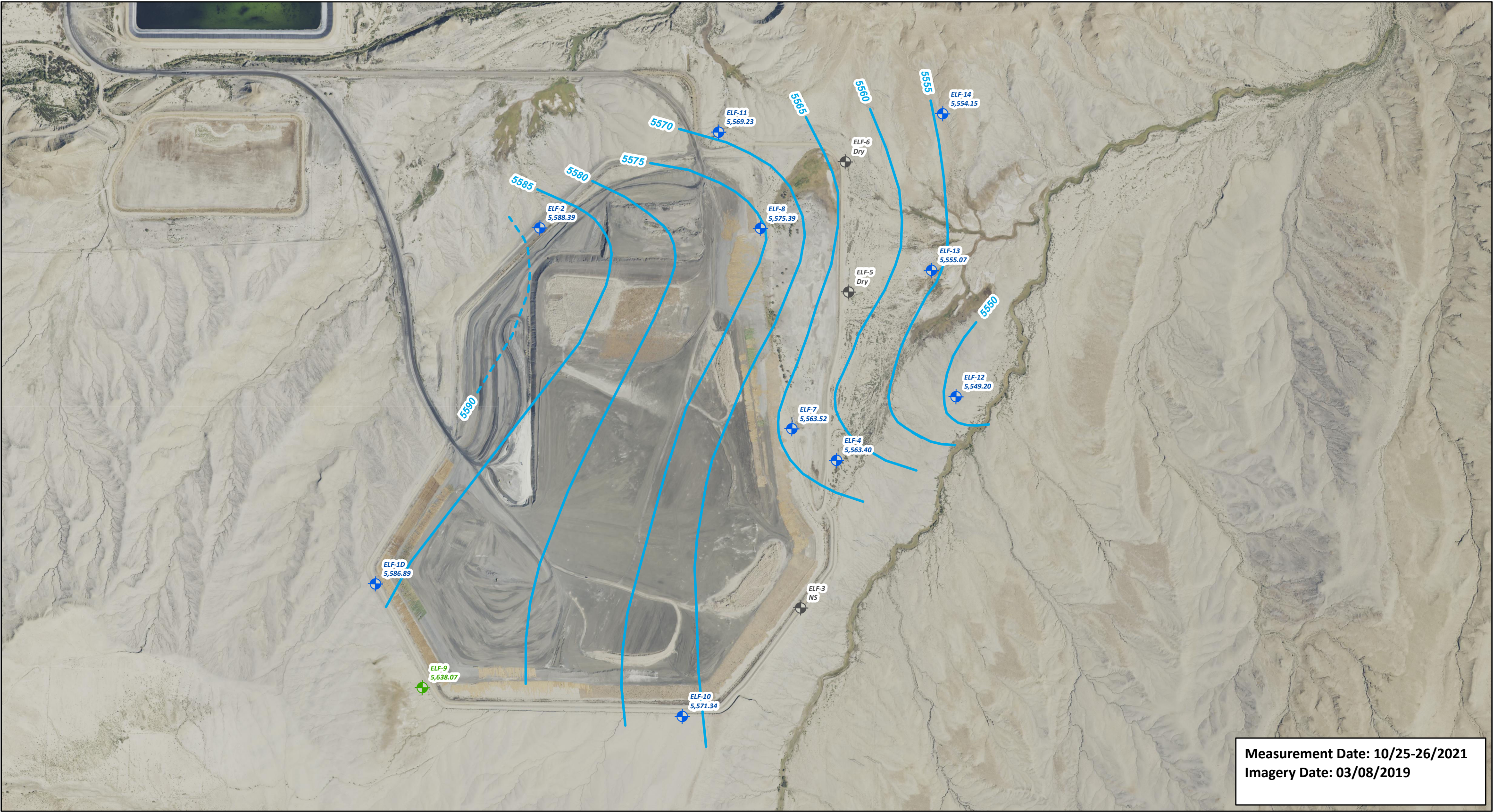
- Attachment A: Groundwater Contour Map
- Attachment B: Data Validation Summary
- Attachment C: Statistical Analysis
- Attachment D: Field Data Sheets
- Attachment E: Laboratory Analytical Reports

**SAP DEVIATIONS.** Wells ELF-3, ELF-5, and ELF-6 did not have enough water to sample.

**Attachment A:**

Groundwater Contour Map





Measurement Date: 10/25-26/2021  
Imagery Date: 03/08/2019

ELF-1D = Well ID  
5,586.89 = Water Level Elevation (Ft.)

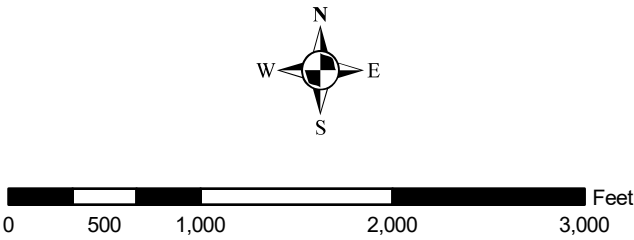
CCR Monitoring Well

CCR Monitoring Well - Dry/Not Sampled (NS)

CCR Monitoring Well - Water Quality Only

Groundwater Elevation Contour (Contour Interval = 5 ft.)

Inferred Groundwater Elevation Contour (Contour Interval = 5 ft.)



<b>HUNTER POWER PLANT</b>	
<i><b>Groundwater Elevation Map CCR Landfill</b></i>	
Job#: PERCM052	<b>Attachment A</b>
Date: 1/13/2022	
Path: M:\PERC\PERC_CCR\GIS\2021_CCR_Sampling\Hunter\GIS\Fall\Hunter_PERC_Fall_GWE.aprx, Author: jhulla	



**Attachment B:**

Data Validation Summary



**DATA VALIDATION SUMMARY  
CCR COMPLIANCE SAMPLING**

<b>Facility Name:</b>	Hunter Power Plant	
<b>Validator:</b>	Janelle Garza (1/12/2021)	
<b>Reviewer:</b>	Marcus Holland (1/12/2022)	
<b>Laboratory:</b>	American West Analytical Laboratories (AWAL); Salt Lake City, UT ALS Laboratories; Fort Collins, CO	
<b>Laboratory Work Order#:</b>	AWAL: 2110765 ALS: 2111019	
<b>Sample IDs:</b>	ELF-1D, ELF-2, ELF-4, Field Blank, ELF-7, ELF-8, ELF-9, ELF-10, ELF-11, ELF-12, ELF-13, ELF-14, Duplicate	
<b>Collection Dates:</b>	October 25-26, 2021	
<b>Sample Media:</b>	Aqueous	
<b>Analytical Parameters:</b>	<b>AWAL:</b> <u>Major Ions</u> <ul style="list-style-type: none"> <li>Chloride and Sulfate by E300.0</li> <li>Fluoride by A4500-F C</li> <li>Calcium (Ca) by E200.7</li> </ul> <u>Physical Properties</u> <ul style="list-style-type: none"> <li>pH and pH Measurement Temp by A4500-H B</li> <li>Total Dissolved Solids (TDS) (@ 180 C) by A2540 C</li> </ul> <u>Total Metals by E200.7/8</u> <ul style="list-style-type: none"> <li>Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Boron (B), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Lead (Pb), Lithium (Li), Molybdenum (Mo), Selenium (Se), Thallium (Tl)</li> </ul> <u>Total Mercury (Hg) by E245.1</u> <b>ALS:</b> <u>Total Radionuclides</u> <ul style="list-style-type: none"> <li>Radium 226</li> <li>Radium 228</li> <li>Radium 226 + Radium 228</li> </ul>	
<b>Review Element:</b>	<b>Complete / Criteria Met? (Yes/No)</b>	<b>If no, describe:</b>
<b>Chain of Custody:</b>	No	COC date and time for Field Blank was 1/10/1900 at 12:00. The container dates and times were 10/26/2021 11:50. The container dates and times were used.
<b>Field Documentation:</b>	Yes	
<b>Holding Times &amp; Sample Preservation:</b>	No	<p>pH in all samples was analyzed past the 15-minute holding time. However, lab pH was compared to final stabilized field pH. If the lab pH was within +/-0.10 of the final stabilized field pH, then the lab pH was considered acceptable.</p> <ul style="list-style-type: none"> <li>❖ Sample Field Blank, consistent of deionized (DI) water, was within an acceptable pH range of 5.5 to 7.0; therefore, no qualification was required.</li> <li>❖ All remaining samples were qualified as estimated high, J+.</li> </ul>
<b>Calibrations:</b>	Yes	

**DATA VALIDATION SUMMARY  
CCR COMPLIANCE SAMPLING**

<b>Blanks:</b>	No	<p><u>Field:</u> Sample Field Blank: representing all samples.</p> <ul style="list-style-type: none"> <li>❖ Chloride was detected at 0.104 mg/L, above the RL of 0.100 mg/L. <ul style="list-style-type: none"> <li>➤ Samples ELF-2, ELF-9, and ELF-12 were qualified as estimated high, J+, due to results <math>\geq</math>RL but <math>&lt;10\times</math> FB value and should be reported at the FB result (104 mg/L).</li> <li>➤ No qualification was required for all remaining samples due to results <math>\geq 10\times</math> FB value.</li> </ul> </li> <li>❖ TDS was detected at 1,800 mg/L, above the RL of 500 mg/L. <ul style="list-style-type: none"> <li>➤ Sample ELF-11 was qualified as estimated high, J+, due to results <math>\geq</math>RL but <math>&lt;10\times</math> FB value and should be reported at the FB result (1,800 mg/L).</li> <li>➤ No qualification was required for all remaining samples due to results <math>\geq 10\times</math> FB value.</li> </ul> </li> </ul>
<b>Laboratory Control Sample:</b>	Yes	
<b>Duplicate Samples:</b>	No	<p><u>Field</u> ELF-14 (original) and Duplicate (duplicate): representing all samples.</p> <ul style="list-style-type: none"> <li>❖ Radium 226 RPD was 90.9%, above the limit of 20%. The mean difference was 0.93, below the limit of 3. Therefore, no qualification is required.</li> <li>❖ Radium 228 RPD was 20.4%, above the limit of 20%. The mean difference was 0.37, below the limit of 3. Therefore, no qualification is required.</li> </ul>
<b>Matrix Spike (MS):</b>	Yes	<p>Lab IDs 2110765-002CMS (Sample ID ELF-2) and 2110765-003CMS (Sample ID ELF-4), Method 200.7:</p> <ul style="list-style-type: none"> <li>❖ Calcium was recovered both below and above the control limits of 70-130%: 34.5% with ELF-2 and 270% and 192% with ELF-4. The sample concentrations were <math>&gt;4\times</math> spike added; therefore, no qualification was required.</li> </ul> <p>Lab ID 2110765-001CMS (Sample ID ELF-1D), Method 245.1:</p> <ul style="list-style-type: none"> <li>❖ Mercury was recovered at 74.4% and 72.4%, below the limits of 80-120%. <ul style="list-style-type: none"> <li>➤ Sample Field Blank, consistent of DI water, was not evaluated due to the potential matrix interference between DI water and aqueous groundwater.</li> <li>➤ All remaining samples were qualified as estimated non-detect, UJ.</li> </ul> </li> </ul> <p>Lab ID 2110611-029 (unassociated work order sample), Method 300.0:</p>

**DATA VALIDATION SUMMARY  
CCR COMPLIANCE SAMPLING**

		<ul style="list-style-type: none"> <li>❖ Sulfate was recovered at 83.2% and 80.8%, below the limits of 90-110%. <ul style="list-style-type: none"> <li>➤ Sample Field Blank, consistent of DI water, was not evaluated due to the potential matrix interference between DI water and aqueous groundwater.</li> <li>➤ All remaining samples were qualified as estimated low, J-.</li> </ul> </li> </ul>
<b>Other:</b>	Yes	Sample ELF-1D arrived with only 200 mL of sample for radionuclide analyses.
<b>Overall Assessment:</b>		
<p>Out of 299 total data points, 259 data points (86.6%) remain unqualified, or were qualified as non-detect (U), and are considered quantitative. The remaining 40 data points (13.4%) were qualified as estimated due to holding time exceedance (pH), field blank contamination, and poor laboratory accuracy, and are assigned as qualitative. No data points were rejected; therefore, this work order is 100% complete and useable.</p>		

**Attachment C:**  
Statistical Analysis

**Facility Name:** Hunter Power Plant – CCR Landfill  
**Event Description:** Assessment Monitoring  
**Event Dates:** October 25-26, 2021  
**Field Personnel:** Dennis Vanderbeek

**ACTIVITY SUMMARY.** PacifiCorp personnel arrived onsite October 25, 2021 and performed groundwater sampling at Hunter CCR Landfill. Prior to collecting samples, field instruments were calibrated, followed by the collection of water levels in the CCR monitoring wells. After recording water levels, the wells were purged in accordance with the EPA low-flow method. Field parameters were monitored during well purging in accordance with the site-specific sampling and analysis plan (SAP). Once field parameters met the SAP stabilization requirements, groundwater samples were collected for Appendix III and Appendix IV constituents. All calibration data and field measurements were recorded on the WET electronic field form. The wells that underwent sampling during this sampling event included:

- ELF-10
- ELF-11
- ELF-12
- ELF-13
- ELF-14
- ELF-1D
- ELF-2
- ELF-3
- ELF-4
- ELF-5
- ELF-6
- ELF-7
- ELF-8
- ELF-9

The following details dates for conducting field work and post-field work data processing:

- Date fieldwork completed: 10/26/2021
- Dates unvalidated lab data received: 12/20/2021
- Data validation completion date: 01/12/2022

After collection, the samples were preserved in accordance with the SAP, placed on ice, chain of custody forms were completed, and the samples were transported to American West Analytical Laboratories (AWAL) in Salt Lake City, Utah for analysis. Samples arrived at AWAL on 10/28/2021. AWAL subcontracted Radium analyses to ALS Global in Fort Collins, Colorado. Samples arrived at ALS on 11/01/2021. The following information is attached to this summary as a supplement:

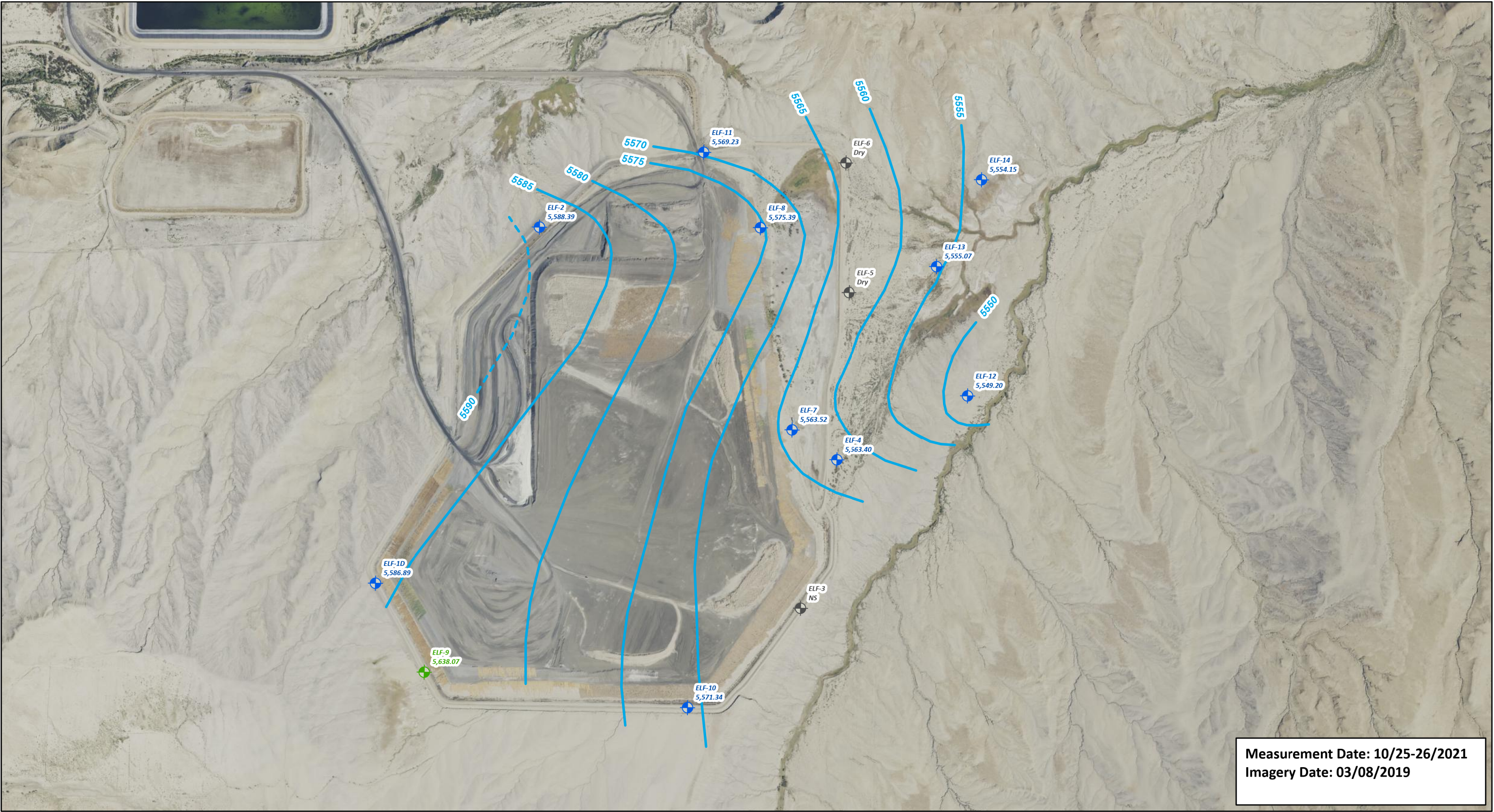
- Attachment A: Groundwater Contour Map
- Attachment B: Data Validation Summary
- Attachment C: Statistical Analysis
- Attachment D: Field Data Sheets
- Attachment E: Laboratory Analytical Reports

**SAP DEVIATIONS.** Wells ELF-3, ELF-5, and ELF-6 did not have enough water to sample.

**Attachment A:**

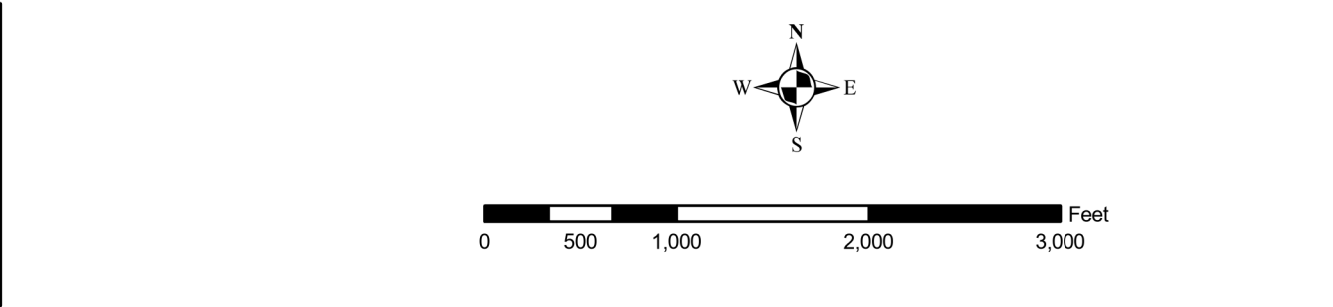
Groundwater Contour Map





ELF-1D = Well ID  
5,586.89 = Water Level Elevation (Ft.)

- CCR Monitoring Well
- CCR Monitoring Well - Dry/Not Sampled (NS)
- CCR Monitoring Well - Water Quality Only
- Groundwater Elevation Contour (Contour Interval = 5 ft.)
- Inferred Groundwater Elevation Contour (Contour Interval = 5 ft.)



<b>HUNTER POWER PLANT</b>	
<b>Groundwater Elevation Map CCR Landfill</b>	
Job#: PERCM052	<b>Attachment A</b>
Date: 1/26/2022	
Path: M:\PERC\PERC_CCR\GIS\2021_CCR_Sampling\Hunter\GIS\Fall\Hunter_PERC_Fall_GWE.aprx, Author: jleprosse	



**Attachment B:**

Data Validation Summary



**DATA VALIDATION SUMMARY  
CCR COMPLIANCE SAMPLING**

<b>Facility Name:</b>	Hunter Power Plant	
<b>Validator:</b>	Janelle Garza (1/12/2021)	
<b>Reviewer:</b>	Marcus Holland (1/12/2022)	
<b>Laboratory:</b>	American West Analytical Laboratories (AWAL); Salt Lake City, UT ALS Laboratories; Fort Collins, CO	
<b>Laboratory Work Order#:</b>	AWAL: 2110765 ALS: 2111019	
<b>Sample IDs:</b>	ELF-1D, ELF-2, ELF-4, Field Blank, ELF-7, ELF-8, ELF-9, ELF-10, ELF-11, ELF-12, ELF-13, ELF-14, Duplicate	
<b>Collection Dates:</b>	October 25-26, 2021	
<b>Sample Media:</b>	Aqueous	
<b>Analytical Parameters:</b>	<b>AWAL:</b> <u>Major Ions</u> <ul style="list-style-type: none"> <li>Chloride and Sulfate by E300.0</li> <li>Fluoride by A4500-F C</li> <li>Calcium (Ca) by E200.7</li> </ul> <u>Physical Properties</u> <ul style="list-style-type: none"> <li>pH and pH Measurement Temp by A4500-H B</li> <li>Total Dissolved Solids (TDS) (@ 180 C) by A2540 C</li> </ul> <u>Total Metals by E200.7/8</u> <ul style="list-style-type: none"> <li>Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Boron (B), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Lead (Pb), Lithium (Li), Molybdenum (Mo), Selenium (Se), Thallium (Tl)</li> </ul> <u>Total Mercury (Hg) by E245.1</u> <b>ALS:</b> <u>Total Radionuclides</u> <ul style="list-style-type: none"> <li>Radium 226</li> <li>Radium 228</li> <li>Radium 226 + Radium 228</li> </ul>	
<b>Review Element:</b>	<b>Complete / Criteria Met? (Yes/No)</b>	<b>If no, describe:</b>
<b>Chain of Custody:</b>	No	COC date and time for Field Blank was 1/10/1900 at 12:00. The container dates and times were 10/26/2021 11:50. The container dates and times were used.
<b>Field Documentation:</b>	Yes	
<b>Holding Times &amp; Sample Preservation:</b>	No	<p>pH in all samples was analyzed past the 15-minute holding time. However, lab pH was compared to final stabilized field pH. If the lab pH was within +/-0.10 of the final stabilized field pH, then the lab pH was considered acceptable.</p> <ul style="list-style-type: none"> <li>❖ Sample Field Blank, consistent of deionized (DI) water, was within an acceptable pH range of 5.5 to 7.0; therefore, no qualification was required.</li> <li>❖ All remaining samples were qualified as estimated high, J+.</li> </ul>
<b>Calibrations:</b>	Yes	

**DATA VALIDATION SUMMARY  
CCR COMPLIANCE SAMPLING**

<b>Blanks:</b>	No	<p><u>Field:</u> Sample Field Blank: representing all samples.</p> <ul style="list-style-type: none"> <li>❖ Chloride was detected at 0.104 mg/L, above the RL of 0.100 mg/L. <ul style="list-style-type: none"> <li>➤ Samples ELF-2, ELF-9, and ELF-12 were qualified as estimated high, J+, due to results <math>\geq</math>RL but <math>&lt;10\times</math> FB value and should be reported at the FB result (104 mg/L).</li> <li>➤ No qualification was required for all remaining samples due to results <math>\geq 10\times</math> FB value.</li> </ul> </li> <li>❖ TDS was detected at 1,800 mg/L, above the RL of 500 mg/L. <ul style="list-style-type: none"> <li>➤ Sample ELF-11 was qualified as estimated high, J+, due to results <math>\geq</math>RL but <math>&lt;10\times</math> FB value and should be reported at the FB result (1,800 mg/L).</li> <li>➤ No qualification was required for all remaining samples due to results <math>\geq 10\times</math> FB value.</li> </ul> </li> </ul>
<b>Laboratory Control Sample:</b>	Yes	
<b>Duplicate Samples:</b>	No	<p><u>Field</u> ELF-14 (original) and Duplicate (duplicate): representing all samples.</p> <ul style="list-style-type: none"> <li>❖ Radium 226 RPD was 90.9%, above the limit of 20%. The mean difference was 0.93, below the limit of 3. Therefore, no qualification is required.</li> <li>❖ Radium 228 RPD was 20.4%, above the limit of 20%. The mean difference was 0.37, below the limit of 3. Therefore, no qualification is required.</li> </ul>
<b>Matrix Spike (MS):</b>	Yes	<p>Lab IDs 2110765-002CMS (Sample ID ELF-2) and 2110765-003CMS (Sample ID ELF-4), Method 200.7:</p> <ul style="list-style-type: none"> <li>❖ Calcium was recovered both below and above the control limits of 70-130%: 34.5% with ELF-2 and 270% and 192% with ELF-4. The sample concentrations were <math>&gt;4\times</math> spike added; therefore, no qualification was required.</li> </ul> <p>Lab ID 2110765-001CMS (Sample ID ELF-1D), Method 245.1:</p> <ul style="list-style-type: none"> <li>❖ Mercury was recovered at 74.4% and 72.4%, below the limits of 80-120%. <ul style="list-style-type: none"> <li>➤ Sample Field Blank, consistent of DI water, was not evaluated due to the potential matrix interference between DI water and aqueous groundwater.</li> <li>➤ All remaining samples were qualified as estimated non-detect, UJ.</li> </ul> </li> </ul> <p>Lab ID 2110611-029 (unassociated work order sample), Method 300.0:</p>

**DATA VALIDATION SUMMARY  
CCR COMPLIANCE SAMPLING**

		<ul style="list-style-type: none"> <li>❖ Sulfate was recovered at 83.2% and 80.8%, below the limits of 90-110%. <ul style="list-style-type: none"> <li>➤ Sample Field Blank, consistent of DI water, was not evaluated due to the potential matrix interference between DI water and aqueous groundwater.</li> <li>➤ All remaining samples were qualified as estimated low, J-.</li> </ul> </li> </ul>
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<b>Overall Assessment:</b>		
<p>Out of 299 total data points, 259 data points (86.6%) remain unqualified, or were qualified as non-detect (U), and are considered quantitative. The remaining 40 data points (13.4%) were qualified as estimated due to holding time exceedance (pH), field blank contamination, and poor laboratory accuracy, and are assigned as qualitative. No data points were rejected; therefore, this work order is 100% complete and useable.</p>		

**Attachment C:**  
Statistical Analysis

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## 1.0 INTRODUCTION

This appendix contains a statistical analysis of the data collected from the groundwater monitoring wells associated with the CCR Landfill at the Hunter Power Plant in Castle Dale, Utah. Methods used to compare upgradient with downgradient wells vary depending on the characteristics of the upgradient well data. Upgradient well data were analyzed for outliers, normality, non-detects, and other characteristics that affect the comparison measures. A comprehensive statistical analysis is presented along with a discussion of the methods used to compare upgradient with downgradient water quality. Table C.1 lists the upgradient and downgradient wells that are used in this analysis. Note that if a well appears in Table C.1 and not in the tables and figures in this appendix, a sample could not be acquired during the sampling event.

**Table C.1.** Upgradient and downgradient wells for the CCR Landfill.

Upgradient Well	Downgradient Well
ELF-1D	ELF-3
ELF-2	ELF-4
ELF-9	ELF-5
ELF-10	ELF-6
	ELF-7
	ELF-8
	ELF-11
	ELF-12
	ELF-13
	ELF-14

## 2.0 PRELIMINARY DATA ANALYSIS

The primary purpose of this statistical analysis was to establish background values from the upgradient well data, and compare these to the downgradient well data to determine if the downgradient water quality has been impacted by the CCR Landfill. Familiarity with numerical and distributional characteristics of the upgradient wells aids in computing appropriate limits and in correctly interpreting those limits. This section contains a statistical summary of the upgradient well data. It is essential to understand the statistical characteristics of the data, prior to making the upgradient / downgradient well comparison. This understanding helps to ensure the appropriate calculations have been done and comparisons are completed using the proper statistical measures. The mean, standard deviation, quartiles, and other statistical quantities and corresponding graphs are presented in the following sections.

### 2.1 Data Analysis Techniques

The following sections summarize the statistical tools and techniques, used to evaluate upgradient well data from the CCR Landfill.

### 2.1.1 Mean

One measure of primary interest is the center of the data. The average ( $\bar{x}$ ), or the mean, is the most commonly used measure of the central tendency of the data. However, it can be heavily influenced by outliers and by asymmetric data. The mean is calculated using Equation (1):

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} \quad (1)$$

Where:

$\bar{x}$  = mean

$n$  = number of observations

$x_i$  =  $i^{th}$  observation.

### 2.1.2 Standard Deviation

Another quantity of interest is the spread of the data. The standard deviation ( $s$ ) is the most commonly used measure of spread, as it is easy to interpret and is used in many other statistical methods. Because it is calculated using the average, it is also sensitive to outliers and affected by data that are not symmetric. The standard deviation is calculated using Equation (2):

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}} \quad (2)$$

Where:

$s$  = standard deviation

$n$  = number of observations

$x_i$  =  $i^{th}$  observation

$\bar{x}$  = mean of the observations.

### 2.1.3 Coefficient of Variance

The coefficient of variance (CV) is a relative measure of variation in the sample data which expresses the standard deviation relative to the mean. The CV is expressed as a percentage and provides a direct comparison to the standard deviations of two different data sets. It is important to note the mean of the data may be very close to or very far away from zero and the spread may be independent of the distance from the mean to zero. Therefore, no firm guidelines have been established for interpreting the CV.

The CV was calculated for each detected analyte in each data grouping using Equation (3):

$$CV = \frac{s}{\bar{X}} \times 100 \% \quad (3)$$

Where:

s = standard deviation

$\bar{X}$  = mean of the observations

#### 2.1.4 Quartiles and the Five Number Summary

The five-number summary is a set of five numbers that are used to assess the spread of the data. It consists of the minimum value, first quartile, median, third quartile, and maximum of the data value. The first quartile is the 25<sup>th</sup> percentile of the data, the median is the 50<sup>th</sup> percentile of the data, and the third quartile is the 75<sup>th</sup> percentile of the data. The 25<sup>th</sup> percentile of the data is the number such that 25% of the data are less than that number and 75% of the data are above the 25<sup>th</sup> percentile. The median and third quartiles are found in a similar manner.

## 2.2 Visual Tools

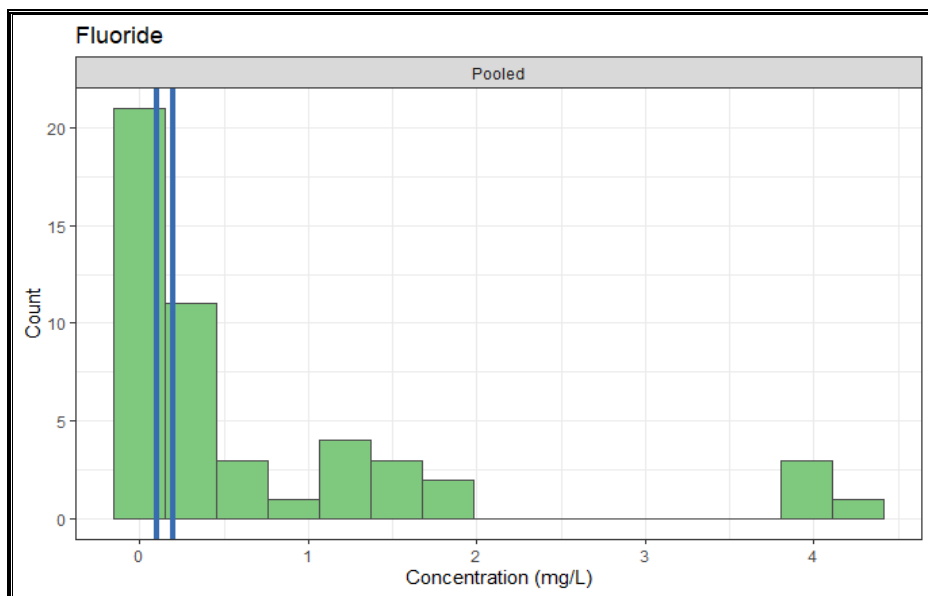
It is difficult to review numerical summary statistics and identify the degree of symmetry or normality of data without the aid of visual tools. In completing the statistical analysis for the CCR Landfill, histograms and dot plots were developed for each of the analytes with at least one detectable observation. All graphs were developed using the R Statistical Package (R Core Team 2021).

### 2.2.1 Histograms

Histograms display the distribution and symmetry of the data. The data are displayed in such a way, that deviations from a normal (i.e., bell shaped) distribution can easily be observed. Outliers are also often identifiable in a histogram. Histograms for the upgradient wells were generated using both non-detects and detected results. The method detection limits (MDL) are plotted on the histogram with a blue line to show which observations are non-detects.

If an analyte has more than one MDL there will be more than one blue line on the histogram. Figure C.1 below is a histogram of fluoride data for the upgradient wells for the CCR Landfill. It is provided here to illustrate data distribution using a histogram. All of the histograms used to examine the analytes from the CCR Landfill upgradient well data, are provided at the end of this appendix in Figure C.3.

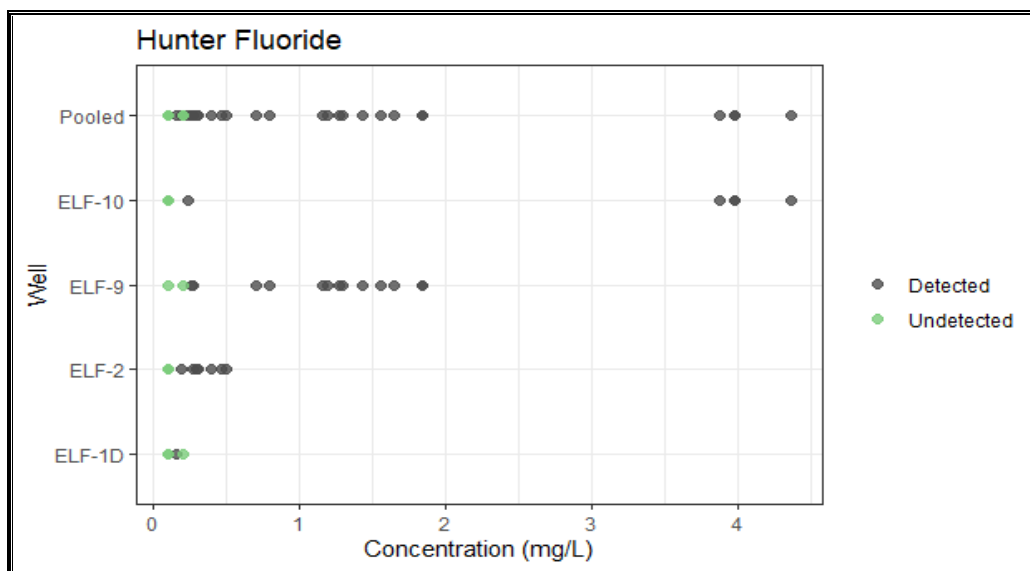




**Figure C.1.** Histogram of fluoride data from the CCR Landfill upgradient wells.

### 2.2.2 Dot Plots

A dot plot is a graphical tool used to determine the spread of the data and to look for outliers. Each measured concentration is plotted on the graph so that non-detects and outliers are clearly visible. The MDL for non-detects are shown as green points on the plot. Figure C.2 uses the same fluoride data points used to develop the Figure C.1. Several of the points are non-detects and the concentrations in well ELF-10 are larger than those in the other wells. All of the dot plots used to examine the CCR Landfill upgradient well data are provided at the end of this appendix in Figure C.3.



**Figure C.2.** Dot plot of fluoride data the CCR Landfill upgradient wells

### 2.2.3 Outliers

Outliers are data points that are notably larger or smaller than the rest of the data set and may indicate a problem with the data point or the data set as a whole. Examples which may be indicative of outliers include: 1) a misreported or erroneous concentration, 2) analytical error(s), or 3) natural variations in groundwater concentrations. Outliers are generally not omitted from project data simply because they are outliers. Rather, the result is examined individually or by project, to ensure the outlier does not represent an erroneous result or another concern warranting either additional sampling or omission of the outlier from the data analysis. There are reasonable situations when it is appropriate to remove outliers. For example, if outliers which represent exceedingly low concentrations are used to compute background concentrations, they may result in background levels which are too conservative. Conversely, use of excessively high outlier concentrations to compute background values, may result in an overestimation of background concentrations resulting in false-negative comparisons for downgradient groundwater quality.

Outliers were detected in the cadmium, cobalt, lead, and radium data CCR Landfill data. However, none of the outliers are extreme enough to warrant removal from the dataset. The MDLs for the non-detects in the boron upgradient data were 5 mg/L and the largest detected value was less than 4 mg/L. This is an unusually large MDL and its inclusion would have resulted in a Groundwater Protection Standard (GWPS) that was larger than any concentration detected in the upgradient wells. Thus, the non-detects were removed from the upgradient boron data and are not included in any tables or graphs in this appendix.

### 2.2.4 Treatment of Non-Detects

Non-detect values are common in environmental data. When present in data sets, non-detects produce difficulties in computing statistical metrics because reliable values cannot be assigned. Substituting a value such as the MDL or one-half of the MDL for non-detects are common practices. However, use of the detection limit, or one-half of the detection limit, can produce unstable or unreliable results (EPA 2009). Statistical methods, such as Kaplan-Meier (Helsel 2004), can be used to appropriately evaluate data sets containing significant quantities of non-detects, by producing estimates of the survival probability function for non-detects. These estimates can then be used to compute summary statistics on the data set. However, Kaplan-Meier does not perform well if more than 50% of the results are non-detects or if fewer than eight detections are available for evaluation.

The arsenic, cadmium, chromium, cobalt, and lead data have more than 50% non-detects. Antimony, beryllium, mercury, and thallium were not detected in any of the samples. Thus, statistical analysis cannot be done for those analytes. The fluoride and selenium data have more than 15% non-detects, but more than half of the data are detected. As a result, Kaplan-Meier was used to compute means, standard deviations, and statistical limits used to compare the upgradient to downgradient water quality for fluoride and selenium.

## 2.3 Summary Results

Table C.2 provides summary statistics for the CCR Landfill upgradient well data. Although the data from the upgradient wells were combined when compared to the downgradient wells, the summary statistics presented in this section are separated by well and are presented as pooled data. The data are presented in this way, due to observed differences between the different wells for many of the analytes. These tables in conjunction with the histograms and normal-quantile plots, provide information about differences between wells and the data properties of the combined data. Note that summary stats were only computed for analytes and wells with at least 50% detects and at least eight detected samples. Analytes that were not detected in any upgradient well samples are not listed in Table C.2.

**Table C.2.** Summary statistics for the CCR Landfill upgradient wells

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Arsenic	ELF-1D	5	0	<0.002	NA	NA	NA
Arsenic	ELF-2	18	0	<0.002	NA	NA	NA
Arsenic	ELF-9	16	16	0.0068	0.007	0.002	29
Arsenic	ELF-10	14	3	<0.002	NA	NA	NA
Arsenic	Pooled	53	19	<0.002	NA	NA	NA
Barium	ELF-1D	5	5	0.0103	NA	NA	NA
Barium	ELF-2	18	17	0.0101	0.0132	0.0096	73
Barium	ELF-9	16	16	0.0177	0.0366	0.0325	89
Barium	ELF-10	14	14	0.0341	0.0384	0.0222	58
Barium	Pooled	53	52	0.0137	0.0266	0.0248	94
Boron	ELF-1D	4	4	2.15	NA	NA	NA
Boron	ELF-2	17	17	3.32	3.35	0.179	5
Boron	ELF-9	14	14	1.42	1.48	0.201	14
Boron	ELF-10	13	13	1.60	1.65	0.172	10
Boron	Pooled	48	48	1.86	2.24	0.863	39
Cadmium	ELF-1D	5	0	<0.0005	NA	NA	NA
Cadmium	ELF-2	18	0	<0.0005	NA	NA	NA
Cadmium	ELF-9	16	1	<0.0005	NA	NA	NA
Cadmium	ELF-10	14	6	<0.0005	NA	NA	NA
Cadmium	Pooled	53	7	<0.0005	NA	NA	NA
Calcium	ELF-1D	4	4	372	NA	NA	NA
Calcium	ELF-2	17	17	400	400	22.0	6
Calcium	ELF-9	15	15	58.7	72.6	31.0	43
Calcium	ELF-10	13	13	474	476	34.3	7

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Calcium	Pooled	49	49	394	318	170	54
Chloride	ELF-1D	4	4	6760	NA	NA	NA
Chloride	ELF-2	17	17	430	351	120	34
Chloride	ELF-9	15	15	416	415	91.1	22
Chloride	ELF-10	13	13	7530	8627	2349	27
Chloride	Pooled	49	49	464	3092	3966	128
Chromium	ELF-1D	5	1	<0.002	NA	NA	NA
Chromium	ELF-2	18	2	<0.002	NA	NA	NA
Chromium	ELF-9	16	7	<0.002	NA	NA	NA
Chromium	ELF-10	14	10	0.0027	0.0046	0.0040	86
Chromium	Pooled	53	20	<0.002	NA	NA	NA
Cobalt	ELF-1D	5	1	<0.004	NA	NA	NA
Cobalt	ELF-2	18	10	0.0046	0.0053	0.0019	36
Cobalt	ELF-9	16	2	<0.004	NA	NA	NA
Cobalt	ELF-10	14	10	0.0043	0.0049	0.0014	28
Cobalt	Pooled	53	23	<0.004	NA	NA	NA
Fluoride	ELF-1D	4	1	<0.1315	NA	NA	NA
Fluoride	ELF-2	17	9	0.10	0.20	0.14	70
Fluoride	ELF-9	15	13	1.19	1.04	0.61	59
Fluoride	ELF-10	13	5	<0.1	NA	NA	NA
Fluoride	Pooled	49	28	0.20	0.75	1.12	150
Lead	ELF-1D	5	0	<0.002	NA	NA	NA
Lead	ELF-2	18	1	<0.002	NA	NA	NA
Lead	ELF-9	16	4	<0.002	NA	NA	NA
Lead	ELF-10	14	6	<0.002	NA	NA	NA
Lead	Pooled	53	11	<0.002	NA	NA	NA
Lithium	ELF-1D	5	5	2.19	NA	NA	NA
Lithium	ELF-2	18	18	1.68	2.30	1.18	51
Lithium	ELF-9	16	16	0.916	1.05	0.444	42
Lithium	ELF-10	14	14	2.18	2.37	1.02	43
Lithium	Pooled	53	53	1.61	1.94	1.07	55
Molybdenum	ELF-1D	5	5	0.0161	NA	NA	NA
Molybdenum	ELF-2	18	17	0.0030	0.0031	0.0007	24
Molybdenum	ELF-9	16	16	0.1110	0.1042	0.0309	30
Molybdenum	ELF-10	14	14	0.0825	0.0778	0.0369	47

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Molybdenum	Pooled	53	52	0.0516	0.0545	0.0508	93
pH	ELF-1D	4	4	7.22	NA	NA	NA
pH	ELF-2	17	17	7.27	7.31	0.165	2
pH	ELF-9	15	15	7.94	7.93	0.161	2
pH	ELF-10	13	13	7.21	7.29	0.414	6
pH	Pooled	49	49	7.34	7.48	0.388	5
Radium	ELF-1D	5	5	2.2	NA	NA	NA
Radium	ELF-2	18	18	1.43	1.87	1.69	90
Radium	ELF-9	16	15	1.37	1.45	0.60	41
Radium	ELF-10	14	14	2.40	3.01	3.36	112
Radium	Pooled	53	52	1.56	2.08	2.09	100
Selenium	ELF-1D	5	0	<0.002	NA	NA	NA
Selenium	ELF-2	18	18	0.282	0.265	0.232	88
Selenium	ELF-9	16	1	<0.002	NA	NA	NA
Selenium	ELF-10	14	9	0.0086	0.082	0.129	157
Selenium	Pooled	53	28	0.0031	0.112	0.187	166
Sulfate	ELF-1D	4	4	8790	NA	NA	NA
Sulfate	ELF-2	17	17	7950	7705	726	9
Sulfate	ELF-9	15	15	6750	6602	756	11
Sulfate	ELF-10	13	13	16800	15004	4859	32
Sulfate	Pooled	49	49	7950	9410	4281	45
TDS	ELF-1D	4	4	26900	NA	NA	NA
TDS	ELF-2	17	17	12000	11929	398	3
TDS	ELF-9	15	15	10700	10801	763	7
TDS	ELF-10	13	13	38200	37469	2482	7
TDS	Pooled	49	49	12000	19580	11740	60

Table C.3 provides the five-number summaries for the CCR Landfill upgradient wells. As with the summary statistics, a five-number summary was computed for each well as well as for the pooled data. If a minimum or a quartile falls within the range of non-detects it is denoted using a less-than (<) symbol. Analytes that were not detected in any of the upgradient well samples are not listed in Table C.3.

**Table C.3.** Five-number summary for the CCR Landfill upgradient wells.

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Arsenic	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-2	<0.001	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-9	0.0050	0.0060	0.0068	0.0078	0.0117
Arsenic	ELF-10	<0.002	<0.002	<0.002	<0.002	0.0093
Arsenic	Pooled	<0.001	<0.002	<0.002	0.0055	0.0117
Barium	ELF-1D	0.0084	0.0085	0.0103	0.0103	0.0104
Barium	ELF-2	<0.0084	0.0095	0.0101	0.0120	0.0500
Barium	ELF-9	0.0118	0.0128	0.0177	0.0500	0.102
Barium	ELF-10	0.0145	0.0189	0.0341	0.0515	0.0863
Barium	Pooled	<0.0084	0.0103	0.0137	0.0348	0.102
Boron	ELF-1D	1.94	2.06	2.15	2.20	2.23
Boron	ELF-2	3.11	3.24	3.32	3.48	3.77
Boron	ELF-9	1.27	1.34	1.42	1.55	1.91
Boron	ELF-10	1.48	1.54	1.60	1.68	2.12
Boron	Pooled	1.27	1.53	1.86	3.24	3.77
Cadmium	ELF-1D	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cadmium	ELF-2	<0.0005	<0.0005	<0.0005	<0.0005	<0.001
Cadmium	ELF-9	<0.0005	<0.0005	<0.0005	<0.0005	0.0005
Cadmium	ELF-10	<0.0005	<0.0005	<0.0005	0.0006	0.0011
Cadmium	Pooled	<0.0005	<0.0005	<0.0005	<0.0005	0.0011
Calcium	ELF-1D	353	363	372	381	393
Calcium	ELF-2	356	392	400	419	430
Calcium	ELF-9	48.9	56.8	58.7	75.7	166
Calcium	ELF-10	407	457	474	500	543
Calcium	Pooled	48.9	91.9	394	430	543
Chloride	ELF-1D	6430	6588	6760	6960	7200
Chloride	ELF-2	197	218	430	457	473
Chloride	ELF-9	282	356	416	467	595
Chloride	ELF-10	5710	7120	7530	9900	13100
Chloride	Pooled	197	363	464	6880	13100
Chromium	ELF-1D	<0.002	<0.002	<0.002	<0.002	0.0023
Chromium	ELF-2	<0.001	<0.002	<0.002	<0.002	0.0110
Chromium	ELF-9	<0.002	<0.002	<0.002	0.0076	0.0201
Chromium	ELF-10	<0.002	<0.002	0.0027	0.0056	0.0164
Chromium	Pooled	<0.001	<0.002	<0.002	0.0036	0.0201
Cobalt	ELF-1D	<0.004	<0.004	<0.004	<0.004	0.0054

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Cobalt	ELF-2	<0.004	<0.004	0.0046	0.0059	0.0114
Cobalt	ELF-9	<0.004	<0.004	<0.004	<0.004	0.0052
Cobalt	ELF-10	<0.004	<0.004	0.0043	0.0054	0.0079
Cobalt	Pooled	<0.004	<0.004	<0.004	0.0050	0.0114
Fluoride	ELF-1D	<0.1	<0.1	<0.1315	0.17	0.20
Fluoride	ELF-2	<0.1	<0.1	0.10	0.30	0.50
Fluoride	ELF-9	<0.1	0.49	1.19	1.50	1.84
Fluoride	ELF-10	<0.1	<0.1	<0.1	3.87	4.36
Fluoride	Pooled	<0.1	<0.1	0.2	1.16	4.36
Lead	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Lead	ELF-2	<0.001	<0.002	<0.002	<0.002	0.002
Lead	ELF-9	<0.002	<0.002	<0.002	0.0026	0.0077
Lead	ELF-10	<0.002	<0.002	<0.002	0.003	0.012
Lead	Pooled	<0.001	<0.002	<0.002	<0.002	0.012
Lithium	ELF-1D	1.96	2.12	2.19	2.20	2.89
Lithium	ELF-2	1.34	1.51	1.68	3.16	4.93
Lithium	ELF-9	0.724	0.777	0.916	1.07	2.48
Lithium	ELF-10	0.841	1.79	2.18	2.90	4.59
Lithium	Pooled	0.724	1.10	1.61	2.20	4.93
Molybdenum	ELF-1D	0.0087	0.0153	0.0161	0.0165	0.0207
Molybdenum	ELF-2	<0.002	0.0027	0.0030	0.0033	0.0050
Molybdenum	ELF-9	0.0569	0.0746	0.1110	0.1240	0.1580
Molybdenum	ELF-10	0.0142	0.0524	0.0825	0.1130	0.1240
Molybdenum	Pooled	<0.002	0.0034	0.0516	0.1070	0.1580
pH	ELF-1D	7.02	7.13	7.22	7.28	7.30
pH	ELF-2	7.12	7.21	7.27	7.42	7.76
pH	ELF-9	7.51	7.86	7.94	8.04	8.19
pH	ELF-10	6.85	7.00	7.21	7.41	8.37
pH	Pooled	6.85	7.21	7.34	7.86	8.37
Radium	ELF-1D	1.1	1.2	2.2	2.6	4.4
Radium	ELF-2	0.6	1.0	1.4	2.1	8.1
Radium	ELF-9	<0.64	1.07	1.37	1.86	2.60
Radium	ELF-10	0.5	1.4	2.4	3.0	14.2
Radium	Pooled	0.0	1.1	1.6	2.3	14.2
Selenium	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Selenium	ELF-2	0.0031	0.0324	0.282	0.460	0.608

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Selenium	ELF-9	<0.002	<0.002	<0.002	<0.002	0.0042
Selenium	ELF-10	<0.002	<0.002	0.0086	0.1357	0.410
Selenium	Pooled	<0.002	<0.002	0.0031	0.146	0.608
Sulfate	ELF-1D	7730	8413	8790	9380	10700
Sulfate	ELF-2	6030	7190	7950	8180	8720
Sulfate	ELF-9	5460	5880	6750	7090	8030
Sulfate	ELF-10	8610	10000	16800	19800	20700
Sulfate	Pooled	5460	6900	7950	9230	20700
TDS	ELF-1D	25000	26350	26900	27425	28700
TDS	ELF-2	11300	11600	12000	12200	12600
TDS	ELF-9	9420	10350	10700	11300	12000
TDS	ELF-10	32900	35300	38200	39600	40300
TDS	Pooled	9420	11400	12000	32900	40300

### 3.0 UPGRAIDENT AND DOWNGRAIDENT WELL COMPARISON

Groundwater quality was assessed using upper tolerance limits (UTLs) and the Maximum Contaminant Levels (MCL) for each of the Appendix III and IV analytes. The data measured from the upgradient/background wells were used to compute a UTL, which serves as the background value. The larger of the UTL and MCL was used as the Groundwater Protection Standard (GWPS). Data obtained from the downgradient wells were compared point-by-point to the GWPSs to determine if the site complies with the *Final Rule*. The software package Sanitas© v.2016, was used to compute the UTLs. As part of this evaluation, groundwater data were examined for characteristics that impact how the UTL was computed. These characteristics include the:

- Number of non-detect results
- Data distribution
- Site-wide false-positive rate (SWFPR)
- Spatial and seasonal variability.

Summary statistics and other statistical characteristics of the data are discussed in the previous section. These characteristics were used to compute the appropriate UTL for each analyte.

### 3.1 Groundwater Protection Standards

The shape or distribution of the data was assessed to ensure that the most appropriate UTL was used for comparison purposes. The most efficient UTL is a parametric UTL that assumes the data follow a normal distribution. If the data do not follow a normal distribution, a non-parametric UTL is typically used. Thus, the data for each analyte are assessed to determine if a



parametric UTL can be computed from the data. The parametric UTL is computed using the formula below:

$$UTL = \bar{X} + \kappa \times S$$

Where:

$\bar{X}$  = the average of the background data

$\kappa$  = multiplier from EPA Unified Guidance, March 2009

$S$  = standard deviation of the background data

### 3.1.1 Normal Distribution

Histograms and dot plots were used to visually inspect the data for deviations from normality and to determine if outliers are present. This examination reveals the outliers are present in the data. The Shapiro-Wilk test was used to assess normality in conjunction with the normal quantile plots. If the p-value associated with the test was greater than or equal to 0.05, the data are considered normally distributed and a parametric UTL was computed using the upgradient measurements. If the p-value is less than 0.05, then the maximum detected value was used as the UTL.

**Note:** The 0.05 p-value is not a hard and fast rule. Parametric UTLs were computed for analytes whose p-values were sufficiently close to 0.05 as determined by the Sanitas software (Sanitas 2016).

If the data for an analyte were not normally distributed, the ladder of powers method was used to determine if a reasonable transformation existed that would produce normal data. The ladder of powers tests different monotonic transformations of the data, such as the natural logarithm or square, to see if the transformed data have a normal distribution. If a transformation within the ladder of powers can be found that produces normal data, a parametric UTL was computed using the transformed data. If a transformation was identified, it was applied to both upgradient / background and downgradient groundwater data prior to comparison.

A non-parametric UTL was computed for data that are not normally distributed and cannot be transformed. The non-parametric UTL is the largest value measured in the upgradient / background wells. Table C.4 summarizes the results of the Shapiro-Wilk test for each of the Appendix III and IV analytes where at least 50% of the measurements were detects. An appropriate transformation was found for lithium and radium. Non-parametric UTLs were computed for all of the analytes except for lithium and radium.

**Table C.4.** Shapiro-Wilk Test for the CCR Landfill upgradient wells.

Analyte	W-Statistic	P-Value	Normal
Barium	0.7272	<0.0001	No
Boron	0.8196	<0.0001	No
Calcium	0.7935	<0.0001	No
Chloride	0.7106	<0.0001	No
Fluoride	0.6306	<0.0001	No
Lithium	0.8857	0.0001	No

Analyte	W-Statistic	P-Value	Normal
Square Root of Lithium	0.9396	0.0099	Yes
Molybdenum	0.8502	<0.0001	No
pH	0.9295	0.0059	No
Radium	0.5520	<0.0001	No
LN of Radium	0.9558	0.0482	Yes
Selenium	0.6407	<0.0001	No
Sulfate	0.7119	<0.0001	No
TDS	0.7133	<0.0001	No

### 3.1.2 Upper Tolerance Limits and Groundwater Protection Standard

This section contains the GWPS computed for each analyte. Table C.5 lists the UTL, MCL, and GWPS for each of the analytes in the upgradient wells. The following criteria were used for determining each GWPS:

- If more than 50% of the data were detected and have a normal distribution, a parametric UTL was computed.
- If the data were not normally distributed or more than 50% of the data were non-detects, the greater of the largest MDL and maximum detected value was used as the UTL.
- If all of the upgradient samples were non-detects, the largest MDL was used as the UTL.
- The larger of the MCL and the UTL was used as the GWPS.
- Fluoride is compared to both the MCL and the UTL if the MCL exceeds the UTL, to meet the criteria for Appendix III constituents.

Figure C.4 shows graphs that were constructed for each of the analytes that had at least one detectable measurement in the downgradient wells. The graphs illustrate the GWPS as a horizontal line with the measurements from each of the downgradient wells plotted on the same graph. Non-detects are represented by hollow gray circles on the graphs. These graphs clearly depict how the downgradient measurements compare to the GWPS.

Results above the GWPS line represent values exceeding the GWPS. As the graphs illustrate, boron, calcium, cobalt, lithium, and molybdenum exceed the GWPS. Table C.5 list the GWPSs and the wells that exceed the GWPS for each analyte (Figure C.4). GWPS plots are not provided for analytes that were not detected in any downgradient samples.

**Table C.5.** Comparison of downgradient wells to the Groundwater Protection Standard

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
Antimony	0.004	0.006	0.006	Within Limit
Arsenic	0.0117	0.01	0.0117	Within Limit
Barium	0.102	2.0	2.0	Within Limit
Beryllium	0.002	0.004	0.004	Within Limit
Boron	3.77	NA	3.77	ELF-4, ELF-8, ELF-11
Cadmium	0.0011	0.0050	0.0050	Within Limit
Calcium	543	NA	543	ELF-8
Chloride	13100	NA	13100	Within Limit
Chromium	0.020	0.1000	0.1000	Within Limit
Cobalt	0.0114	0.006	0.0114	ELF-8, ELF-11
Fluoride	4.36	4.0	4.36	Within Limit
Fluoride Appendix III	4.36	NA	4.36	Within Limit
Lead	0.012	0.015	0.015	Within Limit
Lithium	4.35	0.04	4.35	ELF-11, ELF-14
Mercury	0.0002	0.002	0.002	Within Limit
Molybdenum	0.158	0.100	0.158	ELF-8
pH Acidic Range	6.85	NA	6.85	Within Limit
pH Basic Range	8.37	NA	8.37	Within Limit
Radium	6.3	5.0	6.3	Within Limit
Selenium	0.608	0.050	0.608	Within Limit
Sulfate	20700	NA	20700	Within Limit
TDS	40300	NA	40300	Within Limit
Thallium	0.002	0.002	0.002	Within Limit

## **4.0 CONCLUSIONS**

Groundwater data was collected from the CCR Landfill monitoring network at the Hunter Power Plant. A comprehensive data analysis was completed on the upgradient wells to ensure that comparisons between upgradient and downgradient wells were performed correctly. During the October 2021 sampling event, statistically significant increases (SSIs) above background were noted for Appendix III constituents:

- Boron
- Calcium

SSIs above groundwater protection standards were noted for Appendix IV constituents:

- Cobalt
- Lithium
- Molybdenum

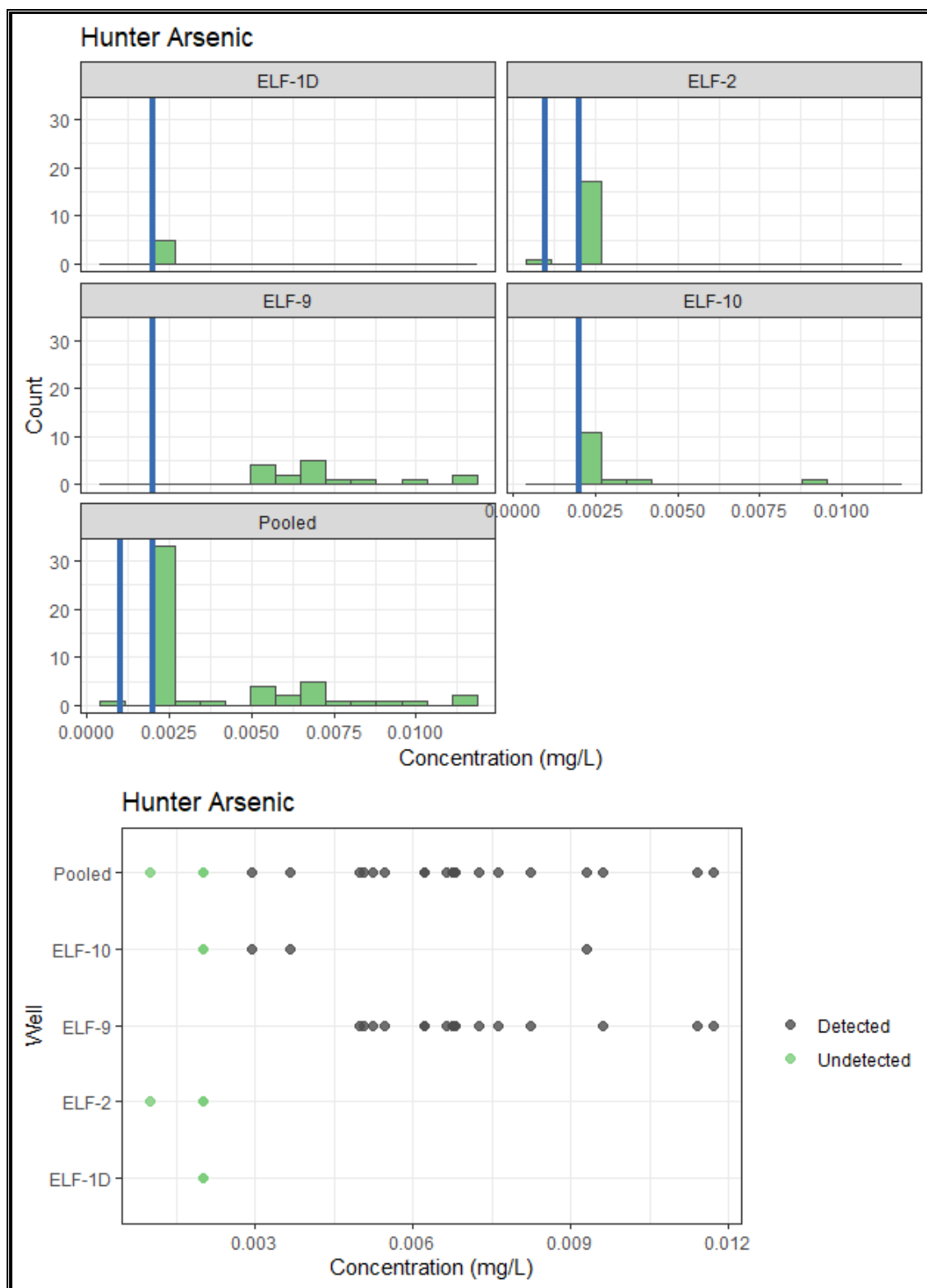
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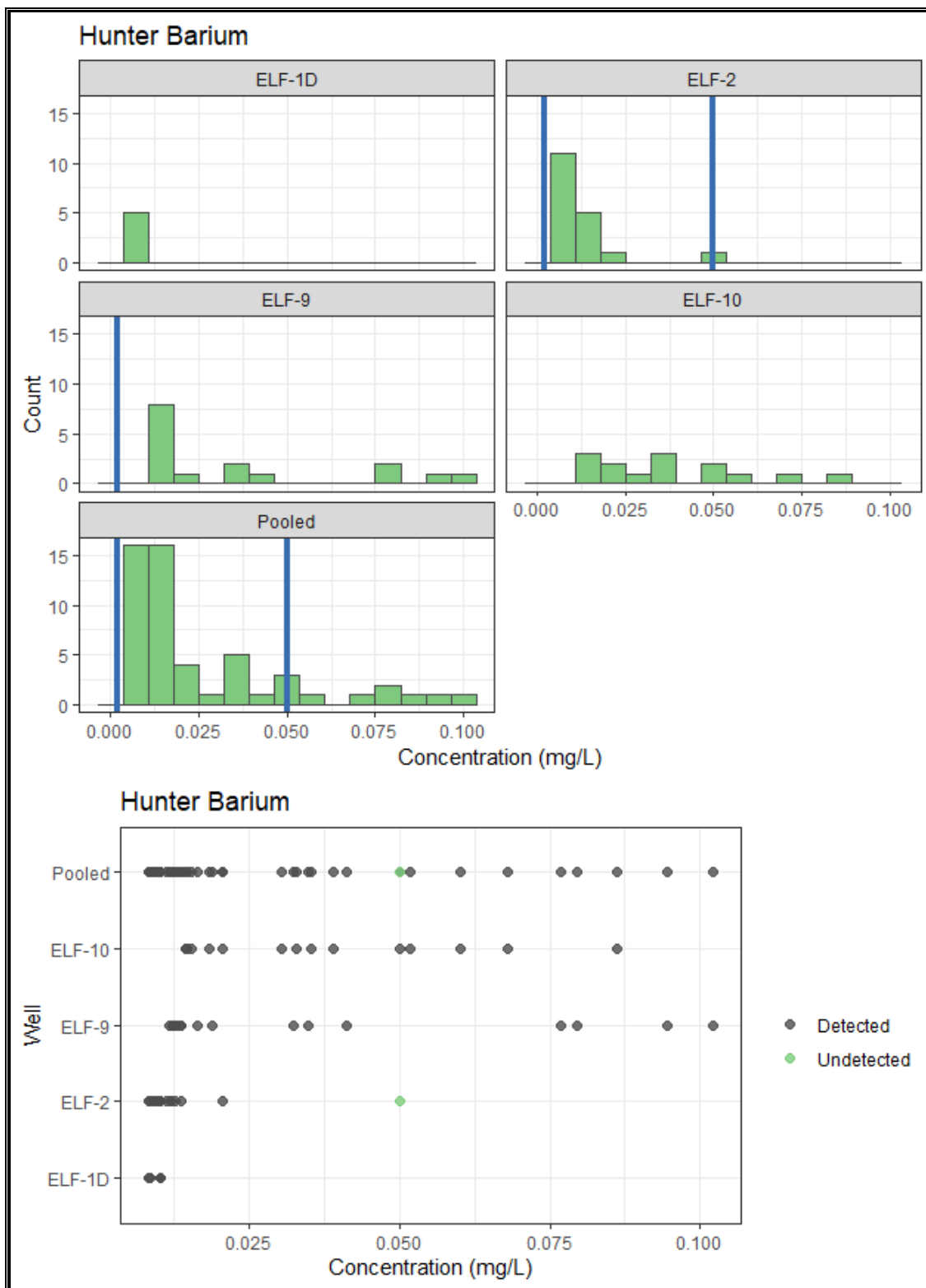
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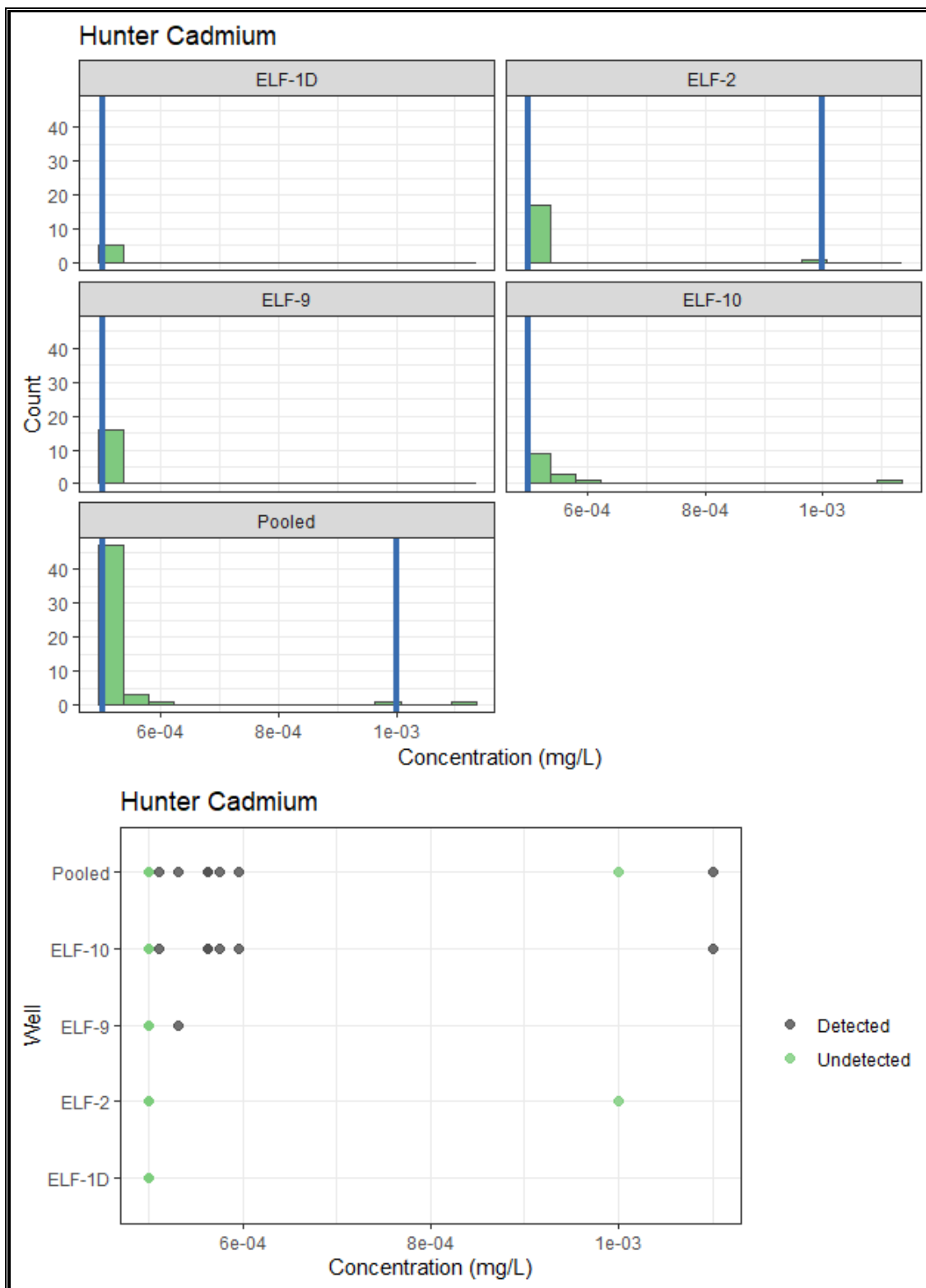
**Figure C.3.** Histograms and dot plots for the upgradient Ash Landfill data.



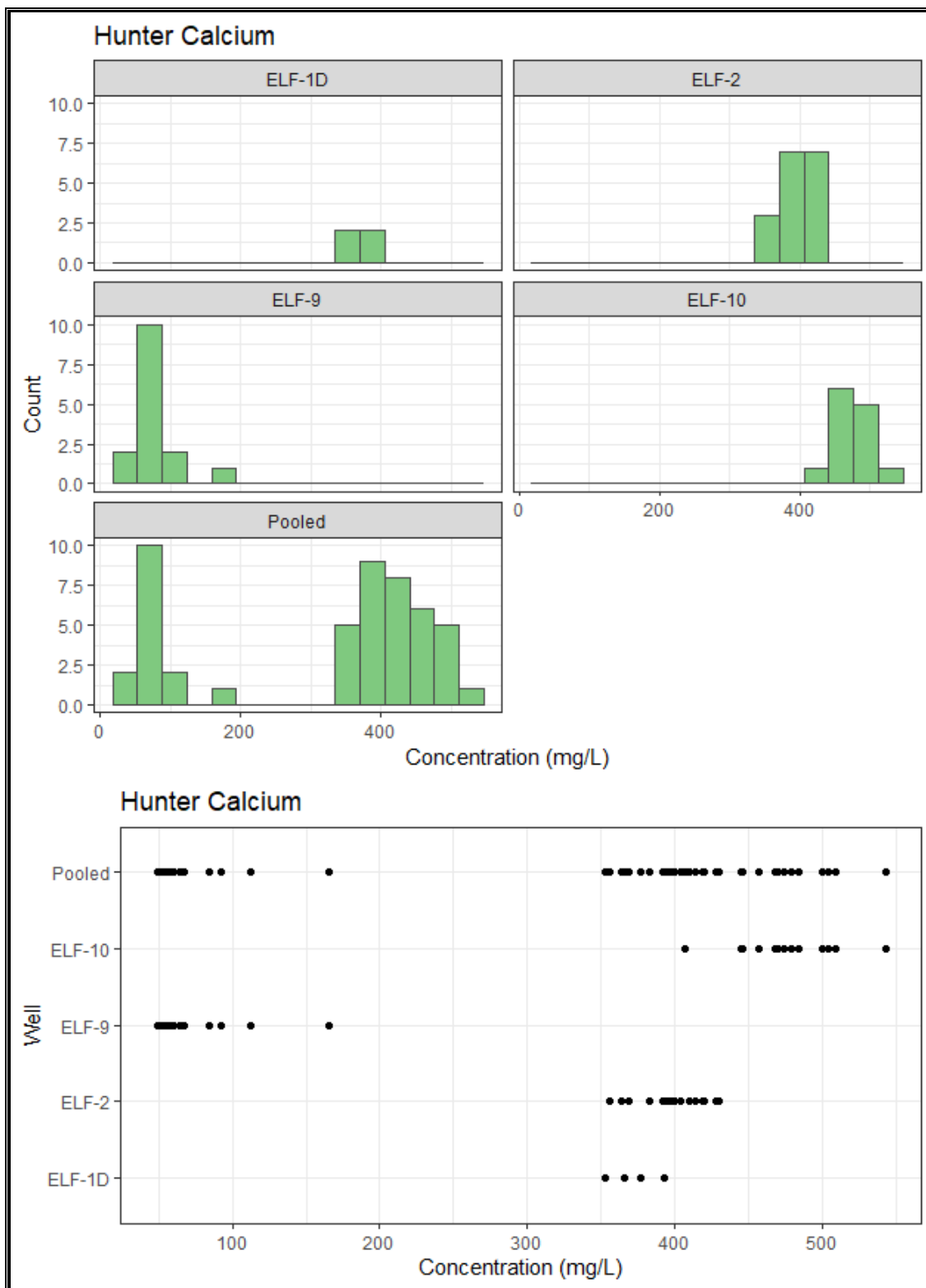
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



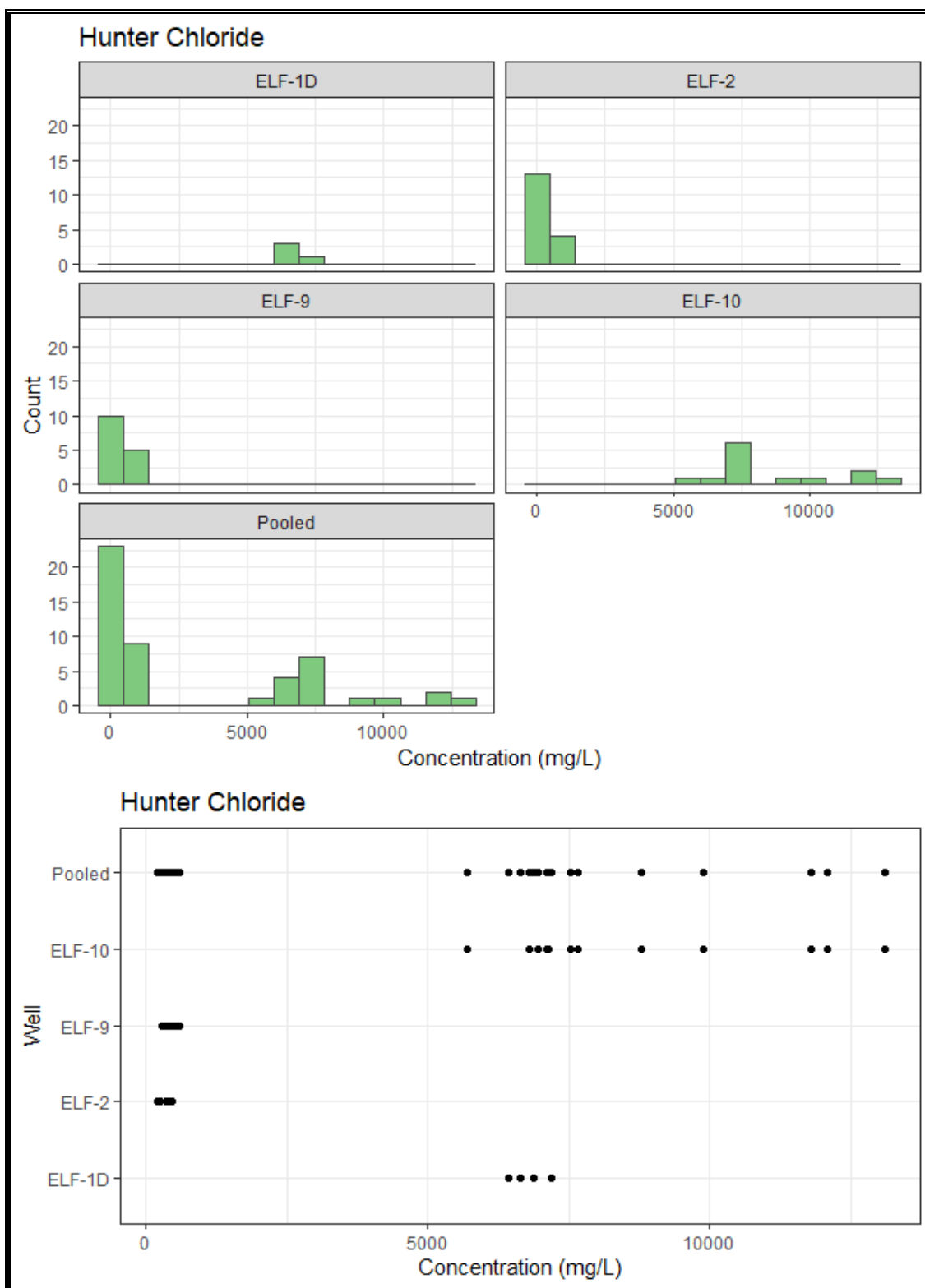




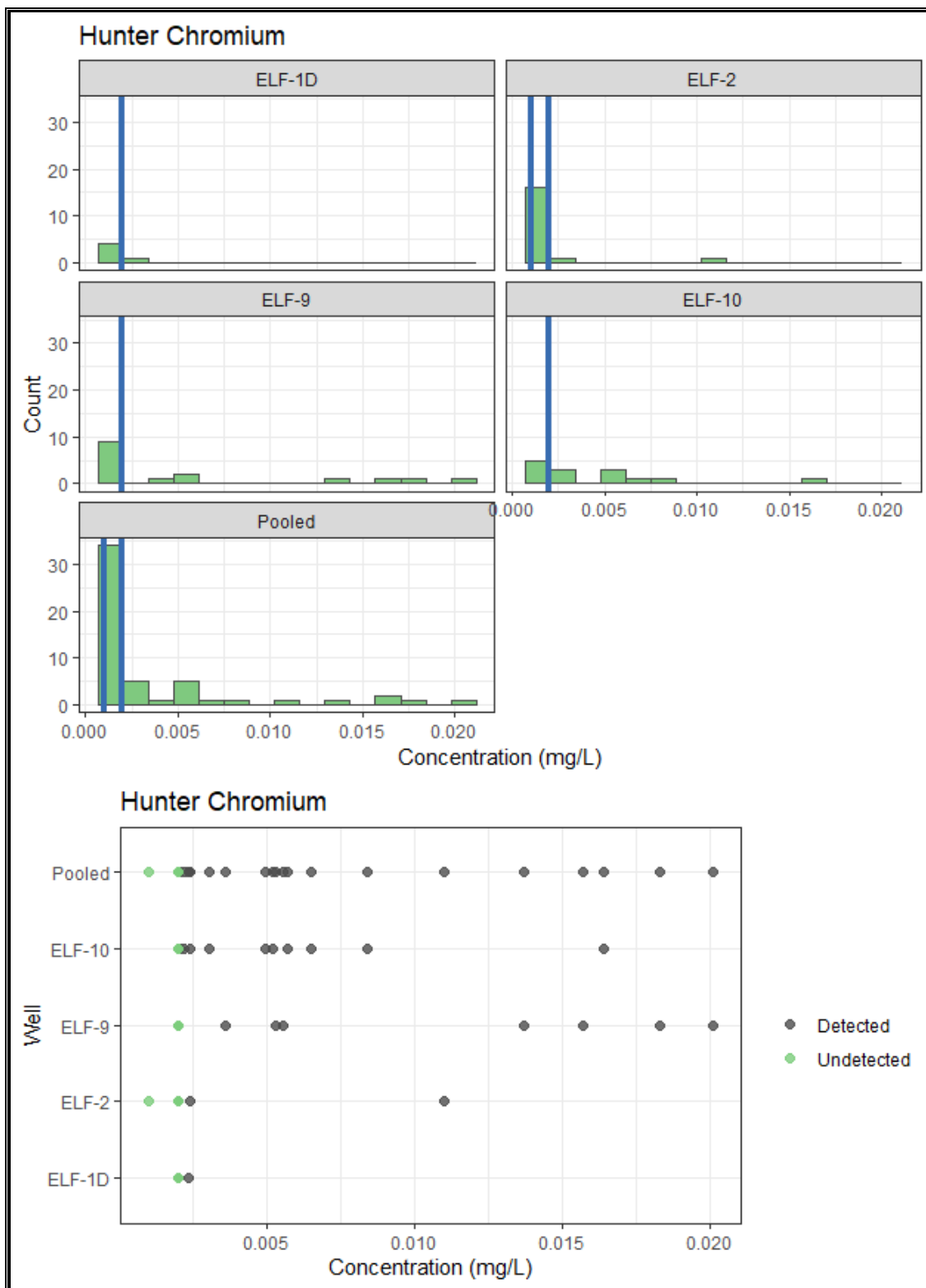
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



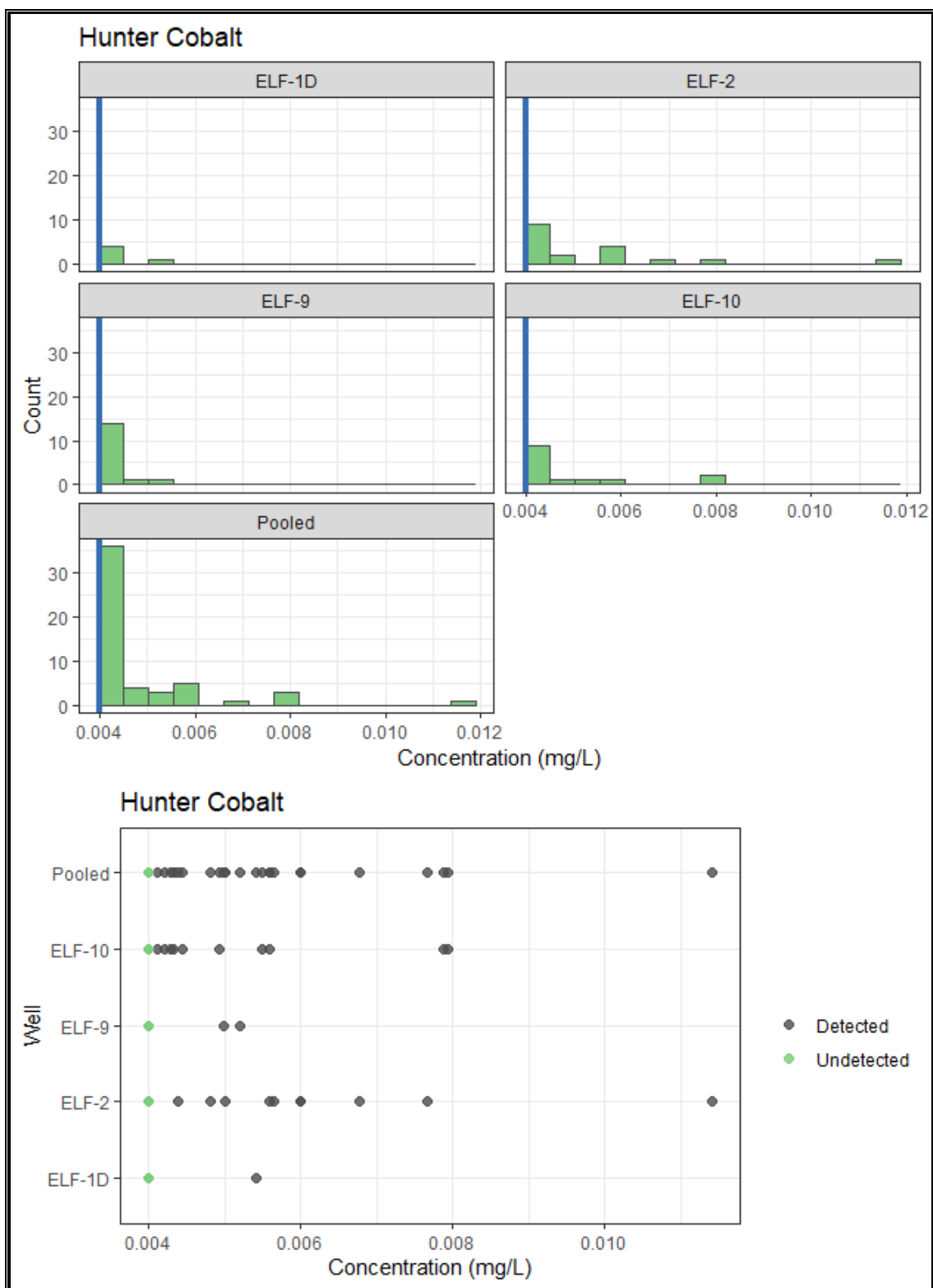
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



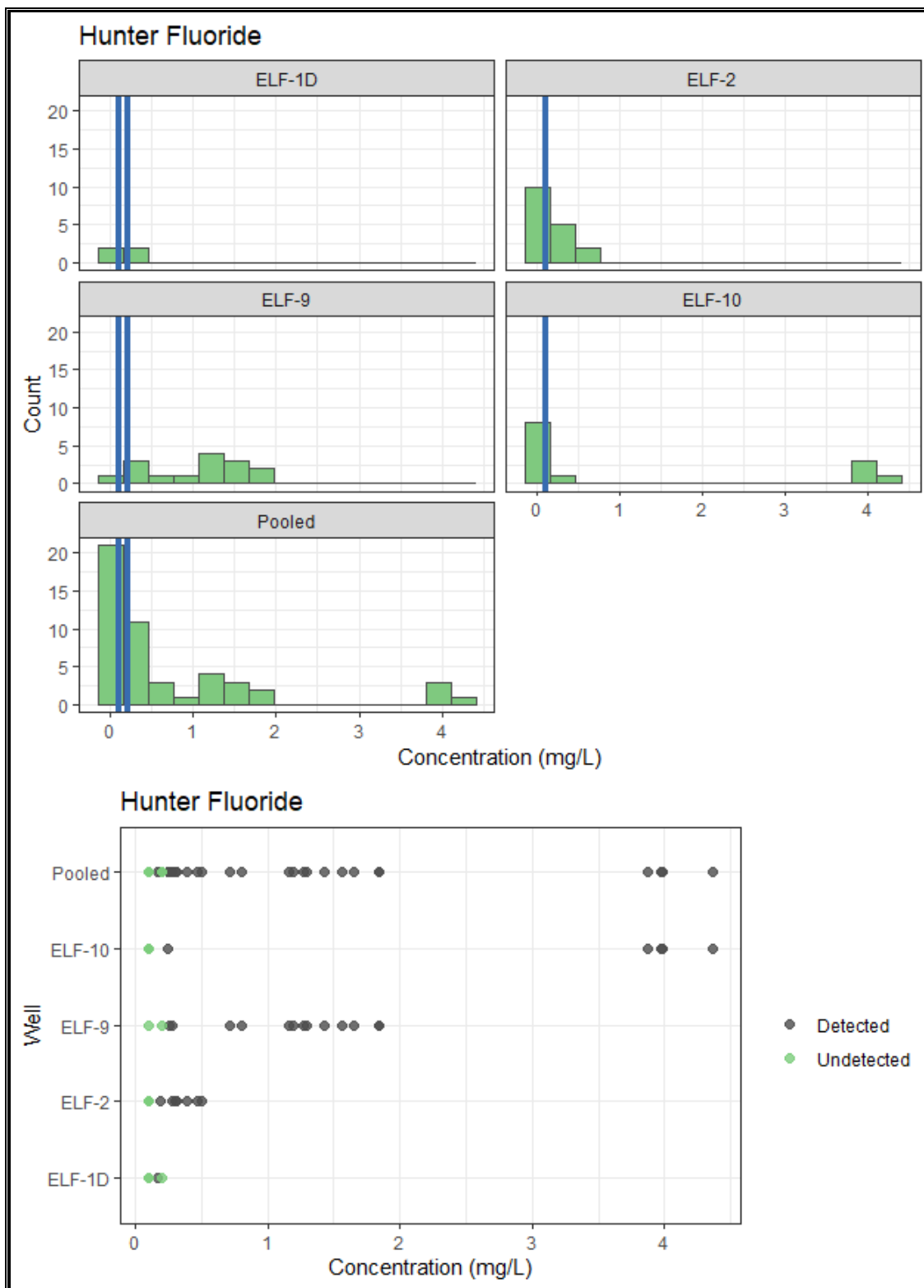
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



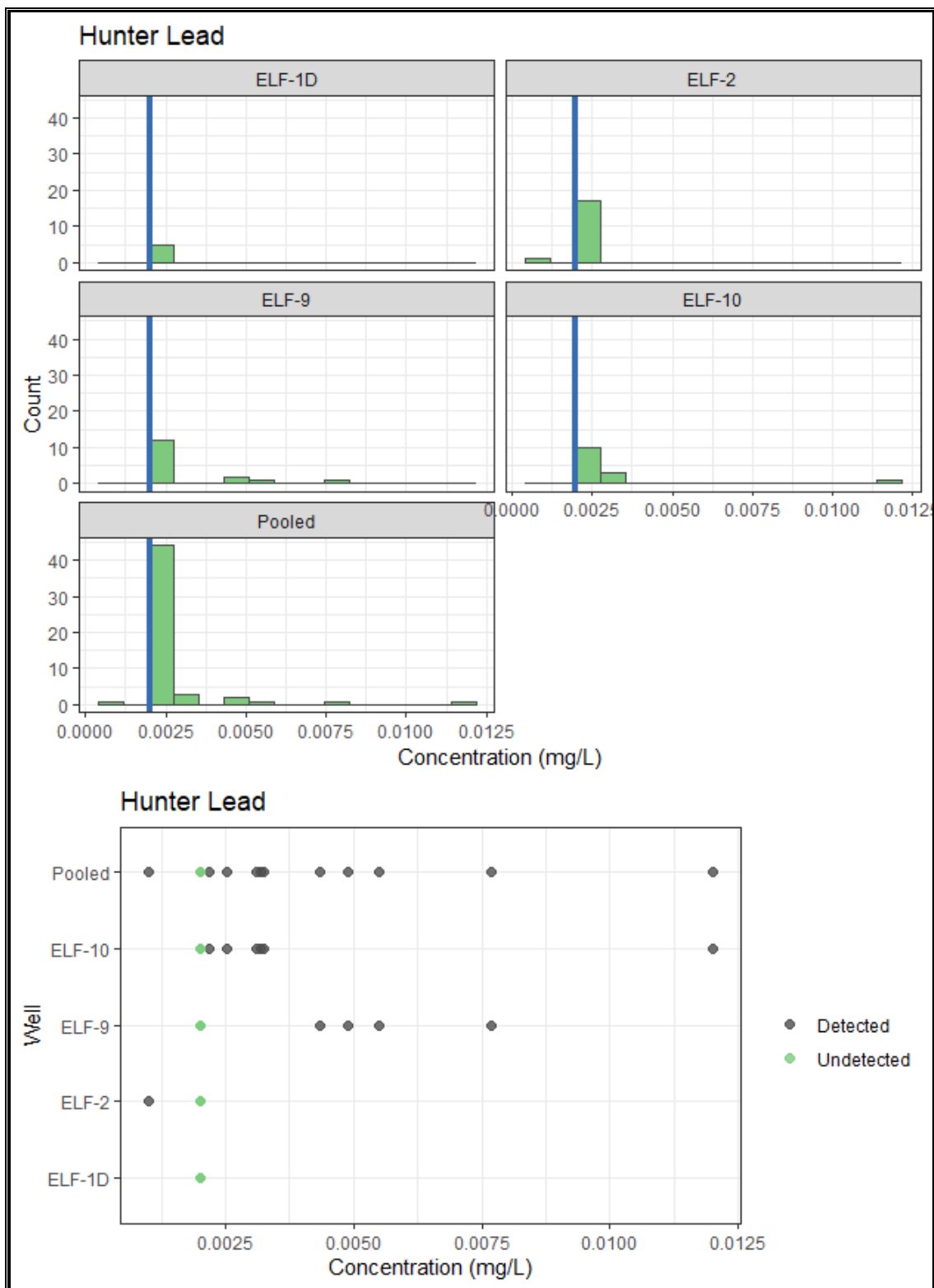
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



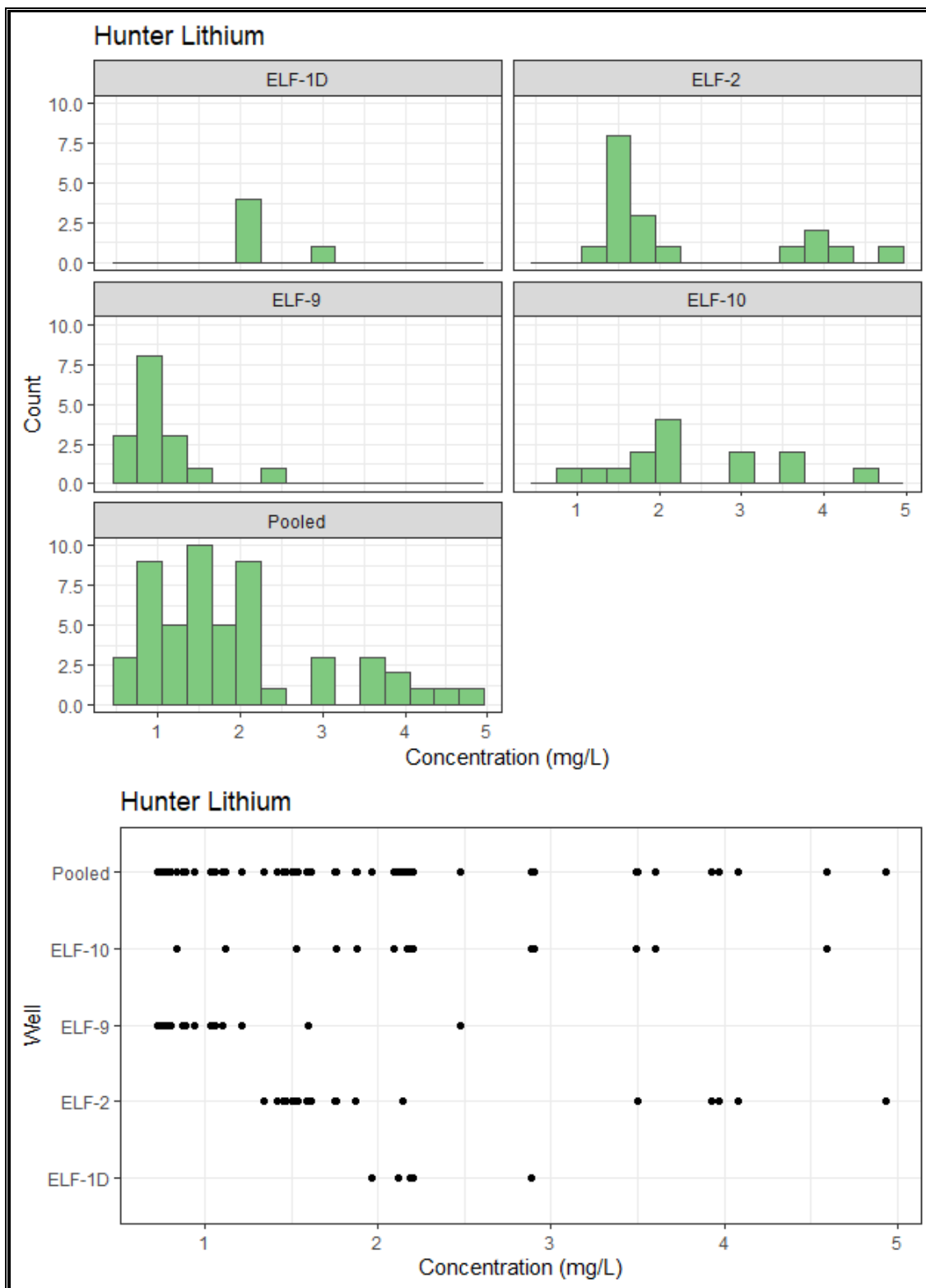
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.

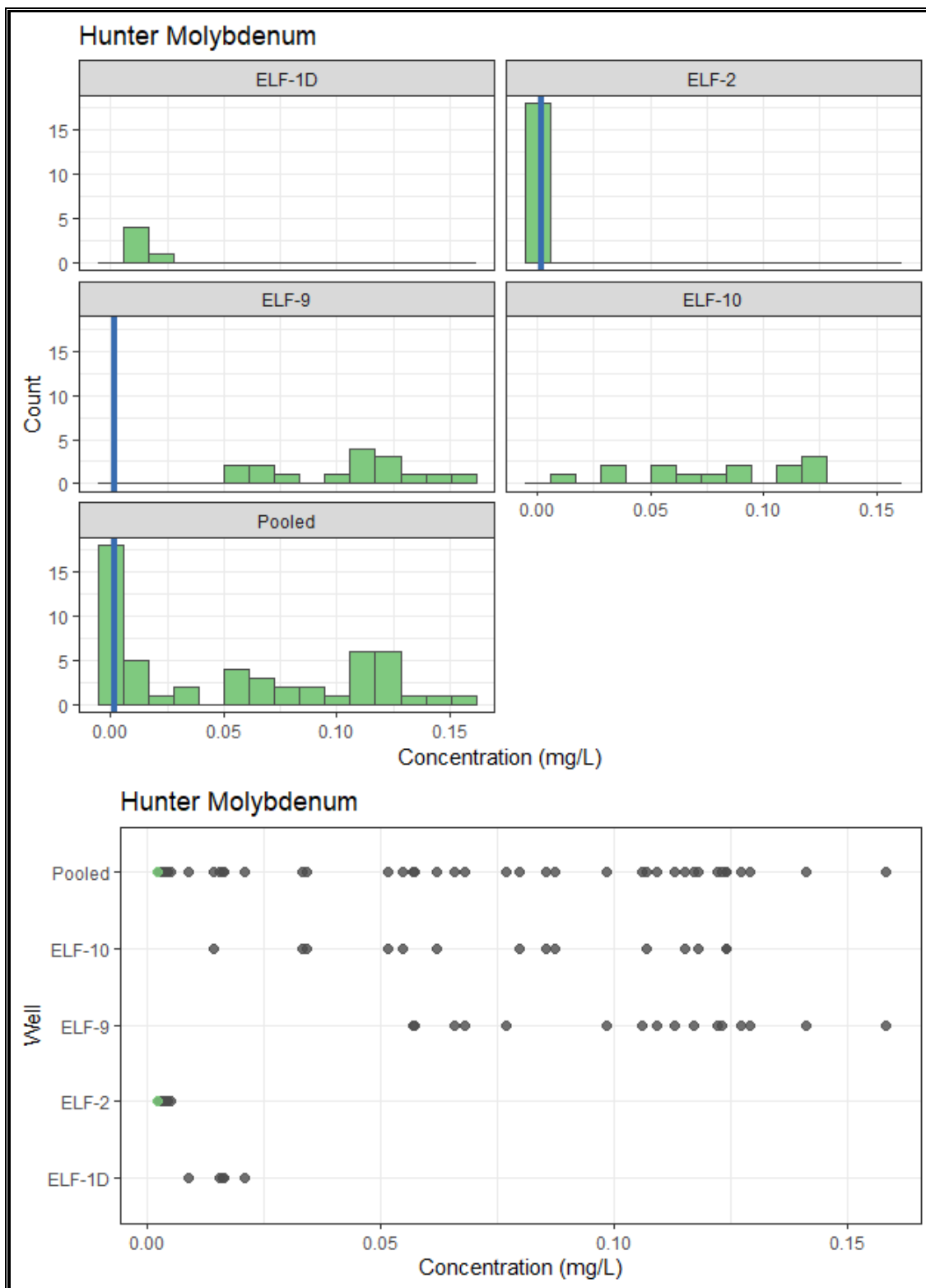


**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.

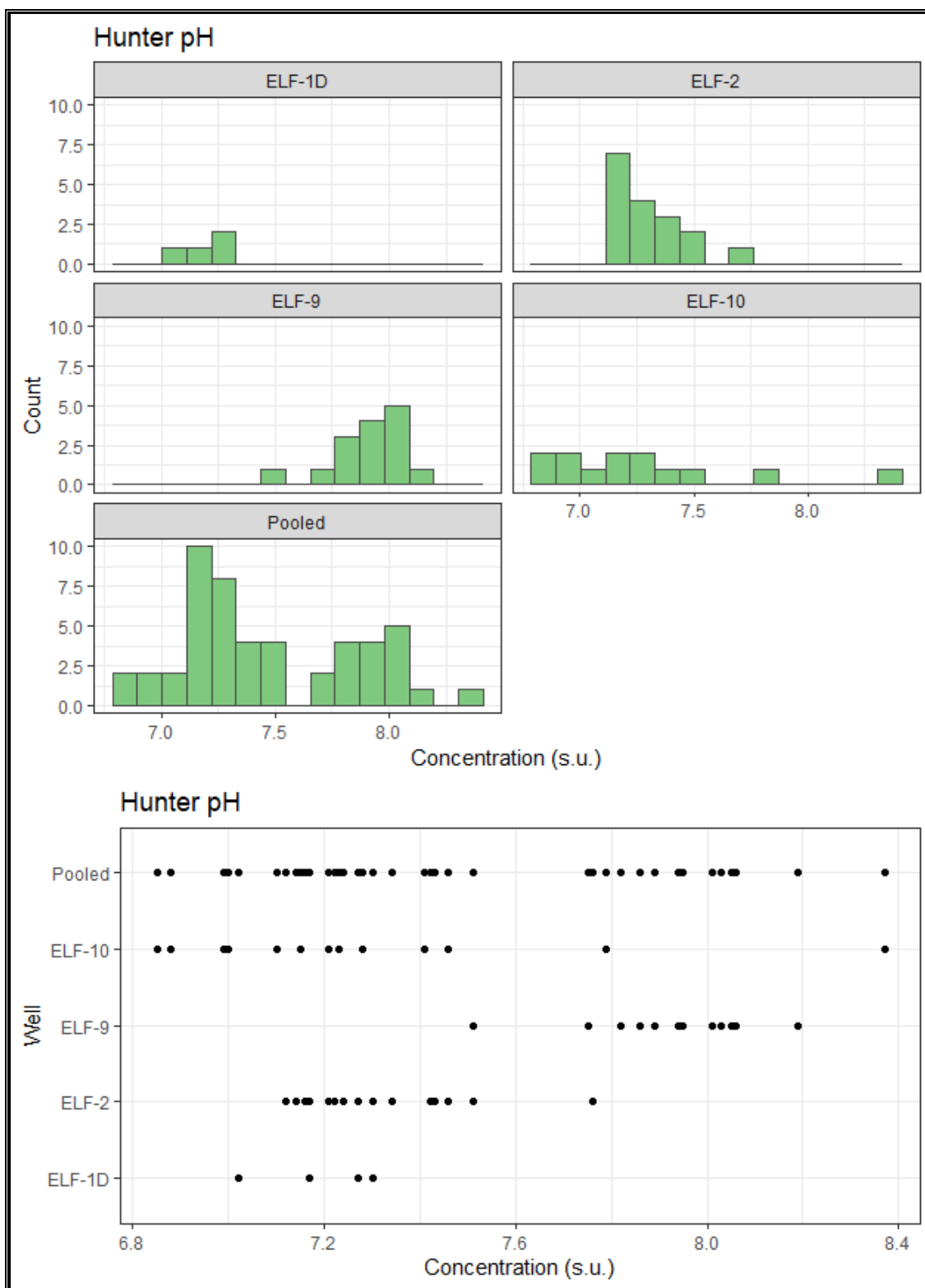


**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.

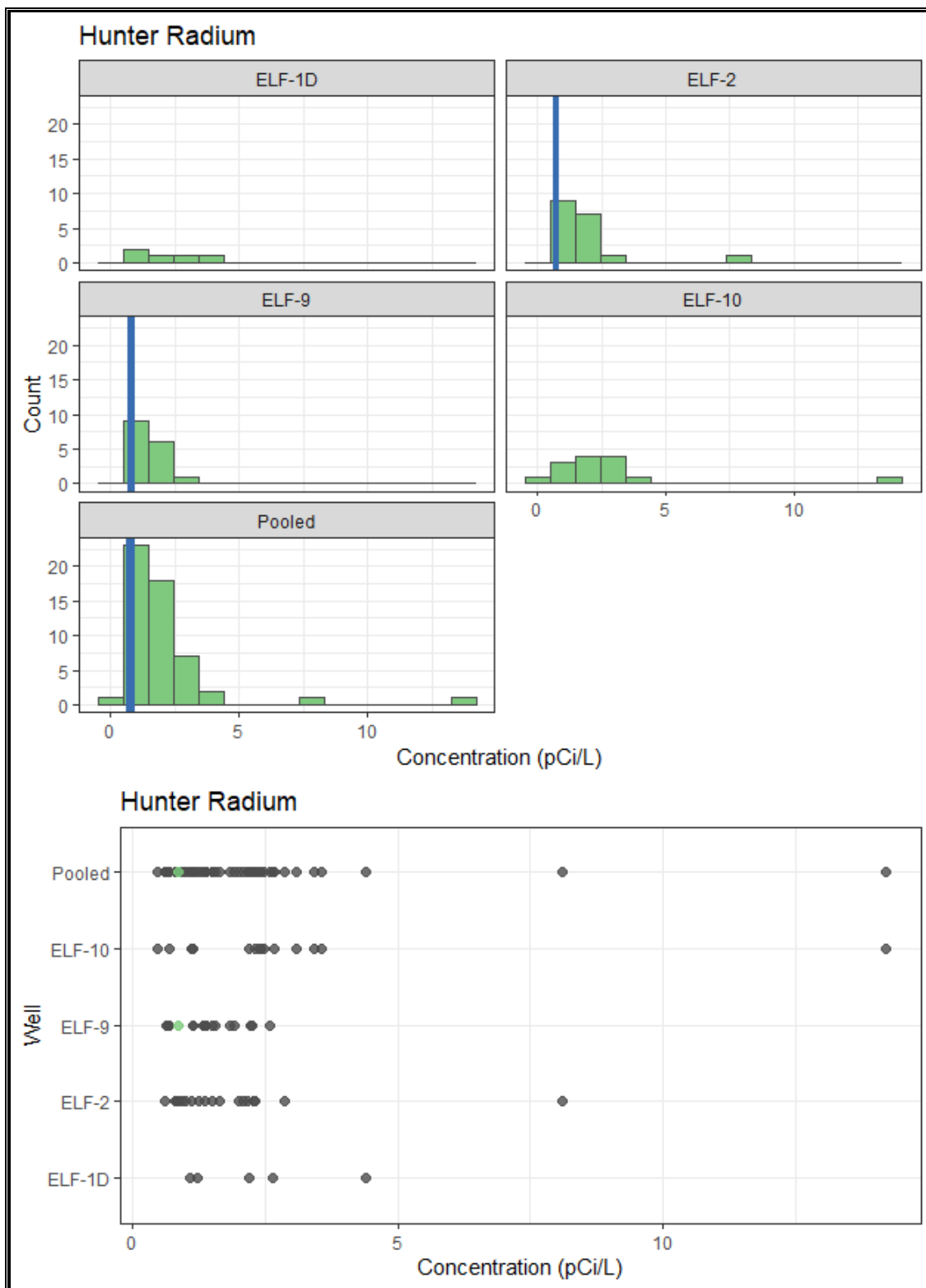




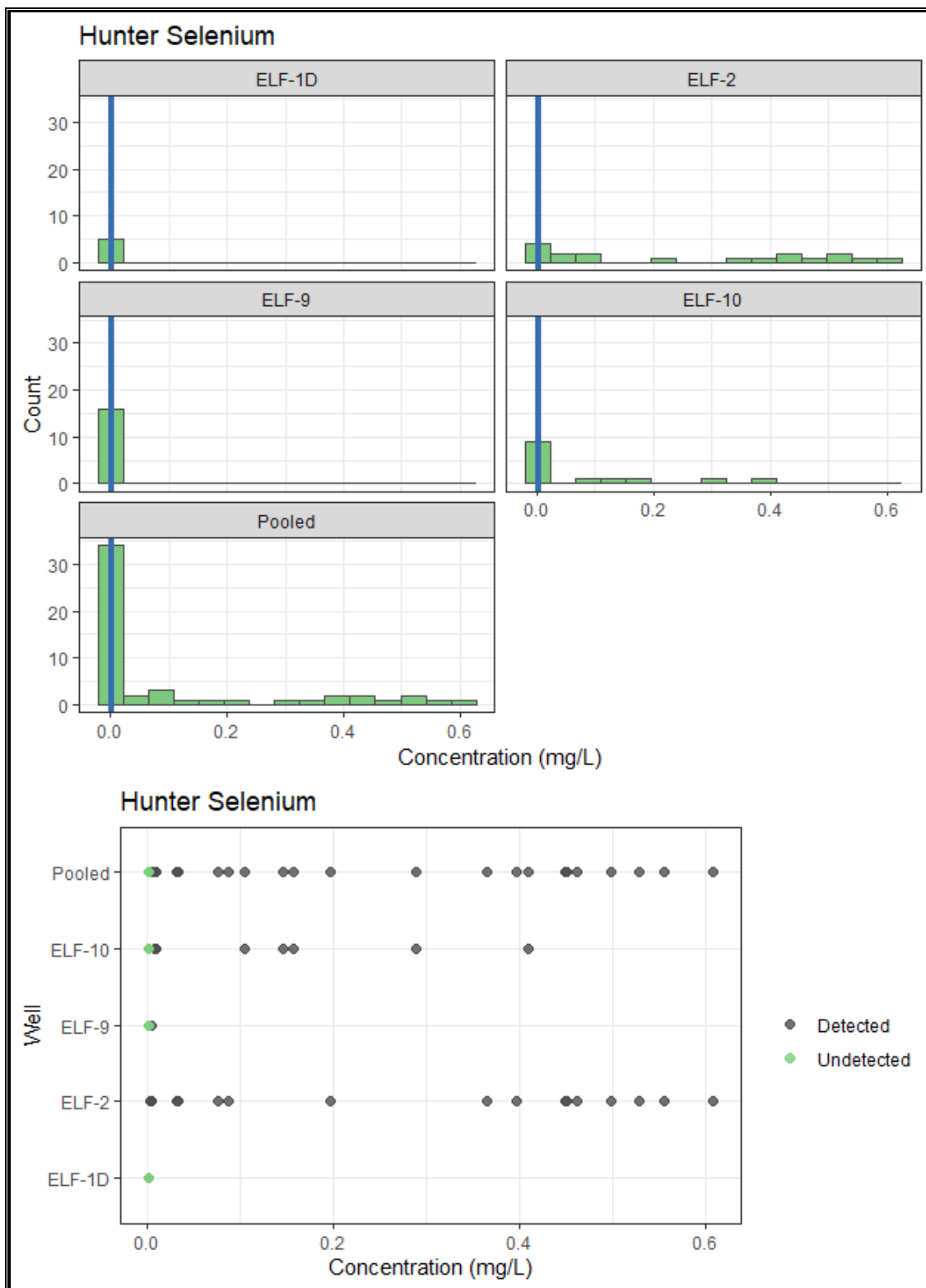
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



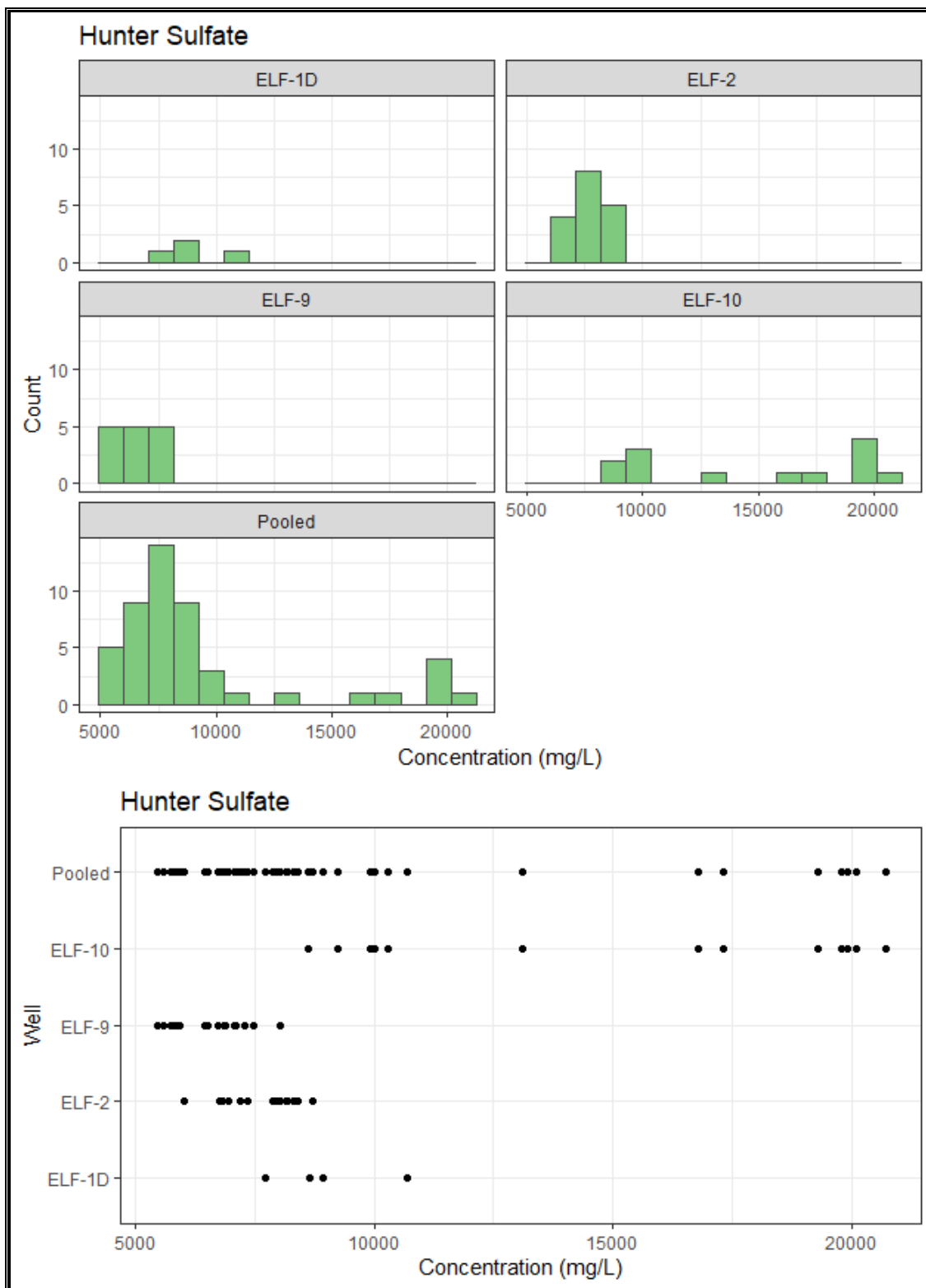
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



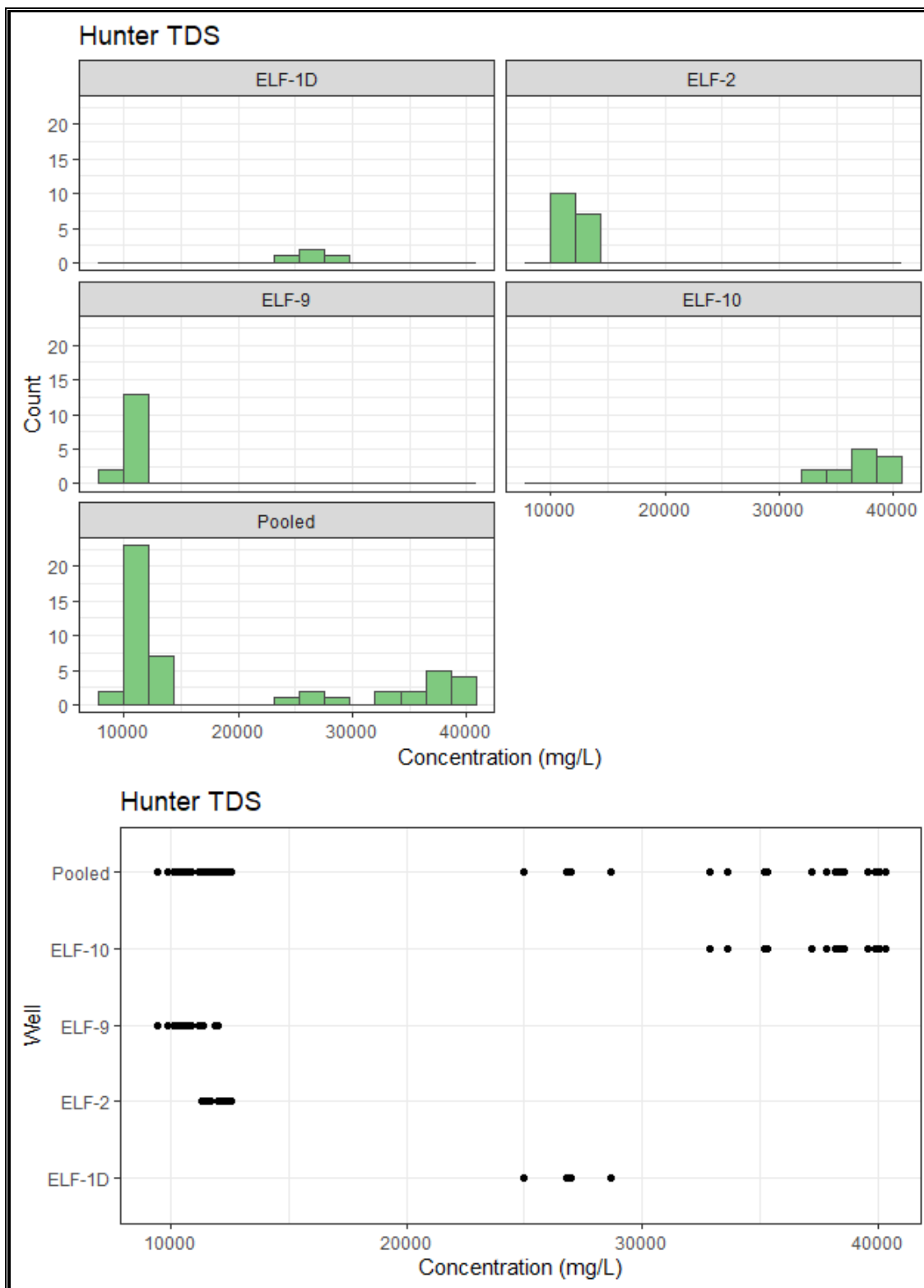
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



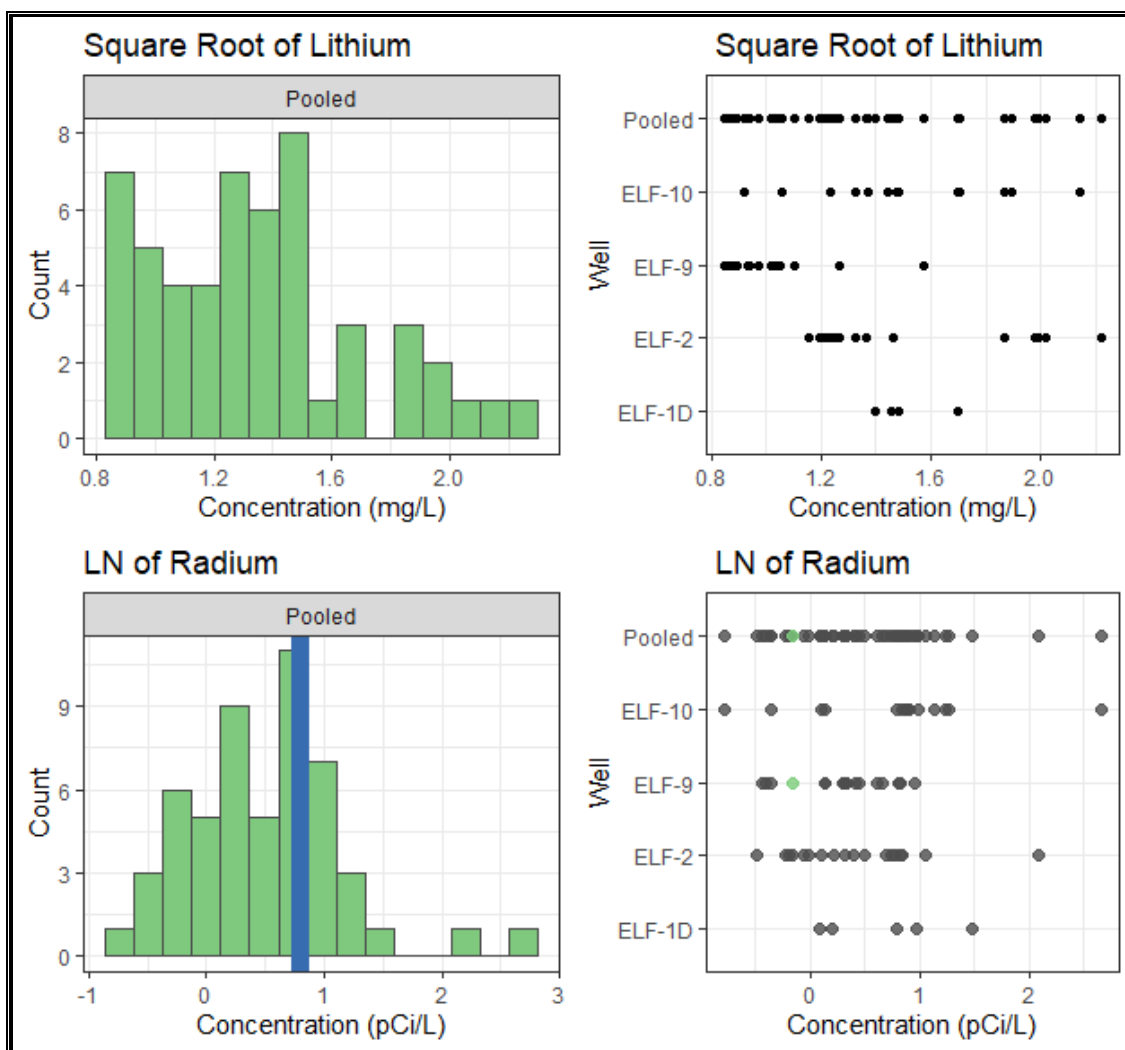
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



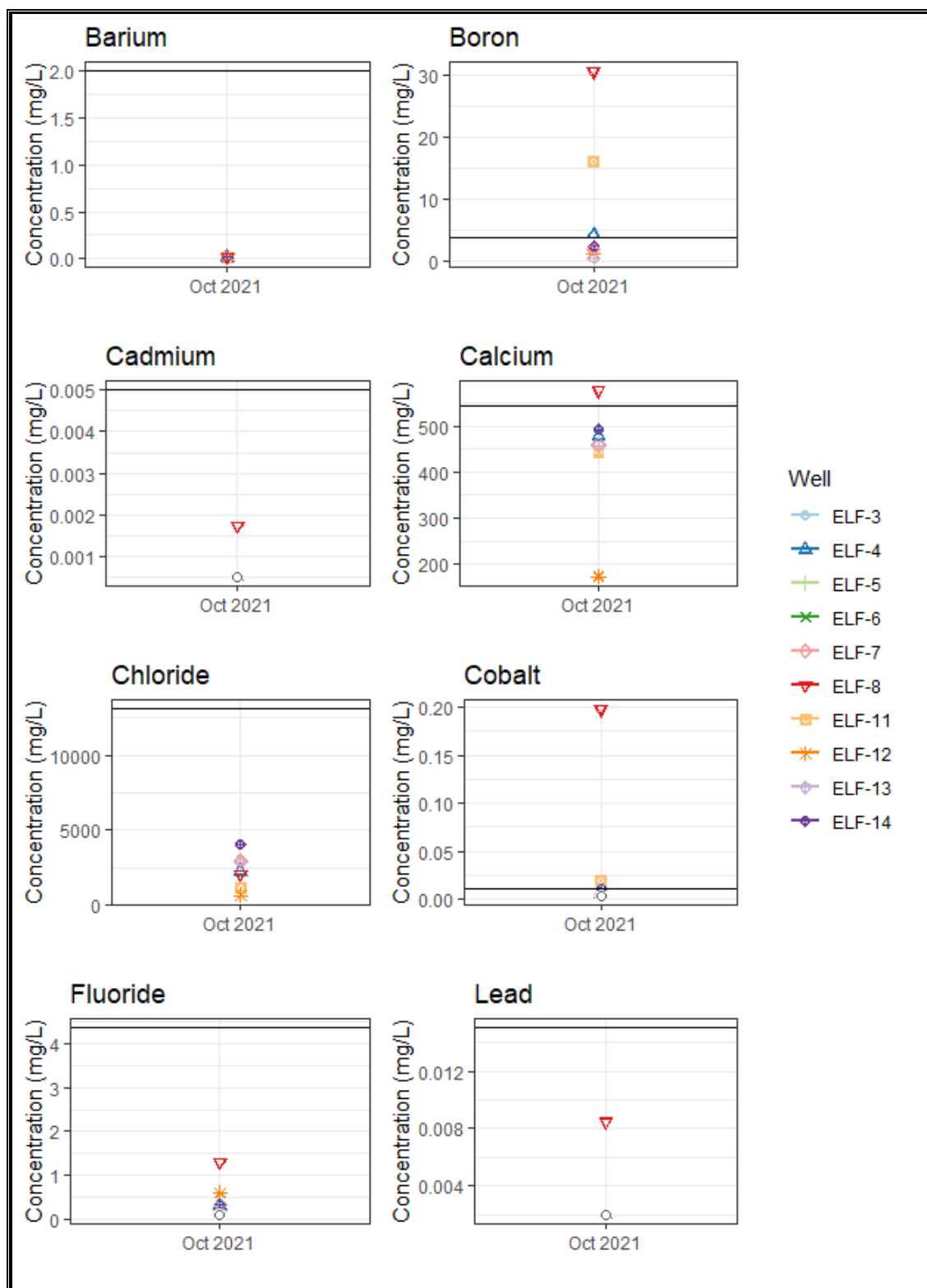
**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.

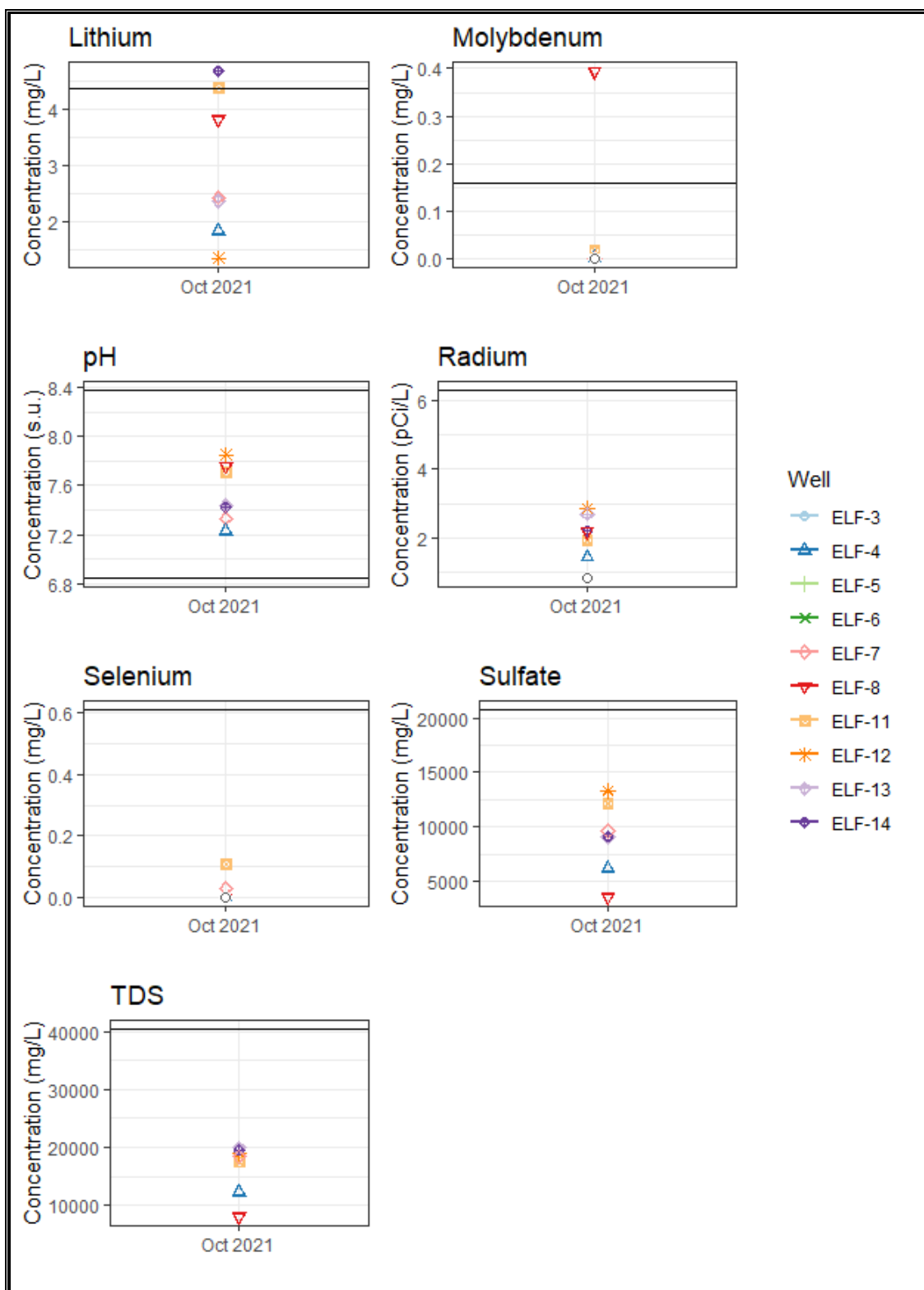


**Figure C.3 (cont.).** Histograms and dot plots for the upgradient Ash Landfill data.



**Figure C.4.** Background upper tolerance limit plots for the CCR Landfill.





**Figure C.4 (cont.).** Background upper tolerance limit plots for the CCR Landfill.

**Attachment D:**

Field Data Sheets



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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-1D
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	12:30
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	82.66
<b>Field Conditions</b>	Very windy, blowing dust, around 24 mph. Partly cloudy 42°F		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,210	12.5	33,800	1.47	7.04	110	8
1,220	12.5	34,200	1.33	7.02	107	7.6
1,230	12.5	34,200	1.34	7.00	105	7.4

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Very poor producer no recharge. Took forever to get samples after stabilization



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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-2
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	13:25
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	23.63
<b>Field Conditions</b>	24 mph gusts, partly cloudy, 42°F		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,305	12.9	13,600	1.01	7.18	210	0
1,315	13.1	13,500	0.97	7.15	213	0
1,325	13.1	13,400	0.93	7.14	214	0

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Good producer, clear water. Water level was dropping but not real fast.



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#### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-3
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	10:00
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	33.6 Top of pump
<b>Field Conditions</b>	Partly cloudy, 46°F, windy		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Pulled pump. Depth to water 33.80 feet No sample. History on this will prove it does not recharge within 24 hours. Not enough water to fill sample bottles.



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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-4
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	09:40
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	18.10
<b>Field Conditions</b>	Mostly cloudy, windy, 40°F		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
920	13.2	14,500	1.32	7.04	322	4.1
930	13.1	14,700	1.25	7.03	320	3.4
940	13.1	14,800	1.21	7.03	318	2.1

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Clear water, good producer. Stabilizes quickly



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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-5
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	09:13
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	
<b>Field Conditions</b>	Windy, 40°F, overcast		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Pump was bound by roots in well. But able to remove pump finally and well has 2" water.



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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-6
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	09:06
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	
<b>Field Conditions</b>	Overcast, 40°F, high wind		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Well is dry. Removed pump to check.





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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-7
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	15:35
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	16.29
<b>Field Conditions</b>	Very windy partly cloudy, 47°F		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,515	14.2	21,200	2.11	7.08	301	113
1,525	14.2	21,500	2.09	7.05	299	110
1,535	14.3	21,500	2.05	7.05	298	106

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Good producer. Replaced and lengthened pump to bottom of well



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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-8
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 25, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	18:30
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	9.11
<b>Field Conditions</b>	49°F, very windy, overcastH		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,810	15.3	11,200	0.93	7.53	254	0
1,820	15.3	11,100	0.91	7.52	252	0
1,830	15.3	11,100	0.90	7.53	250	0

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Very good producer, clear water.



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### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-9
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	23:50
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	22.93
<b>Field Conditions</b>	Heavy wind 47°F partly cloudy		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,120	12.2	14,500	0.68	7.84	39	4.1
1,130	12.2	14,300	0.65	7.88	34	0
1,140	12.2	14,100	0.61	7.93	31	0
1,150	12.2	14,100	0.59	7.94	27	0

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Medium producer. Water level dropping.



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**Phone: 406-782-5220**  
**Fax: 406-723-1537**

### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-10
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 26, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	10:35
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	49.23
<b>Field Conditions</b>	Windy, 45°F partly cloudy		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,015	12.5	46,000	1.25	6.84	334	55
1,025	12.5	46,100	1.17	6.84	331	56.1
1,035	12.5	46,200	1.13	6.82	328	51.8

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Very poor producer.      Very slow recharge. Took a long time to fill all sample bottles.



**Consulting Scientists and Engineers**  
**480 East Park Street**  
**Butte, Montana 59701**  
**Phone: 406-782-5220**  
**Fax: 406-723-1537**

### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-11
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 25, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	17:50
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	28.09
<b>Field Conditions</b>	Overcast, windy, 54°F		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,730	13.9	2,030	1.31	7.31	222	98
1,740	13.9	1,990	1.38	7.26	227	96.3
1,750	13.9	2,000	1.28	7.25	228	95.8

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Very good producer, stabilized quickly



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**Phone: 406-782-5220**  
**Fax: 406-723-1537**

#### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-12
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 25, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	17:15
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	20.79
<b>Field Conditions</b>	55°F, overcast, 18 mph wind		

#### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,645	13.1	2,230	0.96	7.50	-51	13.9
1,655	13.0	2,230	0.87	7.50	-59	10.5
1,705	13.0	2,240	0.89	7.50	-64	9.4
1,715	12.9	2,250	0.80	7.50	-66	9.3

#### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

#### COMMENTS/OBSERVATIONS

Medium producer, mostly clear



**Consulting Scientists and Engineers**  
**480 East Park Street**  
**Butte, Montana 59701**  
**Phone: 406-782-5220**  
**Fax: 406-723-1537**

### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-13
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 25, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	16:35
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	4.36
<b>Field Conditions</b>	55°F, windy, overcast		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,615	13.0	2,020	0.99	7.00	301	0
1,625	13.0	2,020	0.92	6.98	302	0
1,635	12.9	2,020	0.90	6.99	301	0

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Good producer, stayed clear.



**Consulting Scientists and Engineers**  
**480 East Park Street**  
**Butte, Montana 59701**  
**Phone: 406-782-5220**  
**Fax: 406-723-1537**

### GROUNDWATER SAMPLING FORM

<b>Project Name</b>	Hunter Power Plant	<b>Project Location</b>	Castle Dale UT
<b>Job number(s)</b>	PERCM052	<b>Sample ID</b>	ELF-14
<b>Sampling Method</b>	Low Flow Bladder Pump	<b>Sample Date</b>	October 25, 2021
<b>Decon Method</b>	Dedicated Equipment	<b>Sample Time</b>	15:50
<b>Sampler(s) Initials</b>	DV	<b>Depth to Water (ft.)</b>	6.76
<b>Field Conditions</b>	57°F, windy, mostly cloudy		

### FIELD PARAMETERS

TIME (min)	WATER TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	TURBIDITY (NTU)
1,520	15.3	2,310	1.09	6.85	275	59.4
1,530	15.3	2,330	0.98	6.99	265	56
1,540	15.2	2,330	0.94	7.02	260	56.4
1,550	15.2	2,330	0.89	7.03	258	54.1

### SAMPLE COLLECTION

APPENDIX FOR CURRENT SAMPLE		Not Applicable	
APPENDIX	CONTAINERS	PRESERVATIVES	ANALYTES/COMMENTS
3&4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
3&4	(1) 250 mL poly	HNO3	Total metals, Total mercury
3&4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3&4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
3	(1) 250 mL poly	HNO3	Total metals
3	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
3	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity
4	(1) 1/2 gal poly	HNO3	Radium 226 + 228
4	(1) 250 mL poly	HNO3	Total metals, Total mercury
4	(1) 250 mL poly	H2SO4	Nitrate + Nitrite
4	(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

### COMMENTS/OBSERVATIONS

Duplicate sample also taken at this well.      Good producer, muddy but cleared up a lot.



**Attachment E:**

Laboratory Analytical Reports



# Radium-226

## Case Narrative

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### **American West Analytical Labs**

#### **Hunter CCR Sampling -- 2110765**

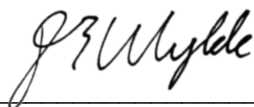
Work Order Number: 2111019

1. This report consists of the analytical results and supporting documentation for thirteen water samples received by ALS on 11/1/2021.
2. These samples were prepared and analyzed according to the current revisions of SOP 783 and SOP 736. The analysis was completed on 12/17/2021.
3. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
4. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate.
5. ICP-AES measurement of barium concentrations prior to chemical separation for sample 2111019-4, the method blank, the laboratory control sample, and the LCSD showed concentrations less than zero. To avoid a low bias in the final analytical results, the initial barium concentration was taken to be zero. These samples are identified with a "Z" flag on the Radiochemistry ICP Worksheet, which can be found in Section 5, "Raw Data" of this report.
6. Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for the LCSD fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. This sample is identified with a "Y1" flag on the final reports.

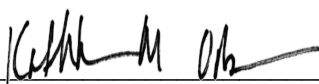


7. ALS uses the following convention for reporting significant digits in the TPU and MDC results. The TPU value is rounded to two significant digits. The MDC value is rounded to the same decimal place as the TPU value. In practice, this could result in an MDC reported value of zero for samples with significant activity, including the batch laboratory control sample.
8. No further anomalous situations were encountered during the preparation or analysis of these samples. All remaining quality control criteria were met.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

  
\_\_\_\_\_  
Dakota Wylde  
Radiochemistry Primary Data Reviewer

12/17/21  
Date

  
\_\_\_\_\_  
Radiochemistry Final Data Reviewer

12/17/21  
Date

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2111019

**Client Name:** American West Analytical Labs

**Client Project Name:** Hunter CCR Sampling

**Client Project Number:** 2110765

**Client PO Number:** 2110765

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-1D	2111019-1		WATER	26-Oct-21	12:30
ELF-2	2111019-2		WATER	26-Oct-21	13:25
ELF-4	2111019-3		WATER	26-Oct-21	9:40
Field Blank	2111019-4		WATER	26-Oct-21	11:50
ELF-7	2111019-5		WATER	26-Oct-21	15:35
ELF-8	2111019-6		WATER	25-Oct-21	18:30
ELF-9	2111019-7		WATER	26-Oct-21	11:50
ELF-10	2111019-8		WATER	26-Oct-21	10:35
ELF-11	2111019-9		WATER	25-Oct-21	17:50
ELF-12	2111019-10		WATER	25-Oct-21	17:15
ELF-13	2111019-11		WATER	25-Oct-21	16:35
ELF-14	2111019-12		WATER	25-Oct-21	15:50
Duplicate (CCR)	2111019-13		WATER	25-Oct-21	

# American West Analytical Laboratories

Client: American West Analytical Laboratories  
Address: 3440 S. 700 W.

Salt Lake City, UT 84119

Project Name: Hunter CCR Sampling / PEREM52  
PO#: 2110765

Chain of Custody

Contact: Elona Hayward  
Phone: 801-263-8686  
Fax: 801-263-8687  
Email: elona@awal-labs.com  
denise@awal-labs.com

2111019

Lab Sample Se



Level: 2+  
Turn Around Time  
Standard

Sample ID:	Date Sampled	Time	# of Containers	Sample Matrix	Radium 226 + Radium 228	Comments
1 ELF-1D	10/26/2021	12:30	2	Aq	x	
2 ELF-2	10/26/2021	13:25	2	Aq	x	
3 ELF-4	10/26/2021	9:40	2	Aq	x	
4 Field Blank * 10/26/21 11:50	10/26/2021	12:00	2	Aq	x	QC 2+: Include performed on client sample in report
5 ELF-7	10/26/2021	15:35	2	Aq	x	
6 ELF-8	10/25/2021	18:30	2	Aq	x	
7 ELF-9	10/26/2021	11:50	2	Aq	x	
8 ELF-10	10/26/2021	10:35	2	Aq	x	
9 ELF-11	10/25/2021	17:50	2	Aq	x	
10 ELF-12	10/25/2021	17:15	2	Aq	x	Samples sent to A&E ALS
11 ELF-13	10/25/2021	16:35	2	Aq	x	Appropriate Utah state certifications required.
12 ELF-14	10/25/2021	15:50	2	Aq	x	
13 Duplicate (CCR)	10/25/2021					

Special Instructions: Include project name and PO# on final report and invoice. Email results to both Elona and Denise.

Relinquished by: Signature	Signature	Date	10/29/21
Print Name	Elona Hayward	Time	1500
Relinquished by: Signature	Signature	Date	
Print Name	Any Kephart	Time	

\* Modification to sampling date/time per EH. kmo 11/4/21



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client: AWAL Workorder No: 2111019  
 Project Manager: KMO Initials: AXK Date: 11/01//2021

	N/A	YES	NO
1. Are airbills / shipping documents present and/or removable?		X	
Tracking number:			
2. Are custody seals on shipping containers intact?		X	
3. Are custody seals on sample containers intact?	X		
4. Is there a COC (chain-of-custody) present?		X	
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)			x
6. Are short-hold samples present?			X
7. Are all samples within holding times for the requested analyses?		X	
8. Were all sample containers received intact? (not broken or leaking)		X	
9. Is there sufficient sample for the requested analyses?			x
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )		X	
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		X	
12. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	X		
13. Were the samples shipped on ice?			X
14. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #5		RAD ONLY
Cooler #: <u>1</u> <u>1</u> Temperature (°C): <u>AMB</u> <u>AMB</u> # of custody seals on cooler: <u>0</u> <u>1</u> External µR/hr reading: <u>11</u> <u>10</u> Background µR/hr reading: <u>11</u> <u>11</u> Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES (If no, see Form 008.)			

\* Please provide details here for NO responses to boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

Sample 4 bottles have 10/26/2021 11:50 info but the COC differs

Sample 1 bottle 2 arrived with only 200ml of sample

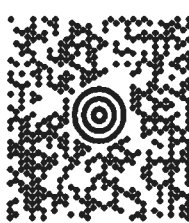



Were unpreserved bottles pH checked? NA All client bottle ID's vs ALS lab ID's double-checked by: AK  
 If applicable, was the client contacted? YES / NO / NA Contact: \_\_\_\_\_ Date/Time: 11/04/21  
 Project Manager Signature / Date: [Signature]

View/Print Label

1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the print dialogue box that appears. Note: If your browser does not support this function, select Print from the File menu to print the label.
2. Fold the printed label at the solid line below. Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.
3. GETTING YOUR SHIPMENT TO UPS
  - Customers with a scheduled Pickup
    - Your driver will pickup your shipment(s) as usual.
  - Customers without a scheduled Pickup
    - Schedule a Pickup on ups.com to have a UPS driver pickup all of your packages.
    - Take your package to any location of The UPS Store®, UPS Access Point™ location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. To find the location nearest you, please visit the 'Locations' Quick link at ups.com.

UPS Access Point™ ADVANCE AUTO PARTS STORE  
CVS STORE # 10741  
UPS Access Point™ 4082 S REDWOOD RD  
SALT LAKE CITY UT 84123-1132  
UPS Access Point™ ADVANCE AUTO PARTS STORE  
3954  
4306 S STATE ST  
SALT LAKE CITY UT 84107-2620

FOLD HERE

ELONA HAYWARD 801-263-8686 AMERICAN WEST ANALYTICAL LABS 3440 S 700 W WEST VALLEY CITY UT 84119	33 LBS DWT: 19,14,11 AH	1 OF 2
<b>SHIP TO:</b> KATIE O'BRIEN 970-218-4543 ALS LIFE SCIENCES/ENVIRONMENTAL 225 COMMERCE DR. FORT COLLINS CO 80524		
<i>Hand</i>		
	<b>CO 805 0-01</b> 	
<b>UPS GROUND</b> TRACKING #: 1Z 9E7 258 03 9174 9159		
		
<b>BILLING: P/P</b>		
Reference #1: 216765 <i>216765</i> XOL 21,10,07 NV45 44,0A,10/2021*		
		

2111019

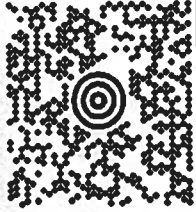

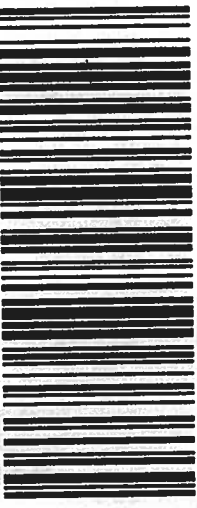



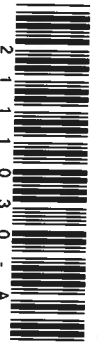
View/Print Label

1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the print dialogue box that appears. Note: If your browser does not support this function, select Print from the File menu to print the label.
2. Fold the printed label at the solid line below. Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.
3. GETTING YOUR SHIPMENT TO UPS
  - Customers with a scheduled Pickup
    - Your driver will pickup your shipment(s) as usual.
  - Customers without a scheduled Pickup
    - Schedule a Pickup on ups.com to have a UPS driver pickup all of your packages.
    - Take your package to any location of The UPS Store®, UPS Access Point™(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. To find the location nearest you, please visit the 'Locations' Quick link at ups.com.

UPS Access Point™  
 ADVANCE AUTO PARTS STORE  
 4082 S REDWOOD RD  
 4306 S STATE ST  
 3954  
 UPS Access Point™  
 ADVANCE AUTO PARTS STORE  
 4719  
 1931 W 3500 S  
 WEST VALLEY CITY UT 84119-3437  
 SALT LAKE CITY UT 84123-1132

FOLD HERE

ELONA HAYWARD 801-263-8686 AMERICAN WEST ANALYTICAL LABS 3440 S 700 W WEST VALLEY CITY UT 84119		50 LBS DWT: 24,14,13 AH	2 OF 2
SHIP TO: KATIE O'BRIEN 970-218-4543 ALS LIFE SCIENCES/ENVIRONMENTAL 225 COMMERCE DR. FORT COLLINS CO 80524 <i>AmuB</i>		10-1	
		CO 805 0-01 	
UPS GROUND TRACKING #: 1Z 9E7 258 03 9056 3566			
			
BILLING: P/P			
Reference #1: 2110765 XOL 21.10.07 NVAS 44.04.10/2021* 			



211019



# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RE211129-1MB

Sample Matrix: WATER

Prep Batch: RE211129-1

Final Aliquot: 995 ml

Prep SOP: PAI 783 Rev 15

QCBatchID: RE211129-1-2

Result Units: pCi/l

Date Collected: 29-Nov-21

Run ID: RE211129-1A

File Name: Manual Entry

Date Prepared: 29-Nov-21

Count Time: 30 minutes

Date Analyzed: 09-Dec-21

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.09 +/- 0.12	0.20	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15790	15390	ug	97.5	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RE211211-1MB

Sample Matrix: WATER

Prep Batch: RE211211-1

Final Aliquot: 993 ml

Prep SOP: PAI 783 Rev 15

QCBatchID: RE211211-1-1

Result Units: pCi/l

Date Collected: 11-Dec-21

Run ID: RE211211-1A

File Name: Manual Entry

Date Prepared: 11-Dec-21

Count Time: 20 minutes

Date Analyzed: 17-Dec-21

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.06 +/- 0.18	0.34	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	29970	28690	ug	95.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RE211129-1LCS

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 29-Nov-21

Date Prepared: 29-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1

QCBatchID: RE211129-1-2

Run ID: RE211129-1A

Count Time: 15 minutes

Final Aliquot: 995 ml

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	48 +/- 12	1	46.42	103	67 - 120	P

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15790	15280	ug	96.8	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE2111019-1

Date Printed: Friday, December 17, 2021

ALS -- Fort Collins

LIMS Version: 7.024

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# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RE211129-1LCSD

Sample Matrix: WATER

Prep Batch: RE211129-1

Final Aliquot: 995 ml

Prep SOP: PAI 783 Rev 15

QCBatchID: RE211129-1-2

Result Units: pCi/l

Date Collected: 29-Nov-21

Run ID: RE211129-1A

File Name: Manual Entry

Date Prepared: 29-Nov-21

Count Time: 15 minutes

Date Analyzed: 09-Dec-21

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	41 +/- 10	0	46.42	88.9	67 - 120	P,Y1

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15790	15970	ug	101	40 - 110 %	Y1

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RE211211-1LCS

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 11-Dec-21

Date Prepared: 11-Dec-21

Date Analyzed: 17-Dec-21

Prep Batch: RE211211-1

QCBatchID: RE211211-1-1

Run ID: RE211211-1A

Count Time: 15 minutes

Final Aliquot: 993 ml

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	41 +/- 10	0	46.42	88.5	67 - 120	P

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	29960	28740	ug	95.9	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RE211211-1LCSD

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 11-Dec-21

Date Prepared: 11-Dec-21

Date Analyzed: 17-Dec-21

Prep Batch: RE211211-1

QCBatchID: RE211211-1-1

Run ID: RE211211-1A

Count Time: 15 minutes

Final Aliquot: 993 ml

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	44 +/- 11	0	46.42	95.6	67 - 120	P

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	29980	27830	ug	92.8	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE2111019-1

Date Printed: Friday, December 17, 2021

ALS -- Fort Collins

LIMS Version: 7.024

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# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID:   
Lab ID: RE211129-1LCSD

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 29-Nov-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
13982-63-3	Ra-226	48 +/-	12	1	P	41 +/-	10	0	P,Y1	0.419	2.13

### Comments:

#### Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.  
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.  
Y2 - Chemical Yield outside default limits.  
W - DER is greater than Warning Limit of 1.42  
D - DER is greater than Control Limit of 2.13  
LT - Result is less than Request MDC, greater than sample specific MDC  
M - Requested MDC not met.  
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.  
L - LCS Recovery below lower control limit.  
H - LCS Recovery above upper control limit.  
P - LCS, Matrix Spike Recovery within control limits.  
N - Matrix Spike Recovery outside control limits

#### Abbreviations:

TPU - Total Propagated Uncertainty  
DER - Duplicate Error Ratio  
BDL - Below Detection Limit  
NR - Not Reported

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID:	
Lab ID:	RE211211-1LCSD

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 11-Dec-21

Date Prepared: 11-Dec-21

Date Analyzed: 17-Dec-21

Prep Batch: RE211211-1

QCBatchID: RE211211-1-1

Run ID: RE211211-1A

Count Time: 15 minutes

Final Aliquot: 993 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
13982-63-3	Ra-226	41 +/- 10		0	P	44 +/- 11		0	P	0.216	2.13

### Comments:

#### Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2.13

LT - Result is less than Request MDC, greater than sample specific MDC

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

#### Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Data Package ID: RE2111019-1



# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-1D

Lab ID: 2111019-1

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 26-Oct-21

Date Prepared: 11-Dec-21

Date Analyzed: 17-Dec-21

Prep Batch: RE211211-1

QCBatchID: RE211211-1-1

Run ID: RE211211-1A

Count Time: 20 minutes

Report Basis: Unfiltered

Final Aliquot: 993 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.07 +/- 0.16	0.29	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	29970	28060	ug	93.6	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-2  
Lab ID: 2111019-2

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 26-Oct-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.06 +/- 0.14	0.26	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	14130	ug	89.4	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-4  
Lab ID: 2111019-3

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 26-Oct-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.32 +/- 0.22	0.23	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	14650	ug	92.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: Field Blank

Lab ID: 2111019-4

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 26-Oct-21

Date Prepared: 29-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1

QCBatchID: RE211129-1-2

Run ID: RE211129-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	-0.03 +/- 0.23	0.45	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15790	13900	ug	88.0	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-7  
Lab ID: 2111019-5

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 26-Oct-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.41 +/- 0.27	0.30	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	14760	ug	93.5	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-8  
Lab ID: 2111019-6

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 25-Oct-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.68 +/- 0.35	0.36	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	15390	ug	97.4	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-9  
Lab ID: 2111019-7

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 26-Oct-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.34 +/- 0.22	0.23	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	15570	ug	98.6	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-10  
Lab ID: 2111019-8

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 26-Oct-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.59 +/- 0.32	0.24	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	15440	ug	97.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1



# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-11  
Lab ID: 2111019-9

Sample Matrix: WATER  
Prep SOP: PAI 783 Rev 15  
Date Collected: 25-Oct-21  
Date Prepared: 29-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1  
QCBatchID: RE211129-1-2  
Run ID: RE211129-1A  
Count Time: 15 minutes  
Report Basis: Unfiltered

Final Aliquot: 995 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.31 +/- 0.21	0.22	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	15350	ug	97.2	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-12

Lab ID: 2111019-10

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 25-Oct-21

Date Prepared: 29-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1

QCBatchID: RE211129-1-2

Run ID: RE211129-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.19 +/- 0.20	0.30	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15790	15100	ug	95.6	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-13

Lab ID: 2111019-11

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 25-Oct-21

Date Prepared: 29-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1

QCBatchID: RE211129-1-2

Run ID: RE211129-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.57 +/- 0.30	0.31	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15790	15200	ug	96.2	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-14

Lab ID: 2111019-12

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 25-Oct-21

Date Prepared: 29-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1

QCBatchID: RE211129-1-2

Run ID: RE211129-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.56 +/- 0.30	0.28	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15800	15080	ug	95.4	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1

# Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 15

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: Duplicate (CCR)

Lab ID: 2111019-13

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 15

Date Collected: 25-Oct-21

Date Prepared: 29-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RE211129-1

QCBatchID: RE211129-1-2

Run ID: RE211129-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.21 +/- 0.23	0.36	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	15810	15430	ug	97.6	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE2111019-1



# Radium-228

## Case Narrative

---

### **American West Analytical Labs**

#### **Hunter CCR Sampling -- 2110765**

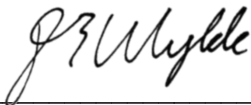
Work Order Number: 2111019

1. This report consists of the analytical results and supporting documentation for thirteen water samples received by ALS on 11/1/2021.
2. These samples were prepared according to the current revision of SOP 749.
3. The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724. The analyses were completed on 12/9/2021.
4. The analysis results for these samples reported in units of pCi/L. The samples were not filtered prior to analysis.
5. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate.
6. ICP-AES measurement of barium concentrations prior to chemical separation for the laboratory control sample showed concentrations less than zero. To avoid a low bias in the final analytical results, the initial barium concentration was taken to be zero. This sample is identified with a "Z" flag on the Radiochemistry ICP Worksheet, which can be found in Section 5, "Raw Data" of this report.
7. The requested MDC was not met for sample 2111019-12. This sample was counted for a maximum count time of 250 minutes and results are reported without further qualification. This sample is identified with an "M" or an "M3" flag on the final reports. The reported activity for samples identified with an "M3" flag exceeds the achieved MDC.

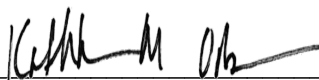


8. Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for samples 2111019-10 fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. This sample is identified with an "Y1" flag on the final reports.
9. No further anomalous situations were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

  
\_\_\_\_\_  
Dakota Wylde  
Radiochemistry Primary Data Reviewer

12/17/21  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Radiochemistry Final Data Reviewer

12/17/21  
\_\_\_\_\_  
Date

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2111019

**Client Name:** American West Analytical Labs

**Client Project Name:** Hunter CCR Sampling

**Client Project Number:** 2110765

**Client PO Number:** 2110765

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-1D	2111019-1		WATER	26-Oct-21	12:30
ELF-2	2111019-2		WATER	26-Oct-21	13:25
ELF-4	2111019-3		WATER	26-Oct-21	9:40
Field Blank	2111019-4		WATER	26-Oct-21	11:50
ELF-7	2111019-5		WATER	26-Oct-21	15:35
ELF-8	2111019-6		WATER	25-Oct-21	18:30
ELF-9	2111019-7		WATER	26-Oct-21	11:50
ELF-10	2111019-8		WATER	26-Oct-21	10:35
ELF-11	2111019-9		WATER	25-Oct-21	17:50
ELF-12	2111019-10		WATER	25-Oct-21	17:15
ELF-13	2111019-11		WATER	25-Oct-21	16:35
ELF-14	2111019-12		WATER	25-Oct-21	15:50
Duplicate (CCR)	2111019-13		WATER	25-Oct-21	



# American West Analytical Laboratories

Chain of Custody

2111019

Lab Sample Se



Client: American West Analytical Laboratories  
Address: 3440 S. 700 W.  
Salt Lake City, UT 84119

Contact: Elona Hayward  
Phone: 801-263-8686  
Fax: 801-263-8687  
Email: elona@awal-labs.com  
denise@awal-labs.com

Project Name: Hunter CCR Sampling / PERCM52  
PO#: 2110765

QC Level: 2+

Turn Around Time  
Standard

Sample ID:	Date Sampled	Time	# of Containers	Sample Matrix	Radium 226 + Radium 228											Comments	
1 ELF-1D	10/26/2021	12:30	2	Aq	x												
2 ELF-2	10/26/2021	13:25	2	Aq	x												
3 ELF-4	10/26/2021	9:40	2	Aq	x												
4 Field Blank	* 10/26/21 11:50	<del>1/10/1980</del> <del>12:00</del>	2	Aq	x												
5 ELF-7	10/26/2021	15:35	2	Aq	x												
6 ELF-8	10/25/2021	18:30	2	Aq	x												
7 ELF-9	10/26/2021	11:50	2	Aq	x												
8 ELF-10	10/26/2021	10:35	2	Aq	x												
9 ELF-11	10/25/2021	17:50	2	Aq	x												
10 ELF-12	10/25/2021	17:15	2	Aq	x												
11 ELF-13	10/25/2021	16:35	2	Aq	x												
12 ELF-14	10/25/2021	15:50	2	Aq	x												
13 Duplicate (CCR)	10/25/2021																

**QC 2+: Include performed on client sample in report**

**Appropriate Utah state certifications required.**

Laboratory Use Only		
Samples Were:		
1 Shipped or hand delivered		
2 Ambient or Chilled		
3 Temperature		
4 Received Broken/Leaking (Improperly Sealed)	Y	N
5 Properly Preserved	Y	N
6 Received Within Holding Times	Y	N
1 Present on Outer Package	Y	N NA
2 Unbroken on Outer Package	Y	N NA
3 Present on Sample	Y	N NA
4 Unbroken on Sample	Y	N NA
Discrepancies Between Sample Labels and COC Record?		
Y	N	

Special Instructions: Include project name and PO# on final report and invoice. Email results to both Elona and Denise.

Relinquished by: Signature <i>Elona Hayward</i>	Date: 10/29/21	Received by: Signature <i>Amy Kephart</i>	Date: 11/01/2021
Print Name: Elona Hayward	Time: 1500	Print Name: Amy Kephart	Time: 1127
Relinquished by: Signature	Date:	Received by: Signature	Date:
Print Name:	Time:	Print Name:	Time:

\* Modification to sampling date/time per EH. kmo 11/4/21



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client: AWAL Workorder No: 2111019  
Project Manager: KMO Initials: AXK Date: 11/01//2021

	N/A	YES	NO
1. Are airbills / shipping documents present and/or removable?		X	
Tracking number:			
2. Are custody seals on shipping containers intact?		X	
3. Are custody seals on sample containers intact?	X		
4. Is there a COC (chain-of-custody) present?		X	
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)			x
6. Are short-hold samples present?			X
7. Are all samples within holding times for the requested analyses?		X	
8. Were all sample containers received intact? (not broken or leaking)		X	
9. Is there sufficient sample for the requested analyses?			x
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )		X	
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		X	
12. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	X		
13. Were the samples shipped on ice?			X
14. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #5		RAD ONLY
Cooler #: <u>1</u> <u>1</u> Temperature (°C): <u>AMB</u> <u>AMB</u> # of custody seals on cooler: <u>0</u> <u>1</u> External µR/hr reading: <u>11</u> <u>10</u> Background µR/hr reading: <u>11</u> <u>11</u> Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES (If no, see Form 008.)			

\* Please provide details here for NO responses to boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

Sample 4 bottles have 10/26/2021 11:50 info but the COC differs

Sample 1 bottle 2 arrived with only 200ml of sample

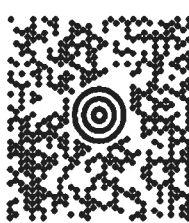



Were unpreserved bottles pH checked? NA All client bottle ID's vs ALS lab ID's double-checked by: AK  
If applicable, was the client contacted? YES / NO / NA Contact: \_\_\_\_\_ Date/Time: 11/04/21  
Project Manager Signature / Date: [Signature]

View/Print Label

1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the print dialogue box that appears. Note: If your browser does not support this function, select Print from the File menu to print the label.
2. Fold the printed label at the solid line below. Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.
3. GETTING YOUR SHIPMENT TO UPS
  - Customers with a scheduled Pickup
    - Your driver will pickup your shipment(s) as usual.
  - Customers without a scheduled Pickup
    - Schedule a Pickup on ups.com to have a UPS driver pickup all of your packages.
    - Take your package to any location of The UPS Store®, UPS Access Point™ location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. To find the location nearest you, please visit the 'Locations' Quick link at ups.com.

UPS Access Point™ ADVANCE AUTO PARTS STORE  
CVS STORE # 10741  
UPS Access Point™ 4082 S REDWOOD RD  
SALT LAKE CITY UT 84123-1132  
UPS Access Point™ ADVANCE AUTO PARTS STORE  
3954  
4306 S STATE ST  
SALT LAKE CITY UT 84107-2620

FOLD HERE

ELONA HAYWARD 801-263-8686 AMERICAN WEST ANALYTICAL LABS 3440 S 700 W WEST VALLEY CITY UT 84119	33 LBS DWT: 19.14, 11 AH	1 OF 2
<b>SHIP TO:</b> KATIE O'BRIEN 970-218-4543 ALS LIFE SCIENCES/ENVIRONMENTAL 225 COMMERCE DR. FORT COLLINS CO 80524		
<i>Hand</i>		
	<b>CO 805 0-01</b> 	
<b>UPS GROUND</b> TRACKING #: 1Z 9E7 258 03 9174 9159		
		
<b>BILLING: P/P</b>		
Reference #1: 216765 <i>216765</i> XOL 21.10.07 NV45 44.0A 10/2021*		
		

2111019

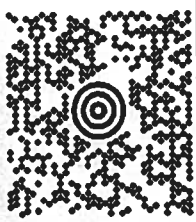





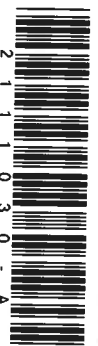
# View/Print Label

1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the print dialogue box that appears. Note: If your browser does not support this function, select Print from the File menu to print the label.
2. Fold the printed label at the solid line below. Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.
3. GETTING YOUR SHIPMENT TO UPS
  - Customers with a scheduled Pickup
    - Your driver will pickup your shipment(s) as usual.
  - Customers without a scheduled Pickup
    - Schedule a Pickup on ups.com to have a UPS driver pickup all of your packages.
    - Take your package to any location of The UPS Store®, UPS Access Point™ location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. To find the location nearest you, please visit the 'Locations' Quick link at ups.com.

UPS Access Point™  
 ADVANCE AUTO PARTS STORE  
 4082 S REDWOOD RD  
 4082 S REDWOOD RD  
 4306 S STATE ST  
 3954  
 UPS Access Point™  
 ADVANCE AUTO PARTS STORE  
 4306 S STATE ST  
 3954  
 WEST VALLEY CITY UT 84119-3437  
 SALT LAKE CITY UT 84123-1132  
 SALT LAKE CITY UT 84107-2620

FOLD HERE

ELONA HAYWARD 801-263-8686 AMERICAN WEST ANALYTICAL LABS 3440 S 700 W WEST VALLEY CITY UT 84119		50 LBS DWT: 24,14,13 AH	2 OF 2
SHIP TO: KATIE O'BRIEN 970-218-4543 ALS LIFE SCIENCES/ENVIRONMENTAL 225 COMMERCE DR. FORT COLLINS CO 80524 <i>AmuB</i>		10-1	
		CO 805 0-01 	
UPS GROUND TRACKING #: 1Z 9E7 258 03 9056 3566			
			
BILLING: P/P			
Reference #1: 2110765 XOL 21.10.07 NVAS 44.04.10/2021* 			



# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RA211121-1MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 21-Nov-21

Date Prepared: 21-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RA211121-1

QCBatchID: RA211121-1-1

Run ID: RA211121-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAA1209A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	0.42 +/- 0.43	0.89	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31780	29950	ug	94.2	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Data Package ID: RA2111019-1

Date Printed: Friday, December 17, 2021

ALS -- Fort Collins

LIMS Version: 7.024

Page 1 of 2

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RA211201-3MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 01-Dec-21

Date Prepared: 01-Dec-21

Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3

QCBatchID: RA211201-3-1

Run ID: RA211201-3A

Count Time: 150 minutes

Final Aliquot: 998 ml

Result Units: pCi/l

File Name: RAA1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	0.45 +/- 0.42	0.86	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32410	31630	ug	97.6	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Data Package ID: RA2111019-1

Date Printed: Friday, December 17, 2021

ALS -- Fort Collins

LIMS Version: 7.024

Page 2 of 2

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RA211121-1LCS

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 21-Nov-21

Date Prepared: 21-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RA211121-1

QCBatchID: RA211121-1-1

Run ID: RA211121-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAA1209A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	28.6 +/- 6.7	0.9	22.83	125	70 - 130	P

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31770	30720	ug	96.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA2111019-1

Date Printed: Friday, December 17, 2021

ALS -- Fort Collins

LIMS Version: 7.024

Page 1 of 3

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RA211121-1LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 21-Nov-21

Date Prepared: 21-Nov-21

Date Analyzed: 09-Dec-21

Prep Batch: RA211121-1

QCBatchID: RA211121-1-1

Run ID: RA211121-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAA1209A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	29.3 +/- 6.8	0.9	22.83	128	70 - 130	P

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31790	28270	ug	88.9	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA2111019-1

Date Printed: Friday, December 17, 2021

ALS -- Fort Collins

LIMS Version: 7.024

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# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Lab ID: RA211201-3LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 01-Dec-21

Date Prepared: 01-Dec-21

Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3

QCBatchID: RA211201-3-1

Run ID: RA211201-3A

Count Time: 30 minutes

Final Aliquot: 998 ml

Result Units: pCi/l

File Name: RAA1215A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	26.6 +/- 6.5	1.9	22.78	117	70 - 130	P,M3

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32410	29480	ug	91.0	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID:   
Lab ID: RA211121-1LCSD

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 21-Nov-21  
Date Prepared: 21-Nov-21  
Date Analyzed: 09-Dec-21

Prep Batch: RA211121-1  
QCBatchID: RA211121-1-1  
Run ID: RA211121-1A  
Count Time: 150 minutes

Final Aliquot: 997 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAA1209A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	28.6 +/- 6.7		0.9	P	29.3 +/- 6.8		0.9	P	0.0668	2.13

### Comments:

#### Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.  
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.  
Y2 - Chemical Yield outside default limits.  
W - DER is greater than Warning Limit of 1.42  
D - DER is greater than Control Limit of 2.13  
LT - Result is less than Request MDC, greater than sample specific MDC  
M - Requested MDC not met.  
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.  
L - LCS Recovery below lower control limit.  
H - LCS Recovery above upper control limit.  
P - LCS, Matrix Spike Recovery within control limits.  
N - Matrix Spike Recovery outside control limits

#### Abbreviations:

TPU - Total Propagated Uncertainty  
DER - Duplicate Error Ratio  
BDL - Below Detection Limit  
NR - Not Reported

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID:	
Lab ID:	RA211201-3LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 01-Dec-21

Date Prepared: 01-Dec-21

Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3

QCBatchID: RA211201-3-1

Run ID: RA211201-3A

Count Time: 30 minutes

Final Aliquot: 998 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAA1215A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	NR		NR		26.6 +/- 6.5		NA	P,M3	0.905	2.13

### Comments:

#### Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2.13

LT - Result is less than Request MDC, greater than sample specific MDC

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

#### Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-1D

Lab ID: 2111019-1

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 26-Oct-21

Date Prepared: 21-Nov-21

Date Analyzed: 17-Dec-21

Prep Batch: RA211121-1

QCBatchID: RA211121-1-1

Run ID: RA211121-1A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAA1209A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	4.4	0.8	1	NA	
15262-20-1	Ra-228	4.4 +/- 1.2	0.8	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31780	31690	ug	99.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-2  
Lab ID: 2111019-2

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 26-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.1	0.79	1	NA	
15262-20-1	Ra-228	1.10 +/- 0.48	0.79	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	32100	ug	99.0	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-4  
Lab ID: 2111019-3

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 26-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.45	0.81	1	NA	
15262-20-1	Ra-228	1.13 +/- 0.49	0.81	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32430	31610	ug	97.5	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: Field Blank

Lab ID: 2111019-4

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 26-Oct-21

Date Prepared: 01-Dec-21

Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3

QCBatchID: RA211201-3-1

Run ID: RA211201-3A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 998 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	0	0.88	1	NA	U
15262-20-1	Ra-228	-0.17 +/- 0.38	0.88	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32410	30510	ug	94.1	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-7  
Lab ID: 2111019-5

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 26-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	0	0.85	1	NA	U
15262-20-1	Ra-228	0.48 +/- 0.42	0.85	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	31780	ug	98.0	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1



# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-8  
Lab ID: 2111019-6

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 25-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.19	0.87	1	NA	
15262-20-1	Ra-228	1.51 +/- 0.58	0.87	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	31440	ug	97.0	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-9  
Lab ID: 2111019-7

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 26-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	0	0.85	1	NA	U
15262-20-1	Ra-228	0.84 +/- 0.47	0.85	1	NA	U

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	30580	ug	94.3	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-10  
Lab ID: 2111019-8

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 26-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.39	0.81	1	NA	
15262-20-1	Ra-228	1.80 +/- 0.61	0.81	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32430	32200	ug	99.3	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-11  
Lab ID: 2111019-9

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 25-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAC1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.92	0.9	1	NA	
15262-20-1	Ra-228	1.61 +/- 0.60	0.90	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32430	31440	ug	97.0	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-12  
Lab ID: 2111019-10

Sample Matrix: WATER  
Prep SOP: SOP749 Rev 7  
Date Collected: 25-Oct-21  
Date Prepared: 01-Dec-21  
Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3  
QCBatchID: RA211201-3-1  
Run ID: RA211201-3A  
Count Time: 150 minutes  
Report Basis: Unfiltered

Final Aliquot: 998 ml  
Prep Basis: Unfiltered  
Moisture(%): NA  
Result Units: pCi/l  
File Name: RAA1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.85	0.91	1	NA	
15262-20-1	Ra-228	2.85 +/- 0.85	0.91	1	NA	Y1

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	32850	ug	101	40 - 110 %	Y1

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-13

Lab ID: 2111019-11

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 25-Oct-21

Date Prepared: 01-Dec-21

Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3

QCBatchID: RA211201-3-1

Run ID: RA211201-3A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 998 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAA1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.69	0.91	1	NA	
15262-20-1	Ra-228	2.12 +/- 0.70	0.91	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	31680	ug	97.7	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: ELF-14

Lab ID: 2111019-12

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 25-Oct-21

Date Prepared: 01-Dec-21

Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3

QCBatchID: RA211201-3-1

Run ID: RA211201-3A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 998 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAA1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.19	1.18	1	NA	
15262-20-1	Ra-228	1.63 +/- 0.71	1.18	1	NA	M3

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	25260	ug	77.9	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1

# Radium-228 Analysis by GFPC

PAI 724 Rev 14

## Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2111019

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Sampling 2110765

Field ID: Duplicate (CCR)

Lab ID: 2111019-13

Sample Matrix: WATER

Prep SOP: SOP749 Rev 7

Date Collected: 25-Oct-21

Date Prepared: 01-Dec-21

Date Analyzed: 15-Dec-21

Prep Batch: RA211201-3

QCBatchID: RA211201-3-1

Run ID: RA211201-3A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 998 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAA1215B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2	0.96	1	NA	
15262-20-1	Ra-228	2.00 +/- 0.70	0.96	1	NA	

## Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32420	31580	ug	97.4	40 - 110 %	

## Comments:

### Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

### Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA2111019-1





Brad Giles  
PacifiCorp  
1407 West North Temple, # 280  
Salt Lake City, UT 84116  
TEL: (801) 220-2989

RE: Hunter Power Plant - CCR

Dear Brad Giles:

Lab Set ID: 2110765

3440 South 700 West  
Salt Lake City, UT 84119

Phone: (801) 263-8686  
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e-mail: [awal@awal-labs.com](mailto:awal@awal-labs.com)  
web: [www.awal-labs.com](http://www.awal-labs.com)

American West Analytical Laboratories received sample(s) on 10/28/2021 for the analyses presented in the following report.

American West Analytical Laboratories (AWAL) is accredited by The National Environmental Laboratory Accreditation Program (NELAP) in Utah and Texas; and is state accredited in Colorado, Idaho, New Mexico, Wyoming, and Missouri.

All analyses were performed in accordance to the NELAP protocols unless noted otherwise. Accreditation scope documents are available upon request. If you have any questions or concerns regarding this report please feel free to call.

The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction, and/or purging efficiency. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

Thank You,

Approved by: \_\_\_\_\_  
Laboratory Director or designee

Sample(s) were subcontracted for the following analyses:

Radiological Testing



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-001  
**Client Sample ID:** ELF-1D  
**Collection Date:** 10/26/2021 1230h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

3440 South 700 West  
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 web: www.awal-labs.com

Jennifer Osborn  
 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	<b>0.0104</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 1951h	E200.7	0.500	<b>1.94</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 1951h	E200.7	5.00	<b>393</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00400	< 0.00400	
Lead	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 1951h	E200.7	0.500	<b>2.89</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1047h	E245.1	0.0000900	< 0.0000900	<sup>1</sup>
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	<b>0.00866</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1845h	E200.8	0.00200	< 0.00200	

<sup>1</sup> - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-002  
**Client Sample ID:** ELF-2  
**Collection Date:** 10/26/2021 1325h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

3440 South 700 West  
Salt Lake City, UT 84119

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 web: www.awal-labs.com

Jennifer Osborn  
 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	<b>0.0102</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 1953h	E200.7	0.500	<b>3.12</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 1953h	E200.7	5.00	<b>400</b>	2
Chromium	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00400	< 0.00400	
Lead	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 1953h	E200.7	0.500	<b>1.87</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1057h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	<b>0.00218</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	<b>0.00456</b>	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1849h	E200.8	0.00200	< 0.00200	

<sup>2</sup> - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-003  
**Client Sample ID:** ELF-4  
**Collection Date:** 10/26/2021 940h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

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Salt Lake City, UT 84119

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web: www.awal-labs.com

Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	<b>0.0118</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2018h	E200.7	1.00	<b>4.36</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2018h	E200.7	10.0	<b>479</b>	<sup>2</sup>
Chromium	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00400	<b>0.00608</b>	
Lead	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2018h	E200.7	1.00	<b>1.82</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1059h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	<b>0.00228</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1921h	E200.8	0.00200	< 0.00200	

<sup>2</sup> - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-004  
**Client Sample ID:** Field Blank  
**Collection Date:** 10/26/2021 1150h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

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 web: www.awal-labs.com

Jennifer Osborn  
 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2024h	E200.7	0.100	< 0.100	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2024h	E200.7	1.00	< 1.00	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00400	< 0.00400	
Lead	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2024h	E200.7	0.100	< 0.100	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1101h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1932h	E200.8	0.00200	< 0.00200	



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-005  
**Client Sample ID:** ELF-7  
**Collection Date:** 10/26/2021 1535h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

### TOTAL METALS

3440 South 700 West  
Salt Lake City, UT 84119

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web: www.awal-labs.com

Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	<b>0.0101</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2026h	E200.7	1.00	<b>1.80</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2026h	E200.7	10.0	<b>461</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00400	< 0.00400	
Lead	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2026h	E200.7	1.00	<b>2.42</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1103h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	<b>0.00236</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	<b>0.0311</b>	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1936h	E200.8	0.00200	< 0.00200	



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-006  
**Client Sample ID:** ELF-8  
**Collection Date:** 10/25/2021 1830h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

3440 South 700 West  
Salt Lake City, UT 84119

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 web: www.awal-labs.com

Jennifer Osborn  
 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	<b>0.0160</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2028h	E200.7	1.00	<b>30.6</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.000500	<b>0.00173</b>	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2028h	E200.7	10.0	<b>578</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00400	<b>0.198</b>	
Lead	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	<b>0.00847</b>	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2028h	E200.7	1.00	<b>3.81</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1105h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	<b>0.394</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1940h	E200.8	0.00200	< 0.00200	



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-007  
**Client Sample ID:** ELF-9  
**Collection Date:** 10/26/2021 1150h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

3440 South 700 West  
Salt Lake City, UT 84119

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 web: www.awal-labs.com

Jennifer Osborn  
 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	<b>0.00622</b>	
Barium	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	<b>0.0118</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2052h	E200.7	0.500	<b>1.33</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2052h	E200.7	5.00	<b>56.4</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00400	< 0.00400	
Lead	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2052h	E200.7	0.500	<b>1.21</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1112h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	<b>0.0571</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1944h	E200.8	0.00200	< 0.00200	





# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-008  
**Client Sample ID:** ELF-10  
**Collection Date:** 10/26/2021 1035h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

3440 South 700 West  
Salt Lake City, UT 84119

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Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	<b>0.0147</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2033h	E200.7	1.00	<b>1.50</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2033h	E200.7	10.0	<b>504</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00400	< 0.00400	
Lead	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2033h	E200.7	1.00	<b>2.89</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1114h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	<b>0.0142</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1948h	E200.8	0.00200	< 0.00200	



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-009  
**Client Sample ID:** ELF-11  
**Collection Date:** 10/25/2021 1750h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

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Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	<b>0.0122</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2035h	E200.7	0.500	<b>16.1</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2035h	E200.7	5.00	<b>444</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00400	<b>0.0194</b>	
Lead	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2035h	E200.7	0.500	<b>4.37</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1116h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	<b>0.0182</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	<b>0.107</b>	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1952h	E200.8	0.00200	< 0.00200	



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-010  
**Client Sample ID:** ELF-12  
**Collection Date:** 10/25/2021 1715h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

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Jennifer Osborn  
 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	<b>0.00960</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2037h	E200.7	0.500	<b>1.25</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2037h	E200.7	5.00	<b>173</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00400	< 0.00400	
Lead	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2037h	E200.7	0.500	<b>1.34</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1118h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 1956h	E200.8	0.00200	< 0.00200	



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-011  
**Client Sample ID:** ELF-13  
**Collection Date:** 10/25/2021 1635h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

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 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	<b>0.00980</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2046h	E200.7	0.500	<b>0.556</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2046h	E200.7	5.00	<b>459</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/5/2021 1223h	E200.8	0.00400	<b>0.00426</b>	
Lead	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2046h	E200.7	0.500	<b>2.36</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1120h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	11/1/2021 805h	11/4/2021 2016h	E200.8	0.00200	< 0.00200	



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-012  
**Client Sample ID:** ELF-14  
**Collection Date:** 10/25/2021 1550h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

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 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	<b>0.0150</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2048h	E200.7	1.00	<b>2.48</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2048h	E200.7	10.0	<b>494</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/5/2021 1227h	E200.8	0.00400	<b>0.0104</b>	
Lead	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2048h	E200.7	1.00	<b>4.66</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1122h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	<b>0.00377</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	<b>0.00344</b>	
Thallium	mg/L	11/1/2021 805h	11/4/2021 2020h	E200.8	0.00200	< 0.00200	



# INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-013  
**Client Sample ID:** Duplicate (CCR)  
**Collection Date:** 10/25/2021  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

## Analytical Results

## TOTAL METALS

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Jennifer Osborn  
 Laboratory Director

Jose Rocha  
 QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	< 0.00200	
Barium	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	<b>0.0152</b>	
Beryllium	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	< 0.00200	
Boron	mg/L	11/1/2021 805h	11/9/2021 2050h	E200.7	1.00	<b>2.49</b>	
Cadmium	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.000500	< 0.000500	
Calcium	mg/L	11/1/2021 805h	11/9/2021 2050h	E200.7	10.0	<b>495</b>	
Chromium	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	11/1/2021 805h	11/5/2021 1231h	E200.8	0.00400	<b>0.00980</b>	
Lead	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	11/1/2021 805h	11/9/2021 2050h	E200.7	1.00	<b>4.75</b>	
Mercury	mg/L	11/1/2021 1454h	11/2/2021 1124h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	<b>0.00374</b>	
Selenium	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	<b>0.00335</b>	
Thallium	mg/L	11/1/2021 805h	11/4/2021 2023h	E200.8	0.00200	< 0.00200	



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-001  
**Client Sample ID:** ELF-1D  
**Collection Date:** 10/26/2021 1230h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/5/2021 1032h	E300.0	100	<b>7,200</b>	
Fluoride	mg/L		11/9/2021 157h	E300.0	0.100	<b>0.163</b>	
pH @ 25° C	pH Units		10/28/2021 1605h	SM4500-H+B	1.00	<b>7.17</b>	H
Sulfate	mg/L		11/5/2021 1032h	E300.0	500	<b>10,700</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>25,000</b>	

*H - Sample was received outside of the holding time.*

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Laboratory Director

Jose Rocha  
QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-002  
**Client Sample ID:** ELF-2  
**Collection Date:** 10/26/2021 1325h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/5/2021 1059h	E300.0	100	213	
Fluoride	mg/L		11/9/2021 316h	E300.0	0.100	0.393	
pH @ 25° C	pH Units		10/28/2021 1605h	SM4500-H+B	1.00	7.46	H
Sulfate	mg/L		11/5/2021 1059h	E300.0	500	8,400	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	100	12,200	

*H - Sample was received outside of the holding time.*

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QA Officer





## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-003  
**Client Sample ID:** ELF-4  
**Collection Date:** 10/26/2021 940h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/5/2021 1218h	E300.0	100	<b>2,220</b>	
Fluoride	mg/L		11/9/2021 342h	E300.0	0.100	<b>0.319</b>	
pH @ 25° C	pH Units		10/28/2021 1605h	SM4500-H+B	1.00	<b>7.23</b>	H
Sulfate	mg/L		11/5/2021 1218h	E300.0	500	<b>6,200</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	100	<b>12,400</b>	

*H - Sample was received outside of the holding time.*

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Jose Rocha  
QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-004  
**Client Sample ID:** Field Blank  
**Collection Date:** 10/26/2021 1150h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 1442h	E300.0	0.100	<b>0.104</b>	
Fluoride	mg/L		11/8/2021 1442h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>6.07</b>	H
Sulfate	mg/L		11/8/2021 1442h	E300.0	0.500	< 0.500	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>1,800</b>	

*H - Sample was received outside of the holding time.*

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Jose Rocha  
QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-005  
**Client Sample ID:** ELF-7  
**Collection Date:** 10/26/2021 1535h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 1508h	E300.0	100	<b>2,980</b>	
Fluoride	mg/L		11/9/2021 409h	E300.0	0.100	<b>0.330</b>	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>7.33</b>	H
Sulfate	mg/L		11/8/2021 1508h	E300.0	500	<b>9,610</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>18,400</b>	

*H - Sample was received outside of the holding time.*

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Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-006  
**Client Sample ID:** ELF-8  
**Collection Date:** 10/25/2021 1830h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 1736h	E300.0	100	<b>2,040</b>	
Fluoride	mg/L		11/9/2021 435h	E300.0	0.100	<b>1.30</b>	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>7.76</b>	H
Sulfate	mg/L		11/8/2021 1736h	E300.0	500	<b>3,550</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	100	<b>8,140</b>	

*H - Sample was received outside of the holding time.*

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Jose Rocha  
QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-007  
**Client Sample ID:** ELF-9  
**Collection Date:** 10/26/2021 1150h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 1802h	E300.0	100	<b>515</b>	
Fluoride	mg/L		11/9/2021 501h	E300.0	0.100	<b>1.84</b>	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>8.19</b>	H
Sulfate	mg/L		11/8/2021 1802h	E300.0	500	<b>7,100</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	100	<b>11,400</b>	

*H - Sample was received outside of the holding time.*

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Laboratory Director

Jose Rocha  
QA Officer



## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-008  
**Client Sample ID:** ELF-10  
**Collection Date:** 10/26/2021 1035h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 1829h	E300.0	200	<b>13,100</b>	
Fluoride	mg/L		11/9/2021 620h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>7.46</b>	H
Sulfate	mg/L		11/8/2021 1829h	E300.0	1,000	<b>9,910</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>39,900</b>	

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-009  
**Client Sample ID:** ELF-11  
**Collection Date:** 10/25/2021 1750h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 1948h	E300.0	100	<b>1,110</b>	
Fluoride	mg/L		11/13/2021 124h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>7.71</b>	H
Sulfate	mg/L		11/8/2021 1948h	E300.0	500	<b>12,100</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>17,500</b>	

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-010  
**Client Sample ID:** ELF-12  
**Collection Date:** 10/25/2021 1715h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 2014h	E300.0	100	<b>605</b>	
Fluoride	mg/L		11/9/2021 713h	E300.0	0.100	<b>0.590</b>	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>7.85</b>	H
Sulfate	mg/L		11/8/2021 2014h	E300.0	500	<b>13,300</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>19,000</b>	

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-011  
**Client Sample ID:** ELF-13  
**Collection Date:** 10/25/2021 1635h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 2041h	E300.0	100	<b>2,810</b>	
Fluoride	mg/L		11/9/2021 740h	E300.0	0.100	<b>0.200</b>	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>7.44</b>	H
Sulfate	mg/L		11/8/2021 2041h	E300.0	500	<b>9,040</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>19,900</b>	

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-012  
**Client Sample ID:** ELF-14  
**Collection Date:** 10/25/2021 1550h  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 2107h	E300.0	100	<b>4,050</b>	
Fluoride	mg/L		11/9/2021 806h	E300.0	0.100	<b>0.332</b>	
pH @ 25° C	pH Units		10/28/2021 1846h	SM4500-H+B	1.00	<b>7.42</b>	H
Sulfate	mg/L		11/8/2021 2107h	E300.0	500	<b>9,110</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>19,600</b>	

*H - Sample was received outside of the holding time.*

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## INORGANIC ANALYTICAL REPORT

**Client:** PacifiCorp  
**Project:** Hunter Power Plant - CCR  
**Lab Sample ID:** 2110765-013  
**Client Sample ID:** Duplicate (CCR)  
**Collection Date:** 10/25/2021  
**Received Date:** 10/28/2021 1450h

**Contact:** Brad Giles

### Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		11/8/2021 2133h	E300.0	100	<b>4,100</b>	
Fluoride	mg/L		11/9/2021 832h	E300.0	0.100	<b>0.305</b>	
pH @ 25° C	pH Units		10/28/2021 2005h	SM4500-H+B	1.00	<b>7.47</b>	H
Sulfate	mg/L		11/8/2021 2133h	E300.0	500	<b>9,170</b>	
Total Dissolved Solids	mg/L		10/29/2021 1140h	SM2540C	500	<b>19,900</b>	

*H - Sample was received outside of the holding time.*

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## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** ME

**QC Type:** LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID:</b> LCS-80502	Date Analyzed:	11/09/2021 1942h											
Test Code:	200.7-W	Date Prepared:	11/01/2021 805h										
Boron	1.01	mg/L	E200.7	0.00290	0.100	1.000	0	101	85 - 115				
Calcium	10.0	mg/L	E200.7	0.0434	1.00	10.00	0	100	85 - 115				
Lithium	0.984	mg/L	E200.7	0.0130	0.100	1.000	0	98.4	85 - 115				
<b>Lab Sample ID:</b> LCS-80504	Date Analyzed:	11/04/2021 1842h											
Test Code:	200.8-W	Date Prepared:	11/01/2021 805h										
Antimony	0.181	mg/L	E200.8	0.000734	0.00400	0.2000	0	90.5	85 - 115				
Arsenic	0.203	mg/L	E200.8	0.000298	0.00200	0.2000	0	101	85 - 115				
Barium	0.203	mg/L	E200.8	0.000544	0.00200	0.2000	0	101	85 - 115				
Beryllium	0.207	mg/L	E200.8	0.000198	0.00200	0.2000	0	104	85 - 115				
Cadmium	0.199	mg/L	E200.8	0.0000742	0.000500	0.2000	0	99.5	85 - 115				
Chromium	0.200	mg/L	E200.8	0.000920	0.00200	0.2000	0	99.9	85 - 115				
Cobalt	0.183	mg/L	E200.8	0.000300	0.00400	0.2000	0	91.5	85 - 115				
Lead	0.200	mg/L	E200.8	0.000588	0.00200	0.2000	0	99.9	85 - 115				
Molybdenum	0.191	mg/L	E200.8	0.000884	0.00200	0.2000	0	95.6	85 - 115				
Selenium	0.202	mg/L	E200.8	0.000508	0.00200	0.2000	0	101	85 - 115				
Thallium	0.180	mg/L	E200.8	0.000418	0.00200	0.2000	0	90.0	85 - 115				
<b>Lab Sample ID:</b> LCS-80517	Date Analyzed:	11/02/2021 1041h											
Test Code:	HG-DW-245.1	Date Prepared:	11/01/2021 1454h										
Mercury	0.00334	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	100	85 - 115				



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## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** ME

**QC Type:** MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID:</b> MB-80502	Date Analyzed:	11/09/2021 1940h											
Test Code:	200.7-W	Date Prepared:	11/01/2021 805h										
Boron	< 0.100	mg/L	E200.7	0.00290	0.100								
Calcium	< 1.00	mg/L	E200.7	0.0434	1.00								
Lithium	< 0.100	mg/L	E200.7	0.0130	0.100								
<b>Lab Sample ID:</b> MB-80504	Date Analyzed:	11/04/2021 1838h											
Test Code:	200.8-W	Date Prepared:	11/01/2021 805h										
Antimony	< 0.00400	mg/L	E200.8	0.000734	0.00400								
Arsenic	< 0.00200	mg/L	E200.8	0.000298	0.00200								
Barium	< 0.00200	mg/L	E200.8	0.000544	0.00200								
Beryllium	< 0.00200	mg/L	E200.8	0.000198	0.00200								
Cadmium	< 0.000500	mg/L	E200.8	0.0000742	0.000500								
Chromium	< 0.00200	mg/L	E200.8	0.000920	0.00200								
Cobalt	< 0.00400	mg/L	E200.8	0.000300	0.00400								
Lead	< 0.00200	mg/L	E200.8	0.000588	0.00200								
Molybdenum	< 0.00200	mg/L	E200.8	0.000884	0.00200								
Selenium	< 0.00200	mg/L	E200.8	0.000508	0.00200								
Thallium	< 0.00200	mg/L	E200.8	0.000418	0.00200								
<b>Lab Sample ID:</b> MB-80517	Date Analyzed:	11/02/2021 1039h											
Test Code:	HG-DW-245.1	Date Prepared:	11/01/2021 1454h										
Mercury	< 0.0000900	mg/L	E245.1	0.0000396	0.0000900								



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## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** ME

**QC Type:** MS

Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual	
Lab Sample ID:	2110765-002CMS	Date Analyzed:	11/09/2021 2007h												
Test Code:	200.7-W	Date Prepared:	11/01/2021 805h												
Boron		4.14	mg/L	E200.7	0.0145	0.500	1.000	3.12	102	70 - 130				2	
Calcium		403	mg/L	E200.7	0.217	5.00	10.00	400	34.5	70 - 130					
Lithium		2.83	mg/L	E200.7	0.0650	0.500	1.000	1.87	96.9	75 - 125					
Lab Sample ID:		2110765-003CMS	Date Analyzed:	11/09/2021 2020h											
Test Code:	200.7-W	Date Prepared:	11/01/2021 805h												
Boron		5.60	mg/L	E200.7	0.0290	1.00	1.000	4.36	124	70 - 130				2	
Calcium		506	mg/L	E200.7	0.434	10.0	10.00	479	270	70 - 130					
Lithium		2.96	mg/L	E200.7	0.130	1.00	1.000	1.82	115	75 - 125					
Lab Sample ID:		2110765-002CMS	Date Analyzed:	11/04/2021 1901h											
Test Code:	200.8-W	Date Prepared:	11/01/2021 805h												
Antimony		0.188	mg/L	E200.8	0.000734	0.00400	0.2000	0	94.2	75 - 125					
Arsenic		0.209	mg/L	E200.8	0.000298	0.00200	0.2000	0	104	75 - 125					
Barium		0.207	mg/L	E200.8	0.000544	0.00200	0.2000	0.0102	98.2	75 - 125					
Beryllium		0.186	mg/L	E200.8	0.000198	0.00200	0.2000	0	92.9	75 - 125					
Cadmium		0.195	mg/L	E200.8	0.0000742	0.000500	0.2000	0.0000863	97.5	75 - 125					
Chromium		0.190	mg/L	E200.8	0.000920	0.00200	0.2000	0	95.0	75 - 125					
Cobalt		0.178	mg/L	E200.8	0.000300	0.00400	0.2000	0.00284	87.5	75 - 125					
Lead		0.187	mg/L	E200.8	0.000588	0.00200	0.2000	0	93.7	75 - 125					
Molybdenum		0.203	mg/L	E200.8	0.000884	0.00200	0.2000	0.00218	100	75 - 125					
Selenium		0.209	mg/L	E200.8	0.000508	0.00200	0.2000	0.00456	102	75 - 125					
Thallium		0.166	mg/L	E200.8	0.000418	0.00200	0.2000	0	83.1	75 - 125					
Lab Sample ID:		2110765-003CMS	Date Analyzed:	11/04/2021 1925h											
Test Code:	200.8-W	Date Prepared:	11/01/2021 805h												
Antimony		0.187	mg/L	E200.8	0.000734	0.00400	0.2000	0	93.4	75 - 125					
Arsenic		0.215	mg/L	E200.8	0.000298	0.00200	0.2000	0.0004	107	75 - 125					
Barium		0.213	mg/L	E200.8	0.000544	0.00200	0.2000	0.0118	101	75 - 125					



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Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** ME

**QC Type:** MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID:</b> 2110765-003CMS	Date Analyzed:	11/04/2021 1925h											
Test Code: 200.8-W	Date Prepared:	11/01/2021 805h											
Beryllium	0.189	mg/L	E200.8	0.000198	0.00200	0.2000	0	94.6	75 - 125				
Cadmium	0.191	mg/L	E200.8	0.0000742	0.000500	0.2000	0.000432	95.1	75 - 125				
Chromium	0.199	mg/L	E200.8	0.000920	0.00200	0.2000	0.00115	98.7	75 - 125				
Cobalt	0.181	mg/L	E200.8	0.000300	0.00400	0.2000	0.00608	87.4	75 - 125				
Lead	0.189	mg/L	E200.8	0.000588	0.00200	0.2000	0	94.3	75 - 125				
Molybdenum	0.207	mg/L	E200.8	0.000884	0.00200	0.2000	0.00228	102	75 - 125				
Selenium	0.202	mg/L	E200.8	0.000508	0.00200	0.2000	0.00138	100	75 - 125				
Thallium	0.169	mg/L	E200.8	0.000418	0.00200	0.2000	0.000509	84.4	75 - 125				
<b>Lab Sample ID:</b> 2110765-001CMS	Date Analyzed:	11/02/2021 1053h											
Test Code: HG-DW-245.1	Date Prepared:	11/01/2021 1454h											
Mercury	0.00248	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	74.4	80 - 120				<sup>1</sup>

<sup>1</sup> - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

<sup>2</sup> - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.



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## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** ME

**QC Type:** MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: 2110765-002CMSD</b>													
Test Code:	200.7-W	Date Analyzed:	11/09/2021 2009h	Date Prepared:	11/01/2021 805h								
Boron	4.22	mg/L	E200.7	0.0145	0.500	1.000	3.12	110	70 - 130	4.14	1.84	20	
Calcium	411	mg/L	E200.7	0.217	5.00	10.00	400	115	70 - 130	403	1.97	20	
Lithium	2.95	mg/L	E200.7	0.0650	0.500	1.000	1.87	108	75 - 125	2.83	3.94	20	
<b>Lab Sample ID: 2110765-003CMSD</b>													
Test Code:	200.7-W	Date Analyzed:	11/09/2021 2022h	Date Prepared:	11/01/2021 805h								
Boron	5.53	mg/L	E200.7	0.0290	1.00	1.000	4.36	117	70 - 130	5.6	1.31	20	
Calcium	499	mg/L	E200.7	0.434	10.0	10.00	479	192	70 - 130	506	1.57	20	2
Lithium	2.94	mg/L	E200.7	0.130	1.00	1.000	1.82	113	75 - 125	2.96	0.708	20	
<b>Lab Sample ID: 2110765-002CMSD</b>													
Test Code:	200.8-W	Date Analyzed:	11/04/2021 1905h	Date Prepared:	11/01/2021 805h								
Antimony	0.193	mg/L	E200.8	0.000734	0.00400	0.2000	0	96.3	75 - 125	0.188	2.20	20	
Arsenic	0.212	mg/L	E200.8	0.000298	0.00200	0.2000	0	106	75 - 125	0.209	1.40	20	
Barium	0.210	mg/L	E200.8	0.000544	0.00200	0.2000	0.0102	99.9	75 - 125	0.207	1.58	20	
Beryllium	0.187	mg/L	E200.8	0.000198	0.00200	0.2000	0	93.6	75 - 125	0.186	0.718	20	
Cadmium	0.198	mg/L	E200.8	0.0000742	0.000500	0.2000	0.0000863	98.8	75 - 125	0.195	1.36	20	
Chromium	0.193	mg/L	E200.8	0.000920	0.00200	0.2000	0	96.6	75 - 125	0.19	1.66	20	
Cobalt	0.178	mg/L	E200.8	0.000300	0.00400	0.2000	0.00284	87.7	75 - 125	0.178	0.209	20	
Lead	0.189	mg/L	E200.8	0.000588	0.00200	0.2000	0	94.6	75 - 125	0.187	0.985	20	
Molybdenum	0.206	mg/L	E200.8	0.000884	0.00200	0.2000	0.00218	102	75 - 125	0.203	1.65	20	
Selenium	0.204	mg/L	E200.8	0.000508	0.00200	0.2000	0.00456	99.7	75 - 125	0.209	2.46	20	
Thallium	0.168	mg/L	E200.8	0.000418	0.00200	0.2000	0	84.1	75 - 125	0.166	1.15	20	
<b>Lab Sample ID: 2110765-003CMSD</b>													
Test Code:	200.8-W	Date Analyzed:	11/04/2021 1928h	Date Prepared:	11/01/2021 805h								
Antimony	0.190	mg/L	E200.8	0.000734	0.00400	0.2000	0	95.0	75 - 125	0.187	1.65	20	
Arsenic	0.216	mg/L	E200.8	0.000298	0.00200	0.2000	0.0004	108	75 - 125	0.215	0.468	20	
Barium	0.212	mg/L	E200.8	0.000544	0.00200	0.2000	0.0118	100	75 - 125	0.213	0.581	20	





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Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp  
**Lab Set ID:** 2110765  
**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles  
**Dept:** ME  
**QC Type:** MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: 2110765-003CMSD</b>		Date Analyzed:	11/04/2021 1928h										
Test Code: 200.8-W		Date Prepared:	11/01/2021 805h										
Beryllium	0.187	mg/L	E200.8	0.000198	0.00200	0.2000	0	93.4	75 - 125	0.189	1.30	20	
Cadmium	0.194	mg/L	E200.8	0.0000742	0.000500	0.2000	0.000432	96.9	75 - 125	0.191	1.90	20	
Chromium	0.191	mg/L	E200.8	0.000920	0.00200	0.2000	0.00115	94.8	75 - 125	0.199	3.99	20	
Cobalt	0.180	mg/L	E200.8	0.000300	0.00400	0.2000	0.00608	87.0	75 - 125	0.181	0.478	20	
Lead	0.186	mg/L	E200.8	0.000588	0.00200	0.2000	0	93.1	75 - 125	0.189	1.34	20	
Molybdenum	0.206	mg/L	E200.8	0.000884	0.00200	0.2000	0.00228	102	75 - 125	0.207	0.743	20	
Selenium	0.205	mg/L	E200.8	0.000508	0.00200	0.2000	0.00138	102	75 - 125	0.202	1.43	20	
Thallium	0.167	mg/L	E200.8	0.000418	0.00200	0.2000	0.000509	83.4	75 - 125	0.169	1.22	20	
<b>Lab Sample ID: 2110765-001CMSD</b>		Date Analyzed:	11/02/2021 1055h										
Test Code: HG-DW-245.1		Date Prepared:	11/01/2021 1454h										
Mercury	0.00241	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	72.4	80 - 120	0.00248	2.80	20	<sup>1</sup>

<sup>1</sup> - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

<sup>2</sup> - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.



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Jennifer Osborn  
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Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** WC

**QC Type:** DUP

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID:</b> 2110767-001ADUP Test Code: PH-4500H+B	Date Analyzed:	10/28/2021	1605h										
pH @ 25° C	7.65	pH Units	SM4500-H+B	1.00	1.00					7.58	0.919	5	
<b>Lab Sample ID:</b> 2110765-001ADUP Test Code: PH-4500H+B	Date Analyzed:	10/28/2021	1605h										
pH @ 25° C	7.22	pH Units	SM4500-H+B	1.00	1.00					7.17	0.695	5	H
<b>Lab Sample ID:</b> 2110765-005ADUP Test Code: PH-4500H+B	Date Analyzed:	10/28/2021	1846h										
pH @ 25° C	7.37	pH Units	SM4500-H+B	1.00	1.00					7.33	0.544	5	H
<b>Lab Sample ID:</b> 2110765-013ADUP Test Code: PH-4500H+B	Date Analyzed:	10/28/2021	2005h										
pH @ 25° C	7.48	pH Units	SM4500-H+B	1.00	1.00					7.47	0.134	5	H
<b>Lab Sample ID:</b> 2110766-001ADUP Test Code: PH-4500H+B	Date Analyzed:	10/28/2021	2005h										
pH @ 25° C	7.20	pH Units	SM4500-H+B	1.00	1.00					7.2	0	5	
<b>Lab Sample ID:</b> 2110765-001ADUP Test Code: TDS-W-2540C	Date Analyzed:	10/29/2021	1140h										
Total Dissolved Solids	25,900	mg/L	SM2540C	400	500					25000	3.54	5	
<b>Lab Sample ID:</b> 2110766-001ADUP Test Code: TDS-W-2540C	Date Analyzed:	10/29/2021	1140h										
Total Dissolved Solids	7,500	mg/L	SM2540C	80.0	100					7440	0.803	5	

*H - Sample was received outside of the holding time.*



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Laboratory Director

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QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** WC

**QC Type:** LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID:</b> LCS-R158789	Date Analyzed:	11/05/2021	1006h										
Test Code:	300.0-W												
Chloride	4.93	mg/L	E300.0	0.0198	0.100	5.000	0	98.6	90 - 110				
Sulfate	5.07	mg/L	E300.0	0.0750	0.500	5.000	0	101	90 - 110				
<b>Lab Sample ID:</b> LCS-R158918	Date Analyzed:	11/08/2021	1415h										
Test Code:	300.0-W												
Chloride	4.90	mg/L	E300.0	0.0198	0.100	5.000	0	98.1	90 - 110				
Fluoride	4.98	mg/L	E300.0	0.00260	0.100	5.000	0	99.5	90 - 110				
Sulfate	5.05	mg/L	E300.0	0.0750	0.500	5.000	0	101	90 - 110				
<b>Lab Sample ID:</b> LCS-R159107	Date Analyzed:	11/12/2021	1757h										
Test Code:	300.0-W												
Fluoride	5.03	mg/L	E300.0	0.00260	0.100	5.000	0	101	90 - 110				
<b>Lab Sample ID:</b> LCS-R158453	Date Analyzed:	10/28/2021	1605h										
Test Code:	PH-4500H+B												
pH @ 25° C	8.99	pH Units	SM4500-H+B	1.00	1.00	9.000	0	99.9	98 - 102				
<b>Lab Sample ID:</b> LCS-R158457	Date Analyzed:	10/28/2021	1846h										
Test Code:	PH-4500H+B												
pH @ 25° C	9.00	pH Units	SM4500-H+B	1.00	1.00	9.000	0	100	98 - 102				
<b>Lab Sample ID:</b> LCS-R158458	Date Analyzed:	10/28/2021	2005h										
Test Code:	PH-4500H+B												
pH @ 25° C	9.00	pH Units	SM4500-H+B	1.00	1.00	9.000	0	100	98 - 102				
<b>Lab Sample ID:</b> LCS-R158582	Date Analyzed:	10/29/2021	1140h										
Test Code:	TDS-W-2540C												
Total Dissolved Solids	204	mg/L	SM2540C	8.00	10.0	205.0	0	99.5	80 - 120				



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Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** WC

**QC Type:** MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID:</b> MB-R158789	Date Analyzed:	11/05/2021	940h										
Test Code:	300.0-W												
Chloride	< 0.100	mg/L	E300.0	0.0198	0.100								
Sulfate	< 0.500	mg/L	E300.0	0.0750	0.500								
<b>Lab Sample ID:</b> MB-R158918	Date Analyzed:	11/08/2021	1349h										
Test Code:	300.0-W												
Chloride	< 0.100	mg/L	E300.0	0.0198	0.100								
Fluoride	< 0.100	mg/L	E300.0	0.00260	0.100								
Sulfate	< 0.500	mg/L	E300.0	0.0750	0.500								
<b>Lab Sample ID:</b> MB-R159107	Date Analyzed:	11/12/2021	1732h										
Test Code:	300.0-W												
Fluoride	< 0.100	mg/L	E300.0	0.00260	0.100								
<b>Lab Sample ID:</b> MB-R158582	Date Analyzed:	10/29/2021	1140h										
Test Code:	TDS-W-2540C												
Total Dissolved Solids	< 10.0	mg/L	SM2540C	8.00	10.0								



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## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** WC

**QC Type:** MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: 2110765-002AMS</b> Date Analyzed: 11/05/2021 1125h													
Test Code: 300.0-W													
Chloride	5,170	mg/L	E300.0	19.8	100	5,000	213	99.1	90 - 110				
Sulfate	13,500	mg/L	E300.0	75.0	500	5,000	8400	102	90 - 110				
<b>Lab Sample ID: 2110611-029AMS</b> Date Analyzed: 11/05/2021 1310h													
Test Code: 300.0-W													
Chloride	131	mg/L	E300.0	0.396	2.00	100.0	39.8	91.7	90 - 110				
Sulfate	235	mg/L	E300.0	1.50	10.0	100.0	152	83.2	90 - 110				<sup>1</sup>
<b>Lab Sample ID: 2110765-005AMS</b> Date Analyzed: 11/08/2021 1710h													
Test Code: 300.0-W													
Chloride	7,860	mg/L	E300.0	19.8	100	5,000	2980	97.6	90 - 110				
Fluoride	4,920	mg/L	E300.0	2.60	100	5,000	0	98.5	90 - 110				
Sulfate	14,200	mg/L	E300.0	75.0	500	5,000	9610	91.1	90 - 110				
<b>Lab Sample ID: 2110767-001AMS</b> Date Analyzed: 11/08/2021 2226h													
Test Code: 300.0-W													
Chloride	2,960	mg/L	E300.0	9.90	50.0	2,500	483	99.3	90 - 110				
Fluoride	2,450	mg/L	E300.0	1.30	50.0	2,500	2.18	98.1	90 - 110				
Sulfate	5,700	mg/L	E300.0	37.5	250	2,500	3190	100	90 - 110				
<b>Lab Sample ID: 2110765-001AMS</b> Date Analyzed: 11/09/2021 223h													
Test Code: 300.0-W													
Fluoride	10.1	mg/L	E300.0	0.00520	0.200	10.00	0.163	99.7	90 - 110				

<sup>1</sup> - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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Jennifer Osborn  
Laboratory Director

Jose Rocha  
QA Officer

## QC SUMMARY REPORT

**Client:** PacifiCorp

**Lab Set ID:** 2110765

**Project:** Hunter Power Plant - CCR

**Contact:** Brad Giles

**Dept:** WC

**QC Type:** MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
<b>Lab Sample ID: 2110765-002AMSD</b> Date Analyzed: 11/05/2021 1151h													
Test Code: 300.0-W													
Chloride	5,190	mg/L	E300.0	19.8	100	5,000	213	99.4	90 - 110	5170	0.332	20	
Sulfate	13,500	mg/L	E300.0	75.0	500	5,000	8400	102	90 - 110	13500	0.0286	20	
<b>Lab Sample ID: 2110611-029AMSD</b> Date Analyzed: 11/05/2021 1337h													
Test Code: 300.0-W													
Chloride	131	mg/L	E300.0	0.396	2.00	100.0	39.8	90.8	90 - 110	131	0.677	20	
Sulfate	233	mg/L	E300.0	1.50	10.0	100.0	152	80.8	90 - 110	235	0.995	20	<sup>1</sup>
<b>Lab Sample ID: 2110765-005AMSD</b> Date Analyzed: 11/08/2021 1644h													
Test Code: 300.0-W													
Chloride	7,910	mg/L	E300.0	19.8	100	5,000	2980	98.5	90 - 110	7860	0.586	20	
Fluoride	4,930	mg/L	E300.0	2.60	100	5,000	0	98.6	90 - 110	4920	0.0934	20	
Sulfate	14,300	mg/L	E300.0	75.0	500	5,000	9610	94.6	90 - 110	14200	1.20	20	
<b>Lab Sample ID: 2110767-001AMSD</b> Date Analyzed: 11/08/2021 2252h													
Test Code: 300.0-W													
Chloride	2,980	mg/L	E300.0	9.90	50.0	2,500	483	99.8	90 - 110	2960	0.437	20	
Fluoride	2,440	mg/L	E300.0	1.30	50.0	2,500	2.18	97.5	90 - 110	2450	0.577	20	
Sulfate	5,710	mg/L	E300.0	37.5	250	2,500	3190	101	90 - 110	5700	0.215	20	
<b>Lab Sample ID: 2110765-001AMSD</b> Date Analyzed: 11/09/2021 250h													
Test Code: 300.0-W													
Fluoride	9.48	mg/L	E300.0	0.00520	0.200	10.00	0.163	93.2	90 - 110	10.1	6.60	20	

<sup>1</sup> - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

## WORK ORDER Summary

Work Order: **2110765**

Page 1 of 5

Client: PacifiCorp

Due Date: 11/11/2021

Client ID: PAC900

Contact: Brad Giles

Project: Hunter Power Plant - CCR

QC Level: II+

WO Type: Project

Comments: QC2+. Include EDD. Footnote report, pH samples received outside of hold. RADS sent to ALS-Ft Collins. Cc: Dennis Vanderbeek;

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
2110765-001A	ELF-1D	10/26/2021 1230h	10/28/2021 1450h	300.0-W	Aqueous		DF-WC
				3 SEL Analytes: CL F SO4			
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2110765-001C				200.7-W			DF-Metals
				3 SEL Analytes: B CA LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2110765-001D				OUTSIDE LAB			ALS
2110765-002A	ELF-2	10/26/2021 1325h	10/28/2021 1450h	300.0-W	Aqueous		DF-WC
				3 SEL Analytes: CL F SO4			
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2110765-002C				200.7-W			DF-Metals
				3 SEL Analytes: B CA LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2110765-002D				OUTSIDE LAB			ALS
2110765-003A	ELF-4	10/26/2021 0940h	10/28/2021 1450h	300.0-W	Aqueous		DF-WC
				3 SEL Analytes: CL F SO4			
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC

# WORK ORDER Summary

Work Order: **2110765**

Page 2 of 5

Client: PacifiCorp

Due Date: 11/11/2021

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage	
2110765-003C	ELF-4	10/26/2021 0940h	10/28/2021 1450h	200.7-W <i>3 SEL Analytes: B CA LI</i>	Aqueous		DF-Metals	1
				200.7-W-PR			DF-Metals	
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals	
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
2110765-003D				OUTSIDE LAB			ALS	2
2110765-004A	Field Blank	10/26/2021 1150h	10/28/2021 1450h	300.0-W <i>3 SEL Analytes: CL F SO4</i>	Aqueous		DF-WC	1
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
2110765-004C				200.7-W <i>3 SEL Analytes: B CA LI</i>			DF-Metals	
				200.7-W-PR			DF-Metals	
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals	
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
2110765-004D				OUTSIDE LAB			ALS	2
2110765-005A	ELF-7	10/26/2021 1535h	10/28/2021 1450h	300.0-W <i>3 SEL Analytes: CL F SO4</i>	Aqueous		DF-WC	1
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
2110765-005C				200.7-W <i>3 SEL Analytes: B CA LI</i>			DF-Metals	
				200.7-W-PR			DF-Metals	
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals	
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
2110765-005D				OUTSIDE LAB			ALS	2



# WORK ORDER Summary

Work Order: **2110765** Page 3 of 5

Client: PacifiCorp

Due Date: 11/11/2021

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
2110765-006A	ELF-8	10/25/2021 1830h	10/28/2021 1450h	300.0-W <i>3 SEL Analytes: CL F SO4</i>	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2110765-006C				200.7-W <i>3 SEL Analytes: B CA LI</i>			DF-Metals
				200.7-W-PR			DF-Metals
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2110765-006D				OUTSIDE LAB			ALS 2
2110765-007A	ELF-9	10/26/2021 1150h	10/28/2021 1450h	300.0-W <i>3 SEL Analytes: CL F SO4</i>	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2110765-007C				200.7-W <i>3 SEL Analytes: B CA LI</i>			DF-Metals
				200.7-W-PR			DF-Metals
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2110765-007D				OUTSIDE LAB			ALS 2
2110765-008A	ELF-10	10/26/2021 1035h	10/28/2021 1450h	300.0-W <i>3 SEL Analytes: CL F SO4</i>	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2110765-008C				200.7-W <i>3 SEL Analytes: B CA LI</i>			DF-Metals
				200.7-W-PR			DF-Metals
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals

# WORK ORDER Summary

Work Order: **2110765**

Page 4 of 5

Client: PacifiCorp

Due Date: 11/11/2021

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage	
2110765-008C	ELF-10	10/26/2021 1035h	10/28/2021 1450h	HG-DW-PR	Aqueous		DF-Metals	1
2110765-008D				OUTSIDE LAB			ALS	2
2110765-009A	ELF-11	10/25/2021 1750h	10/28/2021 1450h	300.0-W	Aqueous		DF-WC	1
				3 SEL Analytes: CL F SO4				
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
2110765-009C				200.7-W			DF-Metals	
				3 SEL Analytes: B CA LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	
			HG-DW-245.1		DF-Metals			
			HG-DW-PR		DF-Metals			
2110765-009D				OUTSIDE LAB		ALS		2
2110765-010A	ELF-12	10/25/2021 1715h	10/28/2021 1450h	300.0-W	Aqueous		DF-WC	1
				3 SEL Analytes: CL F SO4				
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
2110765-010C				200.7-W			DF-Metals	
				3 SEL Analytes: B CA LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	
			HG-DW-245.1		DF-Metals			
			HG-DW-PR		DF-Metals			
2110765-010D				OUTSIDE LAB		ALS		2
2110765-011A	ELF-13	10/25/2021 1635h	10/28/2021 1450h	300.0-W	Aqueous		DF-WC	1
				3 SEL Analytes: CL F SO4				
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
2110765-011C				200.7-W			DF-Metals	
				3 SEL Analytes: B CA LI				
				200.7-W-PR			DF-Metals	

# WORK ORDER Summary

Work Order: **2110765** Page 5 of 5

Client: PacifiCorp

Due Date: 11/11/2021

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
2110765-011C	ELF-13	10/25/2021 1635h	10/28/2021 1450h	200.8-W	Aqueous		DF-Metals 1
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2110765-011D				OUTSIDE LAB			ALS 2
2110765-012A	ELF-14	10/25/2021 1550h	10/28/2021 1450h	300.0-W	Aqueous		DF-WC 1
				3 SEL Analytes: CL F SO4			
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2110765-012C				200.7-W			DF-Metals
				3 SEL Analytes: B CA LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2110765-012D				OUTSIDE LAB			ALS 2
2110765-013A	Duplicate (CCR)	10/25/2021	10/28/2021 1450h	300.0-W	Aqueous		DF-WC 1
				3 SEL Analytes: CL F SO4			
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
2110765-013C				200.7-W			DF-Metals
				3 SEL Analytes: B CA LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
2110765-013D				OUTSIDE LAB			ALS 2

AWAL Use Only - One or more samples expired upon receipt:

AWAL Use Only - Close Hold Times

Test Code  
PH-4500H+B

Test Code  
TDS-W-2540C

# Sampls  
13

Min. days left  
-.53



American West  
Analytical Laboratories

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## CHAIN OF CUSTODY

All analysis will be conducted using NELAP accredited methods and all data will be reported using AWAL's standard analyte lists and reporting limits (PQL) unless specifically requested otherwise on this Chain of Custody and/or attached documentation.

2110765

AWAL Lab Sample Set #

Page 2 of 2

Client: **PacifiCorp Environmental Remediation**

Address: **1407 West North Temple Ste 270**

City, State, Zip: Salt Lake City, UT 84140

Contact: **Jeff Tucker**

Phone #: **(801) 220-2989**

Cell #:

E-mail: [jeff.tucker@pacificorp.com](mailto:jeff.tucker@pacificorp.com); [dennis.vanderbeek@pacificorp.com](mailto:dennis.vanderbeek@pacificorp.com);

E-mail: [brad\\_giles@pacificorn.com](mailto:brad_giles@pacificorn.com)

Project Name: **Hunter Power Plant - CCR**

Project #:

PO #:

Sampler Name:

[illegible]

By signing this Chain of Custody you are agreeing to permit AWAL to subcontract any analyses not normally performed at AWAL.

REV 10/16/2020

Lab Set ID: 2110765  
pH Lot #: 66818

## Preservation Check Sheet

### Sample Set Extension and pH

[illegible]

Procedure:

- 1) Pour a small amount of sample in the sample lid
- 2) Pour sample from lid gently over wide range pH paper
- 3) **Do Not** dip the pH paper in the sample bottle or lid
- 4) If sample is not preserved, properly list its extension and receiving pH in the appropriate column above
- 5) Flag COC, notify client if requested
- 6) Place client conversation on COC
- 7) Samples may be adjusted

Frequency: All samples requiring preservation

- \* The sample required additional preservative upon receipt.
- + The sample was received unpreserved.
- ▲ The sample was received unpreserved and therefore preserved upon receipt.
- # The sample pH was unadjustable to a pH < 2 due to the sample matrix.
- The sample pH was unadjustable to a pH > \_\_\_\_ due to the sample matrix interference.

**ATTACHMENT C:**

**Remedy Selection Progress Report – October 2021**

**Date:** October 15, 2021  
**To:** Scott Wetzel  
**From:** Dave Erickson  
**Subject:** Semi-Annual Progress Report for Selecting and Designing Remedy  
Hunter Power Plant – CCR Landfill

In compliance with the requirements of the Coal Combustion Residuals (CCR) *Final Rule*, § 257.97(a), included herein is a semi-annual progress report for remedy selection and design. The Corrective Measures Assessment for the Hunter CCR Landfill was completed and posted to the plant operating record on 4/15/2019. The preferred alternative in the assessment was re-design and/or optimization of the existing horizontal well capture system, to address localized groundwater impacts. To date, the following activities have been completed in the selecting and designing a remedy:

- **6/28/2019:** Contract was initiated to complete an inspection of existing horizontal well system and to scope the work needed to evaluate the remedy.
- **7/23/2019:** Conducted a public meeting to discuss the results of the corrective measures assessment.
- **8/20/2019:** A site visit was completed by the project engineer to inspect and document the current condition of the existing horizontal well system. Research began on inspection, cleaning, and upgrade methods for the existing system.
- **8/26/2019:** Received comments from Heal Utah, Utah Clean Energy, and the Sierra Club. Comments were reviewed and addressed in Remedy Selection Report.
- **9/23/2019:** Contract finalized to inspect each horizontal well using a mobile camera. Equipment will be on site during the inspection to clean the wells if warranted.
- **11/12/2019:** Inspection caps were removed from the horizontal capture wells in an attempt to inspect well integrity. Well construction prevented the camera from entering the wells to perform the inspections, due to the size of the openings.
- **June 2020:** The initial vendor tasked with performing inspections was unable to successfully retrofit their camera equipment to fit the well openings. Additional vendor sources to perform the well inspections are being sought for procurement.
- **October 2020:** Remedy selection report, nature and extent report, and corrective measures sampling and analysis plan were placed in the plant operating record. The remedy selection report was also placed on the CCR website.
- **January 2021:** Performed full inspection of existing horizontal wells. The wells are not in good working order.
- **March 2021:** An investigation to assess liquids in the landfill waste was attempted using Geoprobe direct push drilling methods. The drilling method could not reach the desired depths. A second attempt using sonic drilling methods is planned for the fall/winter of 2021-22.



Upcoming tasks relative to the CCR Landfill will include the following:

- Complete investigation to determine free liquid levels (if any) in the landfill; and
- Assess the need for design, permitting, and installation of additional horizontal wells.