

Groundwater Monitoring & Corrective Action Report
FGD Pond 1 - Jim Bridger Power Plant
Point of Rocks, Wyoming
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Prepared For:
Jim Bridger Power Plant
8 Miles NE of Point of Rocks
Point of Rocks, WY 82942

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ACRONYMS

AMSL	Above Mean Sea Level
bgs	Below Ground Surface
CCR	Coal Combustion Residuals
COC	Chain of Custody
CFR	U.S. Code of Federal Regulations
DO	Dissolved Oxygen
EPA	U.S. Environmental Protection Agency
FGD	Flue-Gas Desulfurization
ICP	Inductively Coupled Plasma
MCL	Maximum Concentration Limit
MDL	Method Detection Limit
MS	Mass Spectrometer
ORP	Oxidation-Reduction Potential
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SC	Specific Conductance
SM	Standard Methods
SOP	Standard Operation Procedure
SWFPR	Site-Wide False Positive Rate
UTL	Upper Tolerance Limit

1.0 INTRODUCTION

The Jim Bridger Power Plant is located 8 miles northeast of Point of Rocks, Wyoming. The physical location is Township 20 North, Range 101 West in Sweetwater County (Figure 1). The Jim Bridger Power Plant is a four-unit coal-fired electrical generation plant owned by PacifiCorp. Pond 1 accepted spent flue-gas desulfurization (FGD) fluids from the scrubber prior to being deactivated. As a result, it is considered a CCR unit.

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) (Final Rule)*. 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 *Final Rule*. PacifiCorp met this requirement and provided the findings of initial detection monitoring in the first Groundwater Monitoring and Corrective Action Report for the Ash Pond (WET 2018).

The results of detection monitoring found that all Appendix III constituents exceeded site-specific background concentrations. Based on these findings, the FGD Pond 1 monitoring program transitioned to assessment monitoring in 2018. Two rounds of sampling were completed, groundwater protection standards were established, and assessment monitoring results were compared to these standards. Results from assessment monitoring found that Appendix IV constituents; arsenic, cadmium, cobalt, fluoride, lead, lithium, molybdenum, radium, and selenium, exceeded their groundwater protection standards. PacifiCorp initiated an investigation to determine the nature and extent of the release (Section 7.0). FGD Pond 1 will proceed to corrective measures in 2019 (Section 8.0).

FGD Pond 1 was taken out of service in 2004 and was considered an inactive impoundment under 257.100. 257.100, which was vacated in the final rule published in October 2016. Pond closure began under § 257.100 and is proceeding under the provisions defined in § 257.101 and § 257.102 of the *Final Rule*. A pond closure plan has been approved by the Wyoming Department of Environmental Quality and pond closure is proceeding under the provisions defined in § 257.100 - § 257.103 of the *Final Rule*. Pond closure is scheduled for completion in 2019 (Section 9.0).

1.1 Report Purpose and Organization

The following sections provide a status update for activities initiated or completed at the Jim Bridger Power Plant FGD Pond 1, during the 2018 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 (Sections 1, 5, 6, 7 and 8);
- Summarize key actions completed (Section 1);

- Describe any problems encountered (Section 1.2);
- Discuss actions taken to resolve problems (Section 1.2); and
- Define key activities for the upcoming year (Section 9).

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 (Section 3.1.3).
- 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 (Section 5 and Table 5).
- A narrative discussion of any transition between monitoring programs (i.e. transitioning from detection monitoring to assessment monitoring Section 1.0 and 7.0), in addition to identifying constituents detected at a statistically significant increase over background levels (Section 6.0).

Other information required under § 257.90 through § 257.98 of the *Final Rule* can be found in the report as follows:

- § 257.91: Installed the groundwater monitoring network as required (Section 3);
- § 257.92: Reserved (no requirements).
- § 257.93: Developed a site-specific sampling and analysis requirements (Section 4.0);
- § 257.94: Completed Detection monitoring as required (Section 1.0)
- § 257.95: Completed Assessment monitoring as required (Section 5.0).
- § 257.96: Initiated an assessment of corrective measures (Section 9.0).

1.2 Problems & Resolutions

During the February assessment monitoring, well 685-WL was dry and could not be sampled. Wells 285-WA and 685-WL were not accessible during the May monitoring event and could not be sampled.

2.0 HYDROGEOLOGIC SETTING

Based on past hydrogeologic studies and updates at the Jim Bridger Power Plant, along with specific hydrologic investigations in multiple areas across the facility, an interpretation of surface/subsurface geology is presented below. This interpretation incorporates information gathered during the installation of the monitoring network and monitoring required by the State of Wyoming. Overall the Jim Bridger Plant monitoring network includes a total of 81 wells, of

which eight existing wells and five new wells were installed for groundwater monitoring. Additionally, geologic, groundwater and statistical information has been gathered over the course of nearly 20 years of groundwater monitoring at the Jim Bridger Power Plant, as mandated by the State of Wyoming.

2.1 Stratigraphy and Lithology

The western half of FGD Pond 1 overlays the Almond (sandstone) Formation, while the eastern half overlies the Lewis Shale. The Lewis Shale conformably overlies the Almond Formation and the approximated contact between these formations is shown in Figure 2.

The Lewis Shale consists of calcareous, silty, gypsum shale with occasional thin beds of limestone, siltstone, bentonite, and dark carbonaceous shale. The formation is thin-bedded and ranges from moderately indurated and brittle to relatively plastic. Where exposed, the upper 1 to 60 feet of the Lewis is commonly weathered to silty clay or clayey silt. The formation strikes to the northwest and dips gently to the northeast at 5°.

The Almond Formation is a fine to medium-grained massive quartz sandstone. This thin-bedded formation is calcareous, friable, and moderately cemented. Sporadically, strongly indurated beds occur. The total stratigraphic thickness of the Almond Formation, as measured in nearby stratigraphic sections, is approximately 700 ft. The formation strikes to the northwest and dips gently to the northeast at approximately 5°.

Major normal faulting has been mapped several miles west of the plant and generally trends northeasterly from the anticlinal axis. Several linear drainages near JBPP also trend to the northeast. A mapped northeast trending fault is located southeast of the plant site. The fault interpretation is strengthened by the aquifer testing results in wells completed in the linear drainage bottoms. These wells generally show an increase in transmissivity of one to two orders of magnitude, compared to wells completed out of the drainages. This is consistent with faulted, fine-grained material in an extensional setting.

2.2 Groundwater

The Lewis shale has a low transmissivity (~2 ft²/day), but locally may have much greater transmissibility where the formation is weathered and/or fractured (~100 ft²/day, *JBPP FGD Pond 2 Expansion Permit, Table 4*). The Lewis contains two different water-bearing units; the upper weathered and/or fractured Lewis and the deeper less permeable un-weathered, competent Lewis Shale. Generally, the Lewis has a higher transmissivity where weathered. Groundwater in the competent Lewis Shale does not form a continuous aquifer. Groundwater moves to the northeast in the Lewis. Where drainages are incised into the Lewis, groundwater moves from the Lewis into the alluvium and down the drainages.

2.3 Aquifer Characteristics

The Almond Formation is exposed at the surface along relatively straight-line that trends northwest (along the formation strike) and dissects FGD Pond 1. As a result, the western portion of the pond is in contact with the Almond Formation, while eastern portion is in contact with the Lewis Shale. The Almond Sandstone aquifer is unconfined to the west of its contact with the Lewis and confined to the east. Depth to water in the vicinity of the pond varies from 9 ft bgs to 104 ft bgs.

Results of slug testing (Table 1) indicate that the hydraulic conductivity of the Almond formation at the location of well 566-WA is 9.25 ft/day. Per Morris and Johnson, 1967 (in Kresic N. 2007), site-specific aquifer porosity and effective porosity are 37% and 27%, respectively.

Table 1. Jim Bridger Power Plant - Groundwater Monitoring Network Slug Test Results

Calculated Hydraulic Conductivity (cm/sec)	^A 566-WA	^B 566-WA
	3.9E-03	2.6E-03
# of Measurements:	1	1
Mean Conductivity (cm/sec):	11.0	7.5
Mean Conductivity (ft/day):	9.25	
A = Dames & Moore, 1982. Western Wyoming College, Water Quality Lab, Slug Testing Results, Jim Bridger Power Plant		
B = Hydro Geochem, 1984. Slug Testing Results, Jim Bridger Power Plant.		
Slug testing was conducted on a facility-wide subset of wells to characterize site-wide hydrogeologic characteristics. Not all of the slug test wells appear on every site-specific map.		

Attachments A and B provide groundwater elevation contours for the February and May CCR monitoring events at FGD Pond 1. The localized contours are not fully representative of the complete groundwater flow pattern at the facility. Groundwater flow is influenced by mounding at FGD Pond 2 and a pump back system placed along the eastern perimeter of FGD Pond 1 to capture groundwater as it leaves the pond. The Almond, west of its contact with the Lewis, is unconfined with a northeastern trending hydraulic gradient of approximately 0.02 ft/ft. East of this contact, the Almond becomes confined beneath the Lewis Shale and exhibits an upward hydraulic gradient. Here, the groundwater flow direction changes from northeasterly to a southeasterly with a gradient of approximately 0.004 ft/ft.

3.0 GROUNDWATER MONITORING NETWORK

The following sections describe the monitoring network developed and implemented to support groundwater monitoring at the FGD Pond 1.

3.1 Monitoring Network Installation

FGD Pond 1 is an approximately 93-acre impoundment (Figure 1). Three monitoring wells were installed around the perimeter and on the dike between ponds FGD Pond 1 and FGD Pond 2, in addition to the ten existing wells that were part of the monitoring required by the State of Wyoming. The monitoring data collected from these wells includes groundwater elevations and water chemistry data, as required in Appendix III and IV of the CCR Final Rule.

3.1.1 Background Wells

Background monitoring wells include three locations spanning the upgradient extent of FGD Pond 1 and include: 1284-WL, 285-WA, and JB-N10-A. Monitoring results from these locations indicate they are not being influenced by releases from the CCR unit, providing results representative of background concentrations for the site. Assessment monitoring results are provided in Section 5.0 and Table 5.

3.1.2 Downgradient Wells

Downgradient monitoring wells for the FGD Pond 1 include ten locations, placed to capture groundwater as it passes the boundary of the CCR unit. Using historical data and knowledge of the site from ongoing state mandated groundwater monitoring, downgradient wells were placed along the groundwater flow path which generally travels from northwest to the southeast as it passes across the FGD Pond 1 (Figure 1, Attachments A and B). The downgradient monitoring wells include the following: 984-WA, 566-WA, WA-3, WA-4, JB-WA-6, JB-N5-A, JB-12-A, JB-12-L, JB-N11-A, and JB-N11-L.

Table 2 provides a summary of well depths, and well construction details for the monitoring network. Well logs for each are included in the site-specific sampling and analysis plan for the FGD Pond 1, which is part of the facility operating record (WET 2017).

Table 2. Monitoring Well Information

Well ID	Latitude	Longitude	Top of Casing Elevation (ft. asl)	Screen Interval (ft. bgs)	Total Depth (ft.)
JB-N10-A	41.752	-108.813	6701.61	43-53	53
285-WA	41.777	-108.818	6709.63	240-260	261
1284-WL	41.7742	-108.824	6704.64	49-69	70
685-WL	41.7744	-108.819	6697.02	136-141	141.5
984-WA	41.7583	-108.811	6709.29	80-100	100
566-WA	41.7535	-108.809	6693.60	56-76	81
JB-WA-6	41.7521	-108.807	6680.68	18-28	30
WA-3	41.7505	-108.81	6700.29	37.5-57.5	57.5
WA-4	41.7467	-108.801	6712.28	54.5-74.5	74.5

Well ID	Latitude	Longitude	Top of Casing Elevation (ft. asl)	Screen Interval (ft. bgs)	Total Depth (ft.)
JB-N5-A	41.7542	-108.802	6705.41	119-129	132.5
JB-N11-A	41.7578	-108.803	6704.38	162-172	172
JB-N12-A	41.7566	-108.801	6705.28	174-184	184
JB-N11-L	41.7578	-108.803	6704.37	116-126	126
JB-N12-L	41.7566	-108.801	6705.50	105-115	115.00

3.1.3 Well Decommissioning / Replacement

The monitoring well network described in the preceding section, represents all of the wells utilized for assessment monitoring at the FGD Pond 1. No wells were replaced or decommissioned at the site.

3.1.4 Monitoring Network Adequacy

The minimum requirement for a groundwater monitoring network under the *Final Rule* is consistent with other elements of the Resource Conservation and Recovery Act (RCRA), which mandates a minimum of one upgradient and three downgradient monitoring wells for each CCR unit. The *Final Rule* goes further, stating that justification is required if the minimum number of wells is selected as the monitoring network.

As Section 3.1 demonstrates, the groundwater monitoring network for the FGD Pond 1, surpasses the minimum requirements, employing three background and ten downgradient wells. Their spatial distribution spans the geographic extent of the FGD Pond 1, along both the upgradient and downgradient boundaries of the CCR unit. The number and distribution of the wells provides a sufficient number of wells to capture groundwater as it passes the waste unit boundary in all directions along the groundwater flow path (Figure 1, Attachment A and B). Coupled with site-specific aquifer testing, the network also provides an adequate measure of the upper aquifer characteristics.

As Section 2.3 describes, the upper aquifer beneath the western portion of FGD Pond 1 is the unconfined Almond Sandstone which is overlain by the Lewis Formation (shale) to the west. Subsurface depths to water in the vicinity of the pond vary from approximately 9 to 56 feet bgs in the Almond and 48 to 104 feet bgs in the Lewis.

The monitoring network wells for the FGD Pond 1, were 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; Final Rule* § 257.91 (a) (1) and § 257.91 (b) and adequately monitor groundwater both hydraulically upgradient and downgradient of the site. The network is designed to sample the quality of groundwater passing the waste boundary of the CCR unit in accordance with § 257.91 (a) (2). The network exceeds the minimum monitoring requirements of one upgradient and three downgradient wells as defined in § 257.91 (c) (1), employing three

upgradient and ten downgradient monitoring wells. All 13 wells are completed in the uppermost aquifer as required by § 257.91 (a) and were constructed and are maintained in compliance with § 257.91 (e).

Groundwater elevations were measured in each well immediately prior to purging, each time groundwater was sampled. Groundwater elevations for the FGD Pond 1 were measured during a short enough period (same field visit), to avoid temporal variations in groundwater flow that could preclude accurate determination of groundwater flow rate and direction. Table 5 provides a summary of data acquired during assessment monitoring.

4.0 SAMPLING AND ANALYSIS REQUIREMENTS

A site-specific sampling and analysis plan (SAP) was developed and implemented for FGD Pond 1 to support the detection and assessment monitoring under the *Final Rule* (WET 2017). The SAP defines the procedures necessary to acquire data of known quality, from the upper aquifer. It includes provisions for all major elements of data collection and data evaluation, including those specified in the *Final Rule*:

- Water Levels & Well Purging
- Sample Collection & Preservation
- Sample Handling and Shipment / Delivery
- Chain of Custody
- Analytical Procedures
- Quality Assurance (QA) / Quality Control (QC)

4.1 Water Levels & Well Purging

Prior to initiating well purging activities, static water levels were acquired at each well, for each sampling event, using an electronic tape. The water levels were recorded in the electronic field logbook at the time of collection. After returning from the field, water levels were downloaded, reviewed, transferred to the data summary tables and used to support an examination of groundwater flow direction and flow rates. Water levels were acquired in accordance with Environmental Protection Agency (EPA) Standard Operating Procedure (SOP) EPA-SOP-GW-001, *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (EPA 2010) and are summarized in Attachment A and B. Total depths for each well are defined in Table 2 and the well logs, which are included in Appendix A of the site-specific sampling and analysis plan.

Well purging was completed in accordance with the SAP-specified standard investigation procedures (SIPs) and EPA-SOP-GW-001. During purging, field parameters were monitored, to evaluate groundwater equilibration. They were measured using a YSI Environmental 556 Multiprobe System (YSI 556 MPS) with pre-calibrated dissolved oxygen (DO), pH, specific conductance (SC), and oxidation-reduction potential (ORP) probes, and a Hach 2100Q Portable Turbidimeter. Prior to sample collection, in-stream purge water was measured, by placing the multiprobe system into a pre-cleaned flow-through cell. The following field measurements were

recorded on the electronic groundwater sampling form. Once field parameters stabilized, groundwater samples were collected. Table 3 provides the stabilization criteria used for field parameters during well purging.

- Temperature: degrees Celsius
- SC: $\mu\text{S}/\text{cm}$
- DO: mg/L
- pH: standard units
- ORP: mV

Table 3. Field Parameter Stabilization Requirements

Parameter	Condition
Turbidity	1. 10% for values greater than 5 NTU 2. If three turbidity values are less than 5 NTU, the parameter is stabilized.
Dissolved Oxygen	1. 10% for values greater than 0.5 mg/L 2. If three dissolved oxygen values are less than 0.5, the parameter is stabilized.
Specific Conductance	3%
Temperature	3%
pH	± 0.1 unit
Oxidation/Reduction Potential	± 10 millivolts

4.2 Sample Collection & Preservation

Groundwater samples were collected using a dedicated pump in each well. Dedicated pumps were installed and used throughout detection and assessment monitoring, to prevent cross-contamination and to provide consistent sampling. Samples were acquired in accordance with SIP No. 5, *Groundwater Sampling* (Appendix D - SAP). The basic steps for preparing and collecting groundwater samples included the following.

- Complete sample labels on each container by entering the following information:
 - Sample number
 - Sampler initials
 - Date and time of collection
 - Mark whether filtered or un-filtered
- Don new disposable sampling gloves.
- Fill provided containers for each well, by placing the tubing directly into the mouth of the container.
- Preserve the samples in accordance with Table 4.
- Seal the container.
- Place the container(s) into a cooler and maintain custody.

4.3 Sample Handling and Shipment / Delivery

Following the collection of a full sample container, samples were preserved, the container was sealed, placed in a plastic bag, and secured in a cooler packed with ice. Each cooler was secured, by affixing custody seals to lid and body of the cooler at the end of each day. As needed, the seals were removed at the start of each day and discarded. Field personnel retained custody of the samples from the time of collection to delivery, or shipment to the analytical laboratory.

Table 4. Analytical Methods, Sample Preservation, and Holding Times

Analysis Request:	Analytical Method:	Preservation:	Holding Time:
Metals	EPA 200.7 / 200.8 EPA 245.1 (Hg)	Nitric Acid Cool 4°C	180 days
Chloride	EPA 300.0	Cool 4°C	28 days
Fluoride	SM 4500-F	Cool 4°C	28 days
pH	EPA 150.1	Cool 4°C	Immediately
Sulfate	EPA 300.0	Cool 4°C	28 days
Total Dissolved Solids	SM 2540C	Cool 4°C	7 days

At the end of each sampling event, samples were either shipped using a national shipping vendor (e.g. Federal Express), or were hand delivered to the laboratory. When samples were shipped, labels were completed with the address of the contract laboratory, and hand delivered to the shipping company. The original air bill was retained as part of the field records, to ensure a complete custody history for the samples. To transfer custody, the date and time were recorded on the chain of custody (COC) form by the sampler, the COC was signed, the original retained, and the remaining copies affixed to the lid of the cooler. The cooler was then sealed, custody seals affixed, and the cooler was delivered for shipment or to the laboratory.

4.4 Chain of Custody

A COC record supplied by the analytical laboratory was completed for all samples, as they were collected. The records included the following information:

- Project name and number
- Name of the analytical laboratory destination
- Sampler's signature
- Sample identification number, date, and time of collection, filtered/unfiltered
- Number of containers and type of sample
- Analysis requested, and number of containers provided per analysis
- Any special instructions or hazard warnings

Upon relinquishing custody of the samples, both parties (sampler and lab) signed and dated the COC, noting the time of the exchange of custody. The sampler signed first relinquishing custody and the laboratory personnel signed next, taking custody. Intermediate signatures may or may not be present, depending on the duration of sampling and related factors. When accepting custody of the samples, laboratory personnel performed a review, comparing information on the sample bottles with the chain-of-custody entries. If an error was noted, the sampler was notified, and the issue was resolved prior to performing analyses. Samples marked preserved, were checked for proper pH adjustments, to ensure enough preservative was added and cooler temperatures were checked using a temperature blank, or by checking all of the samples. All samples were recorded in the laboratory receiving logbook and given a unique sample-tracking number prior to initiating analysis.

4.5 Analytical Procedures

Industry standard analytical methods were used to quantify the Appendix III and IV constituents in each well, during each sampling event. Sample preparation and analysis included measurement of total recoverable metals on unfiltered samples in accordance with EPA Methods 3005A and 200.7 – Inductively Coupled Plasma (ICP) and/or 200.8 ICP – mass spectrometry (MS). Other industry standard analytical methods were also employed for detection and assessment monitoring as outlined below:

- Chloride & Sulfate: EPA Method 300.0 – Ion Chromatography
- Fluoride: Standard Method 4500-F – Ion Selective Electrode
- pH: Standard Method A4500-H – Ion Selective Electrode
- Total Dissolved Solids (TDS): Standard Method 2540C – Gravimetric Method
- Metals: EPA 200.7 / 200.8 and EPA 245.1 (Hg)
- Ra²²⁶ & Ra²²⁸: EPA 903.1 / EPA 904.0

4.6 Quality Assurance / Quality Control

The following sections define the quality control (QC) requirements specified for detection and assessment monitoring in the FGD Pond 1 sampling and analysis plan.

4.6.1 Field Quality Control Requirements

Field quality control samples were required at a minimum frequency of one field blank and one field duplicate for every 20 field samples. In general, field quality control samples were collected during each sampling event, exceeding the basic requirements outlined in the SAP. They were submitted for analysis with the group of samples they were collected with, and underwent analysis for all Appendix III and IV constituents (Table 4).

Field blanks were collected and analyzed to monitor the cleanliness of sample containers, preservatives, and the sampling and analytical process. Field duplicates provided a measure of precision among a group of samples, by providing a direct measurement of the variability

between samples in each group. Field blanks were prepared using de-ionized water in randomly selected sample bottles. The blank was then preserved and handled in the same manner as the natural samples it accompanied. Field duplicates were collected using the same collection procedures as the original sample, by collecting a separate sample using the low-flow sampling procedure. The sample was collected immediately following collection of the original sample and preserved and handled in accordance with the SAP provisions. A summary of field quality control performance is provided in Section 5.3.

Note: Equipment rinsates or cross-contamination blanks, were not required for this sampling effort, as dedicated pumps and tubing were used throughout the groundwater monitoring process.

4.6.2 Laboratory Quality Control Requirements

Laboratory quality control for detection and assessment monitoring, consisted of analytical method-specific requirements. Laboratory quality control common to all of the analytical methods includes:

- Chain of Custody
- Sample Preservation
- Holding Times
- Method Calibrations
- Field & Method Blanks
- Laboratory Control Samples
- Duplicates
- Matrix Spikes

Each of these elements, as well as, method-specific QC requirements and corresponding field documentation, underwent a full review as part of data validation. A summary of laboratory quality control performance is provided in Section 5.1.

5.0 ASSESSMENT MONITORING RESULTS AND DISCUSSION

The Ash Pond was transitioned to assessment monitoring in 2018. Two rounds of sampling and analysis were completed, and these results were compared with groundwater protection standards. All of the samples underwent analysis in accordance with the requirements defined in the *Final Rule*. In addition, water level data was acquired each time the wells were sampled, in accordance with the sampling and analysis plan.

Table 5 provides 2018 assessment monitoring data collected for FGD Pond 1. A full examination of water quality is provided in Section 6.0. Attachments A and B contain groundwater contour maps, data validation, and the laboratory data packages for each event. Attachment B contains statistical analyses comparing downgradient groundwater values to groundwater protection standards.

Table 5. Jim Bridger Power Plant - FGD Pond 1 **Detection & Assessment Monitoring Results**

SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	Appendix III												Appendix IV												Radium 226+228															
						B		Ca		Cl		F		pH		SO ₄		TDS		Sb		As		Ba		Be		Cd		Cr		Co		Pb		Li		Hg		Mo		Se		TI	
						mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	s.u	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	pCi/L	Q				
1284-WL	Background	10/23/2015	6704.64	10.30	6694.34	0.65	J-	104	59	0.9	J-	7.60		1780	J-	2810	<0.001	0.001	<0.05	<0.001	<0.001	<0.001	0.015	<0.001	0.2	<0.0001	0.001	0.001	J+	<0.0005	4.1														
		11/13/2015		14.20	6690.44	0.65		98	67	1		7.75		1830	J+	2990	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.009	<0.001	0.2	<0.0001	0.001	0.001	<0.0005	2.5															
		12/8/2015		11.50	6693.14	0.60	J-	93	71	0.8		7.53		1840		3010	<0.001	<0.001	<0.05	UJ	<0.001	<0.001	<0.005	0.014	<0.001	0.2	J-	<0.0001	0.001	J+	<0.001	<0.0005	3.23												
		1/6/2016		10.40	6694.24	0.48	J+	103	68	0.8		7.71		1830		2990	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.013	<0.001	0.2	<0.0001	0.001	0.001	<0.0005	2.0															
		4/12/2016		11.73	6692.91	0.61		121	66	0.7	J-	7.77		1800		2980	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.011	<0.001	0.2	<0.0001	<0.001	<0.001	<0.0005	4.0															
		5/11/2016		11.01	6693.63	0.51		99	67	0.8		7.80		1770		2970	<0.001	<0.001	UJ	<0.001	<0.001	UJ	0.012	J-	<0.001	0.2	<0.001	<0.001	UJ	<0.001	<0.001	J+	<0.001	<0.001	3.2										
		6/14/2016		11.55	6693.09	0.64		100	65	0.8		7.72		1760		3040	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.009	<0.001	0.2	<0.001	0.002	J-	0.003	<0.001	4.2														
		7/12/2016		11.24	6693.40	0.61		96	68	0.8		7.68		1650		3070	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.01	<0.001	0.2	<0.0001	0.030	<0.001	0.030	<0.004	1.1														
		8/9/2016		11.05	6693.59	0.62		107	67	0.8		7.69		1760		2960	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.012	<0.001	0.2	<0.0001	0.001	<0.001	<0.0005	3.5															
		9/20/2016		12.03	6692.61	0.61	J-	102	76	0.8		7.69		1980		3030	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.012	<0.001	0.2	<0.0001	0.002	<0.001	0.016	1.5															
		2/12/2018		10.77	6693.87	NS																																							
		5/22/2018		13.12	6691.52	0.70		97	68	0.8		7.60		1960		3030	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.011	<0.001	0.2	<0.0001	0.001	J+	<0.001	<0.0005	4.30														
285-WA	Background	1/10/2017	6710.31	9.70	6700.61	0.05		225	10	0.2		7.20		769		1510	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.002	<0.1	<0.0001	0.011	<0.001	<0.0005	4.8																
		5/2/2017		10.08	6700.23	0.06		222	10	0.2		7.23		736		1500	<0.001	<0.001	J+	<0.05	<0.001	<0.005	0.001	<0.1	<0.0001	0.002	<0.001	<0.0005	3.3																
		6/21/2017		10.26	6700.05	<0.05		225	9	0.2		7.13		758		1560	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.005	<0.001	<0.1	<0.0001	0.002	<0.001	<0.0005	4.4															
		7/12/2017		10.89	6699.42	<0.05		220	10	0.2		7.18		719		1500	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.005	<0.001	<0.1	<0.0001	0.001	J+	<0.001	<0.0005	2.3														
		7/26/2017		5.44	6704.87	0.05	J-	228	9	0.2		7.18		708		1520	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.001	<0.001	<0.1	<0.0001	0.001	<0.001	<0.0005	4.4															
		8/8/2017		10.54	6699.77	<0.05		224	9.9	0.16		7.14		702		1490	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.005	<0.001	<0.1	<0.0001	0.001	<0.001	<0.0005	3.3															
		8/31/2017		10.41	6699.90	<0.05		214	11	0.2		7.20		790		1510	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.005	<0.001	<0.1	<0.0001	0.001	<0.001	<0.0005	2.8															
		9/13/2017		10.45	6699.86	<0.05		212	10	0.2		7.18		790		1540	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.005	<0.001	<0.1	<0.0001	0.001	<0.001	<0.0005	2.3															
		9/27/2017		10.63	6699.68	0.05		239	10	0.2		7.21		746		1540	<0.001	<0.001	<0.05	<0.001	<0.001	<0.005	0.005	<0.001	<0.1	<0.0001	0.001	<0.001	<0.0005	2.8															
		2/12/2018		NM	NM	NS																																							
		5/22/2018		9.46	6700.85	NS																																							
685-WL	Background	10/23/2015	6697.02	NM	NM	NS - Not enough water to sample.																																							
		11/13/2015	121.60	6575.42	NS	NS - Not enough water to sample.																																							
		12/8/2015	121.01	6576.01	NS	NS - Not enough water to sample.																																							
		4/12/2016	115.90	6581.12	NS	NS - Not enough water to sample.																																							
		5/																																											

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: Estimate

J+: Overestimate

UJ: Estimated Non-Detect

J-: Underestimated

Table 5. Jim Bridger Power Plant - FGD Pond 1 **Detection & Assessment Monitoring Results**

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: Estimate

J+: Overestim

UJ: Estimated Non-Detect

J-: Underestimated

Table 5. Jim Bridger Power Plant - FGD Pond 1 **Detection & Assessment Monitoring Results**

SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	Appendix III												Appendix IV												Radium 226+228															
						B		Ca		Cl		F		pH		SO ₄		TDS		Sb		As		Ba		Be		Cd		Cr		Co		Pb		Li		Hg		Mo		Se		Tl	
						mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	s.u	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	mg/L	Q	pCi/L	Q						
JB-N5-A	Downgradient	1/10/2017	6706.77	41.40	6665.37	0.20		514		130		0.3		6.63		4550		6700		<0.001		<0.001		<0.05		<0.001		<0.001		<0.005		<0.001		0.2		<0.0001		0.002		<0.0005		9.7			
		3/7/2017		40.73	6666.04	0.53		414		144		0.3		6.71		5050		7370		<0.001		<0.001		<0.05	UJ	<0.001		<0.001		<0.005		<0.001		0.1		<0.0001		0.001		<0.0005		5.1			
		5/3/2017		41.48	6665.29	0.34		485		137		0.3		6.60		4650		7250		<0.001		<0.001		<0.05		<0.001		<0.005		<0.005		0.002		0.1		<0.0001		0.002	J+	<0.0005		7.8			
		6/21/2017		41.24	6665.53	0.50		465		135		0.3		6.61		5520		8250		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		0.2		<0.0001		0.001		<0.0005		12.7					
		7/12/2017		39.90	6666.87	0.50		429		133		0.3		6.62		5160		7940		<0.001		<0.001		<0.05		<0.001		<0.005		<0.005		<0.001		0.1		<0.0001		<0.001		<0.0005		10.1			
		7/26/2017		45.47	6661.30	0.32	J-	497		133		0.3		6.65		4500		6890		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.001		<0.0005		10.4					
		8/8/2017		45.72	6661.05	0.13		447		76		0.25		6.67		3170		5320		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.002		<0.0005		6.1					
		8/31/2017		45.05	6661.72	NS - Not enough water to sample.																																							
		9/13/2017		45.79	6660.98	0.21		507		92		0.4		6.69		3490		5470		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.003		<0.0005		5.8					
		2/12/2018		39.70	6667.07	NS																																							
		5/22/2018		44.48	6662.29	0.5		464		177		0.3		6.64		6120		9440		<0.002		<0.001		<0.05		<0.001		<0.005		<0.001		0.1		<0.0001		0.003	J+	<0.001		<0.0005		9.30			
JB-N11-A	Downgradient	5/3/2017	6705.74	32.58	6673.16	0.07		168		19		0.3		7.59		1210		2110		0.002		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.446		0.004		<0.0005		2.9			
		6/21/2017		32.24	6673.50	0.06		164		16		0.3		7.56		1170		2010		0.001	J+	<0.001		<0.05		<0.001		<0.005		<0.001		0.1		<0.0001		0.439		0.001		<0.0005		2.2			
		7/12/2017		29.61	6676.13	0.06		147		18		0.3		7.52		1090		1950		0.001		0.001	J+	<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.441		0.001		<0.0005		2.6			
		7/26/2017		29.86	6675.88	0.08	J-	154		17		0.3		7.54		1030		1980		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.409		<0.001		<0.0005		3.5			
		8/8/2017		30.47	6675.27	<0.05		142		17		0.3		7.55		1050		1920		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.396		<0.001		<0.0005		3			
		8/31/2017		30.44	6675.30	0.05		135		18		0.3		7.53		984		1910		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.432		<0.001		<0.0005		3.1			
		9/13/2017		30.45	6675.29	0.08		140		18		0.3		7.54		960		1840		<0.001		<0.001		<0.05		<0.001		<0.005		<0.001		<0.1		<0.0001		0.418		<0.001		<0.0005		5.			

5.1 Data Quality / Usability

All of the Appendix III and IV sample results underwent data validation in accordance with the EPA *National Functional Guidelines for Inorganic Data Review* (EPA 2017). The complete results are included in Appendix A and B as Attachment B. None of the analytical data used to assess groundwater quality for the FGD Pond 1 were rejected due to quality control issues. A number of results from the May event were qualified either J+ due to low level detections in the laboratory method blank(s). These qualifiers indicate reported results are estimated. Although qualified, these results meet the usability criteria for evaluating site conditions and decision making (EPA 1989).

5.1.1 Precision

Four field duplicates were collected in support of assessment monitoring at the Jim Bridger Power Plant in 2018, one for each sampling event. This equates to a field duplicate frequency of two field duplicate per 12.5 samples (16%), exceeding the frequency outlined in the SAP of one field duplicate for every 20 samples (5%). With 14 constituents per field duplicate, this equates to a total of 56 data points acquired. Two field duplicate results fell outside of the +/- 20% precision criteria, when both results were greater than five times the detection limit (EPA 2017). This equates to 3.6% of the field duplicate results that did not meet project precision goals. The remaining 96.4% met precision criteria defined for the project.

5.1.2 Accuracy

A total of 350 data points was acquired as part of assessment monitoring for the FGD Pond 1. Of these, 13 were qualified during data validation due to low level detections in the laboratory method blank(s). This equates to 3.7% of results that received qualification. The remaining 96.3% met all accuracy criteria for the project without qualification.

5.1.3 Completeness

A total of 350 data points was collected from 13 monitoring wells in February and 12 monitoring wells in May. When precision and accuracy are given equal weight, 96.4% of the data met all project requirements. Although qualified results are assigned some uncertainty, all of the results (100%) are usable to support decision-making and to assess groundwater quality at the FGD Pond 1.

6.0 STATISTICAL METHOD SELECTION AND RESULTS

The upper tolerance limit (UTL) approach was selected to evaluate background and downgradient groundwater quality for FGD Pond 1 as part of detection and assessment monitoring. This method was selected, because it will support an examination of groundwater quality over time, regardless of the size of the data set. This means, a larger dataset and a smaller dataset with similar characteristics, should have similar UTLs over time. In addition, constituents exceeding the background, or the groundwater protection standard, will likely result from

conditions originating from the CCR unit, not a change in the size of the data set. Using this approach, an upper tolerance limit for each constituent was established from the background data distribution and each constituent from the downgradient wells, was compared to the UTL to determine if an increase was observed above background.

6.1 Detection Monitoring

Results from detection monitoring for FGD Pond 1 (2017), revealed all Appendix III constituents exceeded site-specific background concentrations (Table 6a). Based on these findings, FGD Pond 1 was transitioned to assessment monitoring in 2018.

Table 6a. Summary of Groundwater Quality Comparisons – Detection Monitoring

Analyte	Background Upper Tolerance Limit (mg/L)	Type of Upper Tolerance Limit	Downgradient Wells Exceeding Background
Boron	0.65	Max Value	566-WA, 984-WA, JB-N11-L, JB-N12-L
Calcium	239	Max Value	566-WA, 984-WA, JB-N10-A, JB-N11-L, JB-N12-L, JB-N5-A, JB-WA-6, WA-3, WA-4
Chloride	76	Max Value	566-WA, 984-WA, JB-N11-L, JB-N12-L, JB-N5-A, WA-4
Fluoride	1	Max Value	566-WA, 984-WA, JB-N10-A, JB-N11-L, WA-3, WA-4
pH Alkaline	7.8	Max Value	JB-N12-A
pH Acidic	7.1	Max Value	566-WA, 984-WA, JB-N10-A, JB-N5-A, WA-3, WA-4
Sulfate	1980	Max Value	566-WA, 984-WA, JB-N10-A, JB-N11-L, JB-N12-L, JB-N5-A, JB-WA-6, WA-3, WA-4
TDS	3070	Max Value	566-WA, 984-WA, JB-N10-A, JB-N11-L, JB-N12-L, JB-N5-A, JB-WA-6, WA-3, WA-4

6.2 Assessment Monitoring

The *Final Rule* requires the owner or operator of a CCR unit to determine if groundwater protection standards have been exceeded for any Appendix IV constituents as part of assessment monitoring. For FGD Pond 1, site-specific background (UTL) concentrations were combined with *EPA National Primary Drinking Water Standards* to create groundwater protection standards. The higher of these was adopted as the standard and 2018 assessment monitoring values were compared to them to determine if a release had occurred. This comparison is provided in Table 6b and reveals Appendix IV constituents: arsenic, cadmium, cobalt, fluoride, lead, lithium, molybdenum, radium and selenium exceeded their groundwater protection standards. As a result, a nature and extent investigation was initiated to bound the release.

Table 6b. Summary of Groundwater Quality Comparisons – Assessment Monitoring

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells Exceeding the Groundwater Protection Standard
Antimony	0.001	0.006	0.006	None Exceed
Arsenic	0.005	0.01	0.01	566-WA, JB-N12-L, WA-4
Barium	0.07	2	2	None Exceed
Beryllium	0.076	0.004	0.076	None Exceed
Cadmium	0.008	0.005	0.008	566-WA
Chromium	0.007	0.1	0.1	None Exceed
Cobalt	0.205	0.006	0.205	566-WA, WA-4
Fluoride	8.0	4	8	WA-4
Lead	0.01	0.015	0.015	JB-N12-L
Lithium	0.5	0.040	0.5	JB-N11-L, JB-N12-L, WA-4
Mercury	0.001	0.002	0.002	None Exceed
Molybdenum	0.03	0.100	0.100	JB-N11-A, JB-N11-L, JB-N12-A, JB-N12-L
Radium	5.22	5	5.22	JB-N5-A
Selenium	0.006	0.05	0.05	JB-N11-L, JB-N12-L
Thallium	0.0304	0.002	0.0304	None Exceed

7.0 CHARACTERIZATION OF NATURE AND EXTENT OF RELEASE

Because groundwater protection standards were exceeded at the waste unit boundary, PacifiCorp has initiated a supplemental investigation to support an evaluation of the nature and extent of the release from FGD Pond 1. The investigation utilizes data from existing wells on the Jim Bridger Power Plant boundary to comply with the Final Rule, and to bound the release. The investigation will incorporate data obtained from source material reflecting past disposal in FGD Pond 1. Results from these efforts are being evaluated and a report detailing the nature and extent of the release will be included in the Corrective Measures Study for FGD Pond 1 and the Annual Groundwater Monitoring and Corrective Action Report for 2019.

8.0 FINDINGS AND CONCLUSIONS

The results of the detection monitoring completed in 2017, revealed all Appendix III constituents exceeded site-specific background concentrations in downgradient monitoring wells (Table 6a). As a result, FGD Pond 1 was transitioned to assessment monitoring in 2018. The results of 2018 assessment monitoring concluded Appendix IV constituents: arsenic, cadmium, cobalt, fluoride, lead, lithium, molybdenum, radium, and selenium exceeded their groundwater protection

standards. Based on this, PacifiCorp began the process to define the nature and extent of the release at the Jim Bridger Power Plant in accordance with the *Final Rule*. This work will be completed in 2019.

FGD Pond 1 has been inactive since 2003 and is undergoing closure. In accordance with the *Final Rule*, because groundwater at the waste unit boundary exceeded groundwater protection standards, FGD Pond 1 will proceed to corrective measures in 2019.

9.0 UPCOMING YEAR

During 2019, it is anticipated PacifiCorp will complete the following activities at FGD Pond 1:

Semi-Annual Monitoring

- Conduct the first semi-annual monitoring event for Appendix III and IV constituents;
- Perform statistical analysis of data;
- Conduct the second semi-annual monitoring event for Appendix III and IV constituents;
- Perform statistical analysis of data; and
- Develop the Annual Groundwater Monitoring and Corrective Action Report.

Corrective Measures

- Complete characterization and extent of release;
- Complete an assessment of corrective measures;
- Develop a corrective measures study;
- Conduct a public meeting to discuss the corrective measures study;
- Select the preferred remedy alternative;
- Begin remediation; and
- Develop a semi-annual corrective measures progress report.

Operations & Maintenance

The final dewatering of the pond will be completed in 2019 completing the closure. In addition, any necessary cover repairs will also be performed in 2019 as part of the post closure care.

10.0 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.

Morris, D.A. and Johnson, A.I. (1967). Summary of Hydrologic and Physical Properties of Rock and Soil Materials, as Analyzed by the Hydrologic Laboratory of the U.S. Geological Survey, 1948-1960. USGS Water Supply Paper: 1839-D. In Kresic N. 2007. Hydrogeology and Groundwater Modeling, p 111. CRC Press.

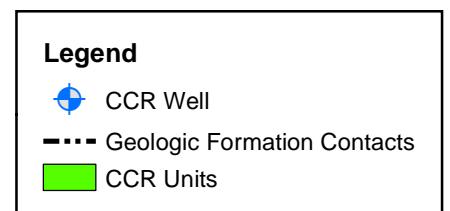
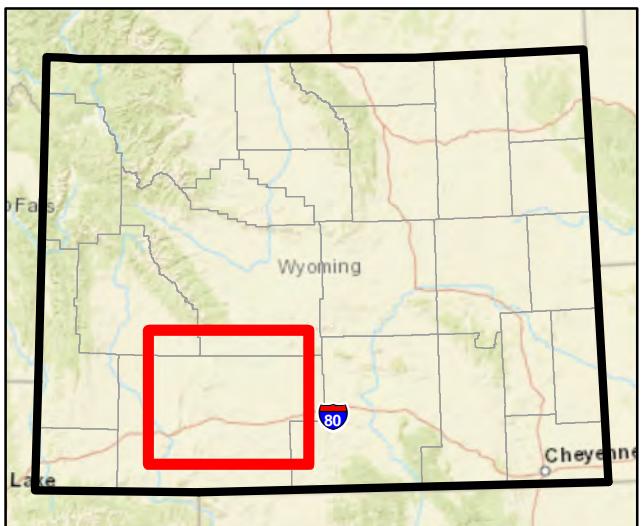
WET, 2018. 2017 Annual Report FGD and Evaporation Pond Groundwater Monitoring Program, PacifiCorp Jim Bridger Power Plant, Point of Rocks, Wyoming, August 2018.

WET, 2017. Sampling and Analysis Plan & Well Documentation, FGD Pond 1 – Jim Bridger Power Plant, Point of Rocks, Wyoming, October 2017.

URS, 2015. Jim Bridger Power Plant Flue-Gas Desulfurization Pond 1, Closure Design Report. September 2015.

WET, 2001. FGD-2 Pond Expansion Permit Application – Jim Bridger Power Plant, March 2001.

Figures



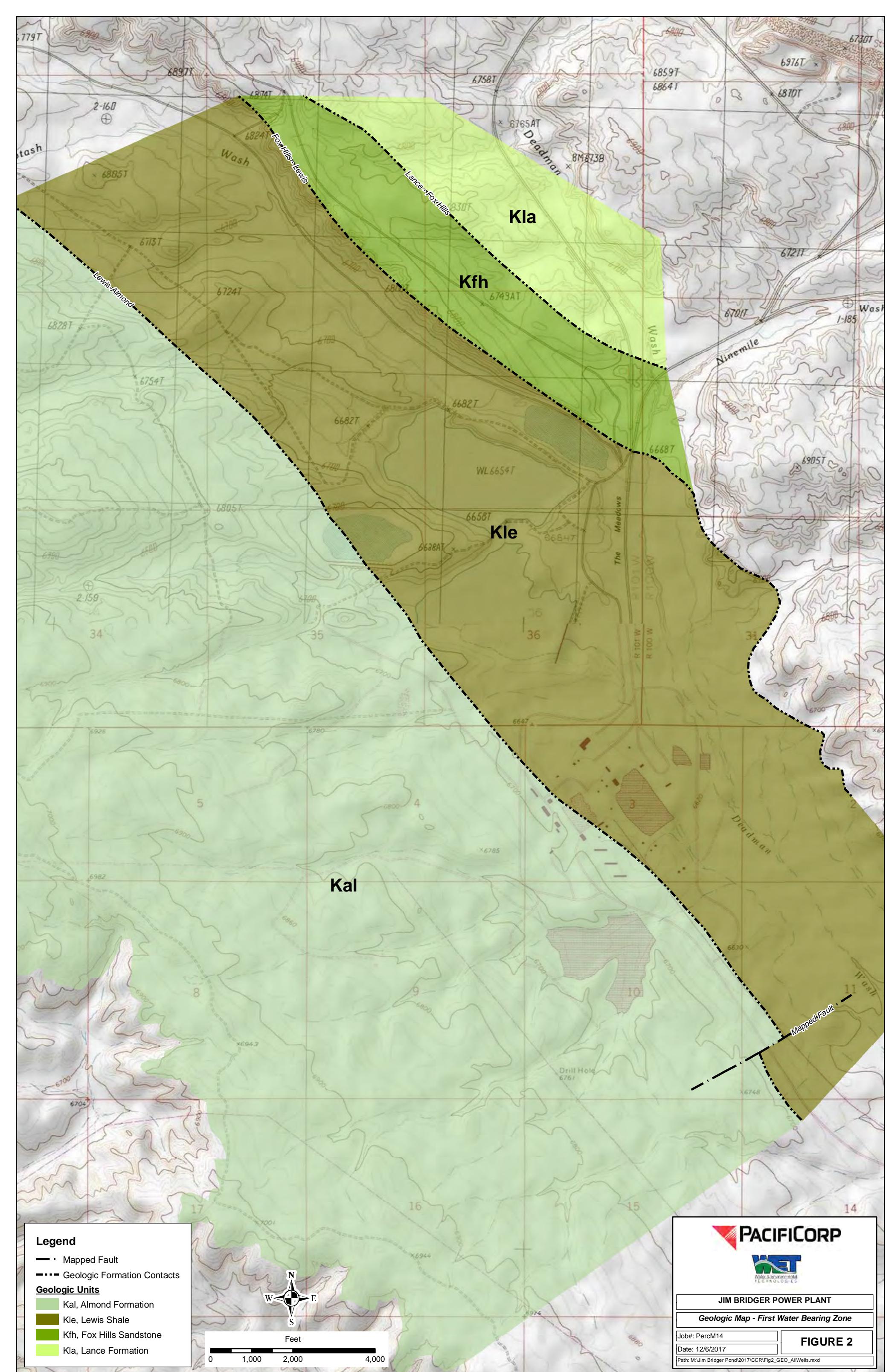
*Note background image is 2013
1 ft. resolution ESRI image



JIM BRIDGER POWER PLANT

FGD Pond 1 CCR Sampling Locations

Job#: PERCM55	Date: 9/15/2017	FIGURE 1
Path: M:\PERC_CCR\Jim_Bridger\CCR_Sampling_3maps.mxd, Author: jlerowse		



Attachment A

Field Summary Report - February 2018

Facility Name: Jim Bridger Power Plant - FGD Pond 1
Event Description: Assessment Monitoring
Event Dates: February 12-14, 2018
Field Personnel: Laura Watson, Dalton Williams

ACTIVITY SUMMARY. WET personnel arrived onsite February 12, 2018 and performed groundwater sampling at CCR unit FGD-1. 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 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:

- JB-N5-A
- JB-N10-A
- JB-N11-A
- JB-N11-L
- JB-N12-L
- JB-N12-A
- JB-WA-6
- WA-3
- WA-4
- 285-WA
- 566-WA
- 984-WA
- 685-WL
- 1284-WL

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

- Date(s) fieldwork completed: February 12-14, 2018
- Date(s) unvalidated lab data received: March 13, 2018; March 21, 2018 (revised due to incorrect project number)
- Data validation completion date: April 2, 2018

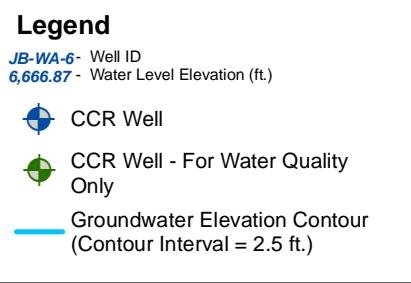
After collection, the samples were preserved in accordance with the SAP, placed on ice, chain of custody forms were completed, and the samples were transported to Energy Laboratories in Casper, WY for analysis on February 15, 2018. The following information is attached to this summary as a supplement:

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

SAP DEVIATIONS. Well 685-WL did not produce sufficient water to collect a sample.

Attachment A:

Groundwater Contour Map



Feet

0 500 1,000 2,000 3,000 4,000



JIM BRIDGER POWER PLANT

Groundwater Elevation Map
FGD Pond 1

Job#: PERCM049

Date: 5/14/2018

Path: M:\PERC_CCR\Feb_2018_SamplingAll_Sites_DDPs.mxd; Author: brutherford

Attachment 1

Attachment B:

Data Validation Summary

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Jim Bridger	
Validator:	Tim Driscoll 4/2/2018	
Reviewer:	Pat Seccomb 04-10-18	
Laboratory:	Energy Laboratories	
Laboratory Work Order#:	C18020380	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix IV: Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li, Hg, Mo, Se, Tl, Ra ²²⁶ + Ra ²²⁸	
Review Element:	Complete / Criteria Met? (Yes/No)	If no, describe:
Chain of Custody:	Yes	
Field Documentation:	Yes	
Holding Times & Sample Preservation:	Yes	
Calibrations:	Yes	
Blanks:	Yes	
Laboratory Control Sample:	Yes	
Laboratory Duplicate:	Yes	
Matrix Spike:	Yes	
Overall Assessment:		
No qualifications were required.		

Attachment C:

Field Data Sheets



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	LW	Project Number:	PERCM049
Sample ID:	JB-N5-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/12/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Wind, cold		
Depth to Water (ft):	39.70	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	39.81

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	7.70	5,135	0.47	6.41	332.10	114.00
6	8.70	5,091	0.22	6.43	333.40	114.00
8	8.70	5,094	0.15	6.46	329.60	12.40

SAMPLE COLLECTION

Appendix:	4	Sample Time:	17:40
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
(1) Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:

No preservative for small bottle



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	JB-N10-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny clear windy		
Depth to Water (ft):	31.96	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	32.76

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	8.20	4,238	5.91	3.79	468.90	1,100.00
6	8.20	4,227	5.01	3.81	4,555.80	1,100.00
8	8.30	4,202	4.88	3.82	445.40	713.00

SAMPLE COLLECTION

Appendix:	4	Sample Time:	13:03
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
(1) Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:

DO not stable air was getting in the tube from pin hole in tube



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	WA-4	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Windy clear		
Depth to Water (ft):	56.40	Total Well Depth (ft):	SAP
Well Diameter (in):	4	Final DTW (ft):	56.61

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	8.40	4,320	4.64	3.47	297.20	0.02
6	8.40	4,307	4.23	3.47	297.70	0.02
8	8.40	4,283	4.14	3.47	288.60	0.02

SAMPLE COLLECTION

Appendix:	4	Sample Time:	11:56
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
(1) Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	WA-3	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Windy clear		
Depth to Water (ft):	31.18	Total Well Depth (ft):	SAP
Well Diameter (in):	4	Final DTW (ft):	31.19

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	7.40	4,461	2.78	6.26	251.50	7.29
6	7.70	4,460	3.20	6.26	252.00	7.29
8	7.80	4,200	3.28	6.25	252.30	6.21

SAMPLE COLLECTION

Appendix:	4	Sample Time:	10:56
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
(1) Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:

Small hole in pipe caused a little air to get into tube



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	JB-WA-6	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 10		
Depth to Water (ft):	15.18	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	21.12

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	7.50	5,394	0.36	7.33	178.40	1,010.00
6	6.80	5,499	0.29	7.34	195.20	1,010.00
8	5.80	5,433	0.43	7.34	198.90	287.00

SAMPLE COLLECTION

Appendix:	4	Sample Time:	9:45
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:

Removed pump to check flow issues tubing was frozen initially



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Fax: 406-723-1537

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	JB-N12-L	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/14/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Clear cold		
Depth to Water (ft):	85.39	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	90.29

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	7.80	50,209	1.26	7.57	122.40	230.00
6	8.00	51,838	1.59	7.53	120.80	230.00
8	7.40	52,156	1.72	7.55	121.80	353.00

SAMPLE COLLECTION

Appendix:	4	Sample Time:	8:58
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
(1) Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:

Water is very cloudy



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Butte, Montana 59701
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Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	JB-N11-L	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Windy clear		
Depth to Water (ft):	40.47	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	49.33

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	8.20	53,002	1.52	7.86	42.50	77.70
6	8.30	52,073	1.38	7.82	51.50	77.70
8	8.40	51,858	1.33	7.80	58.40	136.00

SAMPLE COLLECTION

Appendix:	4	Sample Time:	17:22
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
(1) Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:

Air in tube when pumping



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	JB-N11-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Windy clear		
Depth to Water (ft):	29.89	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	30.20

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	8.90	2,276	0.43	7.53	-92.40	0.86
6	8.80	2,219	0.35	7.51	-100.80	0.86
8	8.70	2,214	0.41	7.50	-108.10	0.02

SAMPLE COLLECTION

Appendix:	4	Sample Time:	16:30
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
(1) Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:

Well smells like sulfur



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	984-WA	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Windy clear		
Depth to Water (ft):	41.33	Total Well Depth (ft):	SAP
Well Diameter (in):	4	Final DTW (ft):	41.70

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	6.70	32,987	0.41	6.60	-44.30	2.19
6	6.50	25,171	0.73	6.73	-25.90	2.19
8	7.00	23,617	0.66	6.74	-22.30	0.02

SAMPLE COLLECTION

Appendix:	4	Sample Time:	15:16
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
		Analytes/Comments	
		Radium 226 + 228	
		Total metals, Total mercury	
		Nitrate + Nitrite	
		TDS, pH, anions, fluoride, alkalinity	

Comments/Observations:

Water is yellow colored smelled like sulfur



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	DW	Project Number:	PERCM049
Sample ID:	566-WA	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Windy clear		
Depth to Water (ft):	27.74	Total Well Depth (ft):	SAP
Well Diameter (in):	4	Final DTW (ft):	27.75

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	7.60	4,953	1.35	4.24	328.90	19.70
6	8.10	4,887	1.13	4.35	305.50	19.70
8	8.00	4,876	1.05	4.36	301.50	4.51

SAMPLE COLLECTION

Appendix:	4	Sample Time:	14:14
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
		Analytes/Comments	
		Radium 226 + 228	
		Total metals, Total mercury	
		Nitrate + Nitrite	
		TDS, pH, anions, fluoride, alkalinity	

Comments/Observations:



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480 East Park Street
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Phone: 406-782-5220
Fax: 406-723-1537

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	LW	Project Number:	PERCM049
Sample ID:	JB-N12-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/14/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	35, wind		
Depth to Water (ft):	35.71	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	36.33

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	8.60	1,941	0.46	7.49	381.50	13.70
6	8.70	1,924	0.40	7.49	383.40	13.70
8	8.80	1,905	0.43	7.50	383.90	18.10

SAMPLE COLLECTION

Appendix:	4	Sample Time:	8:30
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:



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Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	LW	Project Number:	PERCM049
Sample ID:	285-WA	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	33, sun		
Depth to Water (ft):	9.56	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	10.30

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	8.90	1,786	0.46	7.08	416.30	11.10
6	9.00	1,764	0.23	7.10	413.90	11.10
8	9.00	1,778	0.11	7.03	410.30	28.90
10	9.00	1,777	0.41	7.04	406.00	24.00

SAMPLE COLLECTION

Appendix:	4	Sample Time:	12:45
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:



Consulting Scientists and Engineers
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Phone: 406-782-5220
Fax: 406-723-1537

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	LW	Project Number:	PERCM049
Sample ID:	1284-WL	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUN 33		
Depth to Water (ft):	10.77	Total Well Depth (ft):	SAP
Well Diameter (in):	4	Final DTW (ft):	12.89

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	7.90	3,729	0.33	7.69	163.00	12.60
6	8.00	3,735	0.20	7.63	162.70	12.60
8	7.80	3,727	0.13	7.65	161.90	11.30

SAMPLE COLLECTION

Appendix:	4	Sample Time:	12:15
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
		Analytes/Comments	
		Radium 226 + 228	
		Total metals, Total mercury	
		Nitrate + Nitrite	
		TDS, pH, anions, fluoride, alkalinity	

Comments/Observations:

FB-2 @1100



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

Project Name:	Jim Bridger Power Plant CCR Monitoring		
Sampler Initials:	LW	Project Number:	PERCM049
Sample ID:	685-WL	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	2/13/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sun, breeze		
Depth to Water (ft):	136.57	Total Well Depth (ft):	SAP
Well Diameter (in):	2	Final DTW (ft):	136.57

FIELD PARAMETERS

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

SAMPLE COLLECTION

Appendix:	4	Sample Time:	11:43
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:

No sample-well would not produce

Attachment D:

Laboratory Analytical Reports

ANALYTICAL SUMMARY REPORT

March 21, 2018

PacifiCorp
1591 Tank Farm Road
Glenrock, WY 82637

Work Order: C18020380 Quote ID: C5218 - Pacific Corp

Project Name: PERCM49 - Jim Bridger Power Plant

Energy Laboratories, Inc. Casper WY received the following 30 samples for PacifiCorp on 2/15/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C18020380-001	JB-NS-A	02/12/18 17:30	02/15/18	Aqueous	Metals by ICP/ICPMS, Total Mercury, Total Preservation by the Laboratory Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total
C18020380-002	FB-2	02/13/18 11:00	02/15/18	Aqueous	Metals by ICP/ICPMS, Total Mercury, Total Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total
C18020380-003	1284-WL	02/13/18 12:15	02/15/18	Aqueous	Same As Above
C18020380-004	285-WC	02/13/18 12:45	02/15/18	Aqueous	Same As Above
C18020380-005	JB-N6-WL	02/13/18 14:15	02/15/18	Aqueous	Same As Above
C18020380-006	JB-N1-WL	02/13/18 15:15	02/15/18	Aqueous	Same As Above
C18020380-007	DUP-2	02/13/18 15:30	02/15/18	Aqueous	Same As Above
C18020380-008	JB-FX-1	02/13/18 16:15	02/15/18	Aqueous	Same As Above
C18020380-009	JB-N2-WL	02/13/18 17:15	02/15/18	Aqueous	Same As Above
C18020380-010	JB-N2-AL	02/13/18 17:30	02/15/18	Aqueous	Same As Above
C18020380-011	JB-WL-4	02/13/18 18:00	02/15/18	Aqueous	Same As Above
C18020380-012	JB-N12-A	02/14/18 08:30	02/15/18	Aqueous	Same As Above
C18020380-013	JB-N7-AL	02/14/18 09:15	02/15/18	Aqueous	Same As Above
C18020380-014	JB-N7-WL	02/14/18 09:30	02/15/18	Aqueous	Same As Above
C18020380-015	JB-N3-WL	02/14/18 10:15	02/15/18	Aqueous	Same As Above
C18020380-016	JB-N3-AL	02/14/18 10:30	02/15/18	Aqueous	Same As Above
C18020380-017	JB-N1-A1	02/13/18 15:45	02/15/18	Aqueous	Same As Above
C18020380-018	JB-WA-6	02/13/18 09:45	02/15/18	Aqueous	Same As Above

ANALYTICAL SUMMARY REPORT

C18020380-019	FB-1	02/13/18 09:50	02/15/18	Aqueous	Metals by ICP/ICPMS, Total Mercury, Total Preservation by the Laboratory Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total
C18020380-020	WA-3	02/13/18 10:56	02/15/18	Aqueous	Metals by ICP/ICPMS, Total Mercury, Total Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total
C18020380-021	WA-4	02/13/18 11:56	02/15/18	Aqueous	Same As Above
C18020380-022	JB-N10-A	02/13/18 13:03	02/15/18	Aqueous	Same As Above
C18020380-023	566-WA	02/13/18 14:14	02/15/18	Aqueous	Same As Above
C18020380-024	984-WA	02/13/18 15:26	02/15/18	Aqueous	Same As Above
C18020380-025	JB-N11-A	02/13/18 16:30	02/15/18	Aqueous	Same As Above
C18020380-026	DUP-1	02/13/18 16:40	02/15/18	Aqueous	Same As Above
C18020380-027	JB-N11-L	02/13/18 17:22	02/15/18	Aqueous	Same As Above
C18020380-028	JB-N12-L	02/14/18 08:58	02/15/18	Aqueous	Same As Above
C18020380-029	JB-FX-2	02/14/18 09:48	02/15/18	Aqueous	Same As Above
C18020380-030	JB-WL-5	02/14/18 10:21	02/15/18	Aqueous	Same As Above

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Work Order: C18020380

Revised Date: 03/21/18

Report Date: 03/13/18

CASE NARRATIVE

REVISED/SUPPLEMENTAL REPORT

Revised 3/21/18

Per request from Mike Shirley on 3/16/18 to include Jim Bridger Power Plant in the project name

The report has been revised and replaces any previously issued report in its entirety.

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Prep Comments for Sample C18020380-001A, Test PRESERVATION: - The sample fraction submitted for Metals Analysis was received in the laboratory with a pH of ~ 7. This is outside of the method specified requirement of pH < 2. Proper preservation was added before sample analysis.

Prep Comments for Sample C18020380-019A, Test PRESERVATION: - The sample fraction submitted for Metals Analysis was received in the laboratory with a pH of ~ 7. This is outside of the method specified requirement of pH < 2. Proper preservation was added before sample analysis.

Prep Comments for Sample C18020380-019B, Test PRESERVATION: - The sample fraction submitted for Radiochemical Analysis was received in the laboratory with a pH of ~ 6. This is outside of the method specified requirement of pH < 2. Proper preservation was added before sample analysis.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-001
Client Sample ID: JB-NS-A

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/12/18 17:30
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 15:37 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Chromium	0.004	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 15:37 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Lithium	0.1	mg/L		0.1	E200.8		02/23/18 15:37 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 13:55 / eli-b
Molybdenum	0.002	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Selenium	ND	mg/L		0.001	E200.8		02/23/18 15:37 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 15:37 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	2.8	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.6	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	4.6	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 precision (\pm)	1.5	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 226 + Radium 228	7.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.6	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-002
Client Sample ID: FB-2

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 11:00
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Barium	ND	mg/L		0.05	E200.7		02/23/18 13:55 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 15:54 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 13:55 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 13:57 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Selenium	ND	mg/L		0.001	E200.8		02/23/18 15:54 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 15:54 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.2	pCi/L		U	E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	-0.9	pCi/L		U	RA-05		02/28/18 10:14 / plj
Radium 228 precision (\pm)	1.2	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 MDC	2.0	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 226 + Radium 228	-0.7	pCi/L		U	A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.2	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	2.0	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-003
Client Sample ID: 1284-WL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 12:15
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 15:57 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 15:57 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 15:57 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 15:57 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 15:57 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 15:57 / eli-b
Cobalt	0.010	mg/L		0.005	E200.8		02/23/18 15:57 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 15:57 / eli-b
Lithium	0.2	mg/L		0.1	E200.7		02/23/18 13:59 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 13:59 / eli-b
Molybdenum	0.002	mg/L		0.001	E200.8		02/26/18 17:43 / eli-b
Selenium	ND	mg/L		0.001	E200.8		02/23/18 15:57 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 15:57 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.3	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	-0.5	pCi/L	U		RA-05		02/28/18 10:14 / plj
Radium 228 precision (\pm)	1.0	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 226 + Radium 228	0.7	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-004
Client Sample ID: 285-WC

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 12:45
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 16:00 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:00 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 14:03 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:01 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Selenium	ND	mg/L		0.001	E200.8		02/23/18 16:00 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 16:00 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.3	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.4	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	1.5	pCi/L	U		RA-05		02/28/18 10:14 / plj
Radium 228 precision (\pm)	1.2	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 MDC	2.0	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 226 + Radium 228	2.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.3	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	2.0	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-005
Client Sample ID: JB-N6-WL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 14:15
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	0.003	mg/L		0.001	E200.8		02/23/18 16:03 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		02/26/18 17:46 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 16:03 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:03 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 16:03 / eli-b
Chromium	0.003	mg/L		0.001	E200.8		02/23/18 16:03 / eli-b
Cobalt	0.010	mg/L		0.005	E200.8		02/23/18 16:03 / eli-b
Lead	0.001	mg/L		0.001	E200.8		02/26/18 17:46 / eli-b
Lithium	3.9	mg/L		0.1	E200.8		02/23/18 16:03 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:03 / eli-b
Molybdenum	0.014	mg/L		0.001	E200.8		02/23/18 16:03 / eli-b
Selenium	0.009	mg/L	D	0.004	E200.8		03/09/18 12:52 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		03/09/18 12:52 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.4	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	0.7	pCi/L	U		RA-05		02/28/18 10:14 / plj
Radium 228 precision (\pm)	0.9	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 MDC	1.4	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 226 + Radium 228	1.1	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	0.9	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-006
Client Sample ID: JB-N1-WL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 15:15
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 16:06 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 16:06 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 16:06 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:06 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 16:06 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:06 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:06 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 17:49 / eli-b
Lithium	2.2	mg/L		0.1	E200.8		02/23/18 16:06 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:05 / eli-b
Molybdenum	0.002	mg/L		0.001	E200.8		02/23/18 16:06 / eli-b
Selenium	ND	mg/L	D	0.004	E200.8		02/26/18 17:49 / eli-b
Thallium	0.0006	mg/L		0.0005	E200.8		02/26/18 17:49 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.4	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.3	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	4.4	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 precision (\pm)	1.7	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 MDC	1.4	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 226 + Radium 228	5.9	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.
 D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-007
Client Sample ID: DUP-2

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 15:30
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/28/18 14:37 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 16:09 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/27/18 13:36 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:09 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/28/18 14:37 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:09 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:09 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/28/18 14:37 / eli-b
Lithium	2.3	mg/L	D	0.2	E200.7		02/23/18 14:18 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:11 / eli-b
Molybdenum	0.002	mg/L		0.001	E200.8		02/28/18 14:37 / eli-b
Selenium	ND	mg/L	D	0.004	E200.8		03/01/18 15:51 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/28/18 14:37 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.6	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.4	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	3.2	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1.4	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	4.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-008
Client Sample ID: JB-FX-1

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 16:15
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 17:56 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		02/26/18 17:56 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 17:56 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:27 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 17:56 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:27 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:27 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 17:56 / eli-b
Lithium	1.4	mg/L		0.1	E200.8		02/23/18 16:27 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:12 / eli-b
Molybdenum	0.002	mg/L		0.001	E200.8		02/26/18 17:56 / eli-b
Selenium	0.196	mg/L		0.001	E200.8		02/23/18 16:27 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 17:56 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.9	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	0.7	pCi/L	U		RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1.0	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	1.6	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-009
Client Sample ID: JB-N2-WL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 17:15
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:00 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 16:30 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:00 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:30 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:00 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:30 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:30 / eli-b
Lead	0.001	mg/L		0.001	E200.8		02/26/18 18:00 / eli-b
Lithium	1.4	mg/L		0.1	E200.8		02/23/18 16:30 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:14 / eli-b
Molybdenum	0.001	mg/L		0.001	E200.8		02/26/18 18:00 / eli-b
Selenium	ND	mg/L	D	0.004	E200.8		02/26/18 18:00 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:00 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.1	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.3	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	0.7	pCi/L	U		RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.0	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-010
Client Sample ID: JB-N2-AL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 17:30
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:14 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		02/26/18 18:14 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:14 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:33 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:14 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:33 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:33 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 18:14 / eli-b
Lithium	1.1	mg/L		0.1	E200.8		02/23/18 16:33 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:16 / eli-b
Molybdenum	0.005	mg/L		0.001	E200.8		02/26/18 18:14 / eli-b
Selenium	ND	mg/L	D	0.004	E200.8		02/26/18 18:14 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:14 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.3	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 precision (\pm)	0.1	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:48 / arh
Radium 228	-0.03	pCi/L	U		RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1.0	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	0.3	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.0	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-011
Client Sample ID: JB-WL-4

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 18:00
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:17 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 16:42 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:17 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:42 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:17 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:42 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/26/18 18:17 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 18:17 / eli-b
Lithium	1.3	mg/L		0.1	E200.7		02/23/18 15:09 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:18 / eli-b
Molybdenum	0.001	mg/L		0.001	E200.8		02/26/18 18:17 / eli-b
Selenium	ND	mg/L	D	0.004	E200.8		02/26/18 18:17 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:17 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.3	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 precision (\pm)	0.1	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 228	0.9	pCi/L	U		RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1.1	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	1.2	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-012
Client Sample ID: JB-N12-A

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 08:30
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 16:45 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 16:45 / eli-b
Barium	ND	mg/L		0.05	E200.7		02/23/18 15:13 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:45 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 16:45 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:45 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:45 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 18:20 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 15:13 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:20 / eli-b
Molybdenum	0.167	mg/L		0.001	E200.8		02/23/18 16:45 / eli-b
Selenium	ND	mg/L		0.001	E200.8		02/23/18 16:45 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:20 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.5	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 228	0.1	pCi/L	U		RA-05		02/28/18 10:14 / plj
Radium 228 precision (\pm)	1.1	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		02/28/18 10:14 / plj
Radium 226 + Radium 228	0.7	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.9	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-013
Client Sample ID: JB-N7-AL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 09:15
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:24 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		02/26/18 18:24 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:24 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:49 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:24 / eli-b
Chromium	0.003	mg/L		0.001	E200.8		02/23/18 16:49 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:49 / eli-b
Lead	0.003	mg/L		0.001	E200.8		02/26/18 18:24 / eli-b
Lithium	0.8	mg/L		0.1	E200.8		02/23/18 16:49 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:22 / eli-b
Molybdenum	0.004	mg/L		0.001	E200.8		02/26/18 18:24 / eli-b
Selenium	0.165	mg/L	D	0.004	E200.8		02/26/18 18:24 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:24 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.3	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 precision (\pm)	0.1	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 228	-0.3	pCi/L	U		RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	0.02	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-014
Client Sample ID: JB-N7-WL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 09:30
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:27 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		02/26/18 18:27 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:27 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:52 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:27 / eli-b
Chromium	0.002	mg/L		0.001	E200.8		02/23/18 16:52 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 16:52 / eli-b
Lead	0.002	mg/L		0.001	E200.8		02/26/18 18:27 / eli-b
Lithium	0.3	mg/L		0.1	E200.7		02/23/18 15:21 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:24 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		02/26/18 18:27 / eli-b
Selenium	ND	mg/L	D	0.004	E200.8		02/26/18 18:27 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:27 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 228	1.9	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1.3	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	2.9	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.3	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.
 D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-015
Client Sample ID: JB-N3-WL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 10:15
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:31 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 16:55 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:31 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:55 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:31 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:55 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/26/18 18:31 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 18:31 / eli-b
Lithium	1.0	mg/L		0.1	E200.7		02/23/18 15:25 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:26 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		02/26/18 18:31 / eli-b
Selenium	ND	mg/L	D	0.004	E200.8		02/26/18 18:31 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:31 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.8	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:29 / arh
Radium 228	1.3	pCi/L	U		RA-05		02/28/18 11:49 / plj
Radium 228 precision (\pm)	1.3	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 11:49 / plj
Radium 226 + Radium 228	2.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.3	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-016
Client Sample ID: JB-N3-AL

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 10:30
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:34 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		02/26/18 18:34 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:34 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 16:58 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:34 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 16:58 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/26/18 18:34 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 18:34 / eli-b
Lithium	1.2	mg/L		0.1	E200.8		02/23/18 16:58 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:27 / eli-b
Molybdenum	0.003	mg/L		0.001	E200.8		02/26/18 18:34 / eli-b
Selenium	0.031	mg/L	D	0.004	E200.8		02/26/18 18:34 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:34 / eli-b
RADIOMONUCLEIDES, TOTAL							
Radium 226	0.6	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	0.1	pCi/L	U		RA-05		02/28/18 14:13 / plj
Radium 228 precision (\pm)	0.8	pCi/L			RA-05		02/28/18 14:13 / plj
Radium 228 MDC	1.4	pCi/L			RA-05		02/28/18 14:13 / plj
Radium 226 + Radium 228	0.7	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	0.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-017
Client Sample ID: JB-N1-A1

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 15:45
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:38 / eli-b
Arsenic	0.002	mg/L		0.001	E200.8		02/27/18 13:39 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:38 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/27/18 13:39 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:38 / eli-b
Chromium	0.001	mg/L		0.001	E200.8		02/23/18 17:01 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/26/18 18:38 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 18:38 / eli-b
Lithium	1.9	mg/L		0.1	E200.8		02/27/18 13:39 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:41 / eli-b
Molybdenum	0.005	mg/L		0.001	E200.8		02/26/18 18:38 / eli-b
Selenium	0.014	mg/L	D	0.004	E200.8		02/26/18 18:38 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:38 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.7	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	1.3	pCi/L	U		RA-05		02/28/18 14:13 / plj
Radium 228 precision (\pm)	0.9	pCi/L			RA-05		02/28/18 14:13 / plj
Radium 228 MDC	1.4	pCi/L			RA-05		02/28/18 14:13 / plj
Radium 226 + Radium 228	2.0	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	0.9	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-018
Client Sample ID: JB-WA-6

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 09:45
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:41 / eli-b
Arsenic	0.003	mg/L	D	0.003	E200.8		02/26/18 18:41 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 18:41 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 17:04 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:41 / eli-b
Chromium	0.002	mg/L		0.001	E200.8		02/23/18 17:04 / eli-b
Cobalt	0.005	mg/L		0.005	E200.8		02/23/18 17:04 / eli-b
Lead	0.002	mg/L		0.001	E200.8		02/26/18 18:41 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 15:45 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:46 / eli-b
Molybdenum	0.010	mg/L		0.001	E200.8		02/26/18 18:41 / eli-b
Selenium	0.002	mg/L		0.001	E200.8		02/23/18 17:04 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:41 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.1	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	0.5	pCi/L	U		RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	0.9	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.5	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	0.7	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	0.9	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.5	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-019
Client Sample ID: FB-1

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 09:50
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 18:45 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 17:07 / eli-b
Barium	ND	mg/L		0.05	E200.7		02/23/18 15:49 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 17:07 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 18:45 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 17:07 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 17:07 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 18:45 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 15:49 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:48 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		02/26/18 18:45 / eli-b
Selenium	ND	mg/L		0.001	E200.8		02/23/18 17:07 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 18:45 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.1	pCi/L		U	E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.1	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	0.9	pCi/L		U	RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	1.2	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.9	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	1.0	pCi/L		U	A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.2	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.9	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-020
Client Sample ID: WA-3

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 10:56
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 19:02 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 17:10 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/26/18 19:02 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/23/18 17:10 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/26/18 19:02 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 17:10 / eli-b
Cobalt	0.010	mg/L		0.005	E200.8		02/23/18 17:10 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/26/18 19:02 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 15:52 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:50 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		02/26/18 19:02 / eli-b
Selenium	0.003	mg/L		0.001	E200.8		02/23/18 17:10 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 19:02 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.3	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.1	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	0.8	pCi/L	U		RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	1	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.5	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	1.1	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.5	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-021
Client Sample ID: WA-4

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 11:56
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 03:14 / eli-b
Arsenic	0.016	mg/L		0.001	E200.8		02/23/18 03:14 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:14 / eli-b
Beryllium	0.047	mg/L		0.001	E200.8		02/27/18 13:42 / eli-b
Cadmium	0.005	mg/L		0.001	E200.8		02/23/18 03:14 / eli-b
Chromium	0.006	mg/L		0.001	E200.8		02/23/18 03:14 / eli-b
Cobalt	0.490	mg/L		0.005	E200.8		02/23/18 03:14 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 03:14 / eli-b
Lithium	0.7	mg/L		0.1	E200.7		02/23/18 16:19 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:52 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		03/12/18 18:19 / eli-b
Selenium	0.009	mg/L		0.001	E200.8		02/23/18 23:33 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 03:14 / eli-b
RADIOMONUCLEIDES, TOTAL							
Radium 226	0.5	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	0.4	pCi/L	U		RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	1.1	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	0.9	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-022
Client Sample ID: JB-N10-A

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 13:03
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 03:07 / eli-b
Arsenic	0.005	mg/L		0.001	E200.8		02/23/18 03:07 / eli-b
Barium	0.07	mg/L		0.05	E200.8		02/23/18 03:07 / eli-b
Beryllium	0.076	mg/L		0.001	E200.8		02/27/18 13:45 / eli-b
Cadmium	0.008	mg/L		0.001	E200.8		02/23/18 03:07 / eli-b
Chromium	0.007	mg/L		0.001	E200.8		02/23/18 03:07 / eli-b
Cobalt	0.181	mg/L		0.005	E200.8		02/23/18 03:07 / eli-b
Lead	0.010	mg/L		0.001	E200.8		02/23/18 03:07 / eli-b
Lithium	0.5	mg/L		0.1	E200.8		02/27/18 13:45 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:54 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		03/12/18 15:51 / eli-b
Selenium	0.004	mg/L		0.001	E200.8		02/23/18 23:36 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 23:36 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.9	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	1.9	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	1.0	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.5	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	2.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.5	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-023
Client Sample ID: 566-WA

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 14:14
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/23/18 03:11 / eli-b
Arsenic	0.037	mg/L		0.001	E200.8		02/23/18 03:11 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:11 / eli-b
Beryllium	0.017	mg/L		0.001	E200.8		02/27/18 13:48 / eli-b
Cadmium	0.013	mg/L		0.001	E200.8		02/23/18 03:11 / eli-b
Chromium	0.001	mg/L		0.001	E200.8		02/23/18 03:11 / eli-b
Cobalt	0.272	mg/L		0.005	E200.8		02/23/18 03:11 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 03:11 / eli-b
Lithium	0.3	mg/L		0.1	E200.7		02/23/18 16:45 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 14:56 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		03/12/18 18:09 / eli-b
Selenium	0.003	mg/L		0.001	E200.8		02/23/18 23:50 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 23:50 / eli-b
RADIOMONUCIDES, TOTAL							
Radium 226	1.1	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.3	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	1.1	pCi/L	U		RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	1.1	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	2.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.2	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-024
Client Sample ID: 984-WA

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 15:26
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 19:16 / eli-b
Arsenic	0.003	mg/L		0.001	E200.8		02/27/18 17:32 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:38 / eli-b
Beryllium	ND	mg/L	D	0.003	E200.8		02/27/18 13:51 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 03:38 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 03:38 / eli-b
Cobalt	0.017	mg/L		0.005	E200.8		02/23/18 03:38 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 03:38 / eli-b
Lithium	0.4	mg/L		0.1	E200.8		02/27/18 13:51 / eli-b
Mercury	0.0002	mg/L		0.0001	E245.1		03/02/18 14:00 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		03/12/18 15:58 / eli-b
Selenium	0.009	mg/L	D	0.002	E200.8		02/27/18 17:32 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/26/18 19:16 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.6	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	1.9	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	1.1	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.5	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	2.5	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.5	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.
 D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-025
Client Sample ID: JB-N11-A

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 16:30
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 19:19 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 03:42 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:42 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/27/18 13:54 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 03:42 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 03:42 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 03:42 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 03:42 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 16:49 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 15:00 / eli-b
Molybdenum	0.195	mg/L		0.001	E200.8		03/12/18 18:16 / eli-b
Selenium	0.004	mg/L	D	0.002	E200.8		02/27/18 13:54 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 03:42 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.3	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 precision (\pm)	0.3	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 10:49 / arh
Radium 228	3.0	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 precision (\pm)	1.2	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		02/28/18 14:12 / plj
Radium 226 + Radium 228	4.3	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.2	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.
 D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-026
Client Sample ID: DUP-1

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 16:40
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 19:22 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 03:45 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:45 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/27/18 13:57 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 03:45 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 03:45 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 03:45 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 03:45 / eli-b
Lithium	ND	mg/L		0.1	E200.7		02/23/18 16:53 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 15:01 / eli-b
Molybdenum	0.193	mg/L		0.001	E200.8		03/12/18 16:32 / eli-b
Selenium	0.003	mg/L	D	0.002	E200.8		02/27/18 13:57 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 03:45 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.5	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 precision (\pm)	0.4	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 228	2.9	pCi/L			RA-05		02/28/18 14:13 / plj
Radium 228 precision (\pm)	1.4	pCi/L			RA-05		02/28/18 14:13 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 14:13 / plj
Radium 226 + Radium 228	4.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.4	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.
 D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-027
Client Sample ID: JB-N11-L

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/13/18 17:22
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	0.003	mg/L		0.001	E200.8		02/26/18 19:26 / eli-b
Arsenic	0.007	mg/L		0.001	E200.8		02/23/18 03:49 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:49 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/27/18 14:06 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 03:49 / eli-b
Chromium	0.003	mg/L		0.001	E200.8		02/23/18 03:49 / eli-b
Cobalt	0.010	mg/L		0.005	E200.8		02/26/18 19:26 / eli-b
Lead	0.002	mg/L		0.001	E200.8		02/23/18 03:49 / eli-b
Lithium	5.5	mg/L		0.1	E200.8		02/27/18 14:06 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		02/23/18 15:07 / eli-b
Molybdenum	0.390	mg/L		0.001	E200.8		03/12/18 16:36 / eli-b
Selenium	1.95	mg/L	D	0.002	E200.8		02/23/18 03:49 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 03:49 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.5	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 precision (\pm)	0.2	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 228	-0.07	pCi/L	U		RA-05		02/28/18 15:45 / plj
Radium 228 precision (\pm)	0.9	pCi/L			RA-05		02/28/18 15:45 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		02/28/18 15:45 / plj
Radium 226 + Radium 228	0.4	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-028
Client Sample ID: JB-N12-L

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 08:58
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	0.002	mg/L		0.001	E200.8		02/24/18 00:07 / eli-b
Arsenic	0.018	mg/L		0.001	E200.8		02/24/18 00:07 / eli-b
Barium	0.25	mg/L		0.05	E200.8		02/23/18 03:52 / eli-b
Beryllium	ND	mg/L	D	0.007	E200.8		02/27/18 14:09 / eli-b
Cadmium	0.004	mg/L		0.001	E200.8		02/23/18 03:52 / eli-b
Chromium	0.034	mg/L		0.001	E200.8		02/24/18 00:07 / eli-b
Cobalt	0.028	mg/L		0.005	E200.8		02/23/18 03:52 / eli-b
Lead	0.032	mg/L		0.001	E200.8		02/23/18 03:52 / eli-b
Lithium	5.0	mg/L		0.1	E200.8		02/27/18 17:35 / eli-b
Mercury	0.0003	mg/L	D	0.0002	E245.1		03/09/18 14:41 / eli-b
Molybdenum	0.605	mg/L	D	0.002	E200.8		03/12/18 16:39 / eli-b
Selenium	2.78	mg/L	D	0.002	E200.8		02/24/18 00:07 / eli-b
Thallium	0.0032	mg/L		0.0005	E200.8		02/23/18 03:52 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.6	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 precision (\pm)	0.4	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 228	0.5	pCi/L	U		RA-05		02/28/18 15:46 / plj
Radium 228 precision (\pm)	1.0	pCi/L			RA-05		02/28/18 15:46 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		02/28/18 15:46 / plj
Radium 226 + Radium 228	2.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-029
Client Sample ID: JB-FX-2

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 09:48
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/24/18 00:11 / eli-b
Arsenic	0.002	mg/L		0.001	E200.8		02/24/18 00:11 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:56 / eli-b
Beryllium	ND	mg/L	D	0.003	E200.8		02/27/18 14:12 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 03:56 / eli-b
Chromium	0.001	mg/L		0.001	E200.8		02/23/18 03:56 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/24/18 00:11 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 03:56 / eli-b
Lithium	1.2	mg/L		0.1	E200.8		02/27/18 14:12 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		03/02/18 14:03 / eli-b
Molybdenum	0.010	mg/L		0.001	E200.8		03/12/18 16:43 / eli-b
Selenium	0.017	mg/L		0.001	E200.8		02/24/18 00:11 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 03:56 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.4	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 precision (\pm)	0.1	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 228	1	pCi/L	U		RA-05		02/28/18 15:46 / plj
Radium 228 precision (\pm)	1.0	pCi/L			RA-05		02/28/18 15:46 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		02/28/18 15:46 / plj
Radium 226 + Radium 228	1.3	pCi/L	U		A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.1	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49 - Jim Bridger Power Plant
Lab ID: C18020380-030
Client Sample ID: JB-WL-5

Revised Date: 03/21/18
Report Date: 03/13/18
Collection Date: 02/14/18 10:21
DateReceived: 02/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		02/26/18 19:46 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		02/23/18 03:59 / eli-b
Barium	ND	mg/L		0.05	E200.8		02/23/18 03:59 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		02/27/18 14:15 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		02/23/18 03:59 / eli-b
Chromium	ND	mg/L		0.001	E200.8		02/23/18 03:59 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		02/23/18 03:59 / eli-b
Lead	ND	mg/L		0.001	E200.8		02/23/18 03:59 / eli-b
Lithium	0.8	mg/L		0.1	E200.8		02/27/18 14:15 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		03/02/18 14:05 / eli-b
Molybdenum	0.007	mg/L		0.001	E200.8		03/12/18 16:46 / eli-b
Selenium	0.003	mg/L	D	0.002	E200.8		02/27/18 14:15 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		02/23/18 03:59 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.1	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 precision (\pm)	0.3	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		03/05/18 12:35 / arh
Radium 228	1.1	pCi/L	U		RA-05		02/28/18 15:46 / plj
Radium 228 precision (\pm)	1.0	pCi/L			RA-05		02/28/18 15:46 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		02/28/18 15:46 / plj
Radium 226 + Radium 228	2.2	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 precision (\pm)	1.0	pCi/L			A7500-RA		03/06/18 10:49 / dmf
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		03/06/18 10:49 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	U - Not detected at minimum detectable concentration	

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: ICP204-B_180223A		
Lab ID: ICV	2	Continuing Calibration Verification Standard								
Barium		2.45	mg/L	0.10	98	95	105			02/23/18 10:31
Lithium		1.27	mg/L	0.10	101	95	105			
Method: E200.7								Batch: 118676		
Lab ID: MB-118676	2	Method Blank								
Barium		ND	mg/L	0.01				Run: ICP204-B_180223A		
Lithium		ND	mg/L	0.008				02/23/18 13:21		
Lab ID: LCS-118676	2	Laboratory Control Sample								
Barium		0.506	mg/L	0.10	101	85	115			02/23/18 13:25
Lithium		0.559	mg/L	0.10	112	85	115			
Lab ID: C18020380-001AMS3	2	Sample Matrix Spike								
Barium		0.506	mg/L	0.12	101	70	130			02/23/18 13:47
Lithium		0.678	mg/L	0.10	105	70	130			
Lab ID: C18020380-001AMSD	2	Sample Matrix Spike Duplicate								
Barium		0.505	mg/L	0.12	101	70	130	0.2	20	
Lithium		0.682	mg/L	0.10	106	70	130	0.6	20	
Lab ID: C18020380-020AMS3	2	Sample Matrix Spike								
Barium		0.502	mg/L	0.12	100	70	130			02/23/18 16:04
Lithium		0.621	mg/L	0.10	124	70	130			
Lab ID: C18020380-020AMSD	2	Sample Matrix Spike Duplicate								
Barium		0.485	mg/L	0.12	97	70	130	3.4	20	
Lithium		0.585	mg/L	0.10	117	70	130	5.9	20	
Method: E200.7								Batch: 118677		
Lab ID: MB-118677		Method Blank								
Lithium		ND	mg/L	0.008				Run: ICP204-B_180223A		
Lab ID: LCS-118677		Laboratory Control Sample								
Lithium		0.515	mg/L	0.10	103	85	115			02/23/18 16:15
Lab ID: C18020380-021AMS3		Sample Matrix Spike								
Lithium		1.24	mg/L	0.10	111	70	130			02/23/18 16:38
Lab ID: C18020380-021AMSD		Sample Matrix Spike Duplicate								
Lithium		1.22	mg/L	0.10	107	70	130	1.6	20	02/23/18 16:42

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS206-B_180222A		
Lab ID: QCS	9	Initial Calibration Verification Standard								02/23/18 00:12
Antimony		0.0473	mg/L	0.050	95	90	110			
Arsenic		0.0484	mg/L	0.0050	97	90	110			
Barium		0.0480	mg/L	0.10	96	90	110			
Cadmium		0.0239	mg/L	0.0010	96	90	110			
Chromium		0.0488	mg/L	0.010	98	90	110			
Cobalt		0.0497	mg/L	0.010	99	90	110			
Lead		0.0483	mg/L	0.010	97	90	110			
Selenium		0.0480	mg/L	0.0050	96	90	110			
Thallium		0.0483	mg/L	0.10	97	90	110			
Method: E200.8								Batch: 118677		
Lab ID: MB-118677	9	Method Blank								02/23/18 02:53
Antimony		ND	mg/L	0.00004				Run: ICPMS206-B_180222A		
Arsenic		ND	mg/L	0.0002						
Barium		ND	mg/L	0.00005						
Cadmium		ND	mg/L	0.00003						
Chromium		0.0002	mg/L	0.0001						
Cobalt		ND	mg/L	0.00002						
Lead		ND	mg/L	0.00003						
Selenium		ND	mg/L	0.0004						
Thallium		0.00006	mg/L	7E-06						
Lab ID: LCS-118677	9	Laboratory Control Sample								02/23/18 03:18
Antimony		0.495	mg/L	0.0050	99	85	115			
Arsenic		0.489	mg/L	0.0010	98	85	115			
Barium		0.461	mg/L	0.010	92	85	115			
Cadmium		0.237	mg/L	0.0010	95	85	115			
Chromium		0.464	mg/L	0.0010	93	85	115			
Cobalt		0.486	mg/L	0.0010	97	85	115			
Lead		0.483	mg/L	0.0010	97	85	115			
Selenium		0.486	mg/L	0.0050	97	85	115			
Thallium		0.510	mg/L	0.0010	102	85	115			
Lab ID: C18020380-021AMS3	9	Sample Matrix Spike								02/23/18 03:21
Antimony		0.461	mg/L	0.0010	92	70	130			
Arsenic		0.520	mg/L	0.0010	101	70	130			
Barium		0.461	mg/L	0.050	92	70	130			
Cadmium		0.248	mg/L	0.0010	97	70	130			
Chromium		0.460	mg/L	0.0050	91	70	130			
Cobalt		0.965	mg/L	0.0050	95	70	130			
Lead		0.466	mg/L	0.0010	93	70	130			
Selenium		0.503	mg/L	0.0018	99	70	130			
Thallium		0.465	mg/L	0.00050	93	70	130			

Qualifiers:

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ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										
Lab ID: C18020380-021AMSD	9	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180222A			02/23/18 03:24	
Antimony		0.461	mg/L	0.0010	92	70	130	0.0	20	
Arsenic		0.508	mg/L	0.0010	98	70	130	2.4	20	
Barium		0.463	mg/L	0.050	92	70	130	0.3	20	
Cadmium		0.243	mg/L	0.0010	95	70	130	1.9	20	
Chromium		0.452	mg/L	0.0050	89	70	130	1.8	20	
Cobalt		0.933	mg/L	0.0050	89	70	130	3.4	20	
Lead		0.467	mg/L	0.0010	93	70	130	0.1	20	
Selenium		0.509	mg/L	0.0018	100	70	130	1.2	20	
Thallium		0.463	mg/L	0.00050	93	70	130	0.4	20	
Method: E200.8										
Lab ID: QCS	6	Initial Calibration Verification Standard				Analytical Run: ICPMS206-B_180223A			02/23/18 20:37	
Antimony		0.0497	mg/L	0.050	99	90	110			
Arsenic		0.0494	mg/L	0.0050	99	90	110			
Chromium		0.0494	mg/L	0.010	99	90	110			
Cobalt		0.0504	mg/L	0.010	101	90	110			
Selenium		0.0504	mg/L	0.0050	101	90	110			
Thallium		0.0479	mg/L	0.10	96	90	110			
Method: E200.8										
Lab ID: MB-118677	6	Method Blank				Run: ICPMS206-B_180223A			02/23/18 23:05	
Antimony		ND	mg/L	0.00004						
Arsenic		ND	mg/L	0.0002						
Chromium		0.0002	mg/L	0.0001						
Cobalt		ND	mg/L	0.00002						
Selenium		ND	mg/L	0.0004						
Thallium		0.00002	mg/L	7E-06						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS206-B_180226A		
Lab ID: QCS	9	Initial Calibration Verification Standard								02/26/18 14:33
Antimony		0.0470	mg/L	0.050	94	90	110			
Arsenic		0.0484	mg/L	0.0050	97	90	110			
Barium		0.0471	mg/L	0.10	94	90	110			
Cadmium		0.0238	mg/L	0.0010	95	90	110			
Cobalt		0.0487	mg/L	0.010	97	90	110			
Lead		0.0478	mg/L	0.010	96	90	110			
Molybdenum		0.0451	mg/L	0.0050	90	90	110			
Selenium		0.0480	mg/L	0.0050	96	90	110			
Thallium		0.0492	mg/L	0.10	98	90	110			
Method: E200.8								Batch: 118676		
Lab ID: MB-118676	10	Method Blank								Run: ICPMS206-B_180226A 02/26/18 17:29
Antimony		ND	mg/L	0.00004						
Arsenic		ND	mg/L	0.0002						
Barium		ND	mg/L	0.00005						
Beryllium		ND	mg/L	0.00008						
Cadmium		ND	mg/L	0.00003						
Cobalt		ND	mg/L	0.00002						
Lead		ND	mg/L	0.00003						
Molybdenum		ND	mg/L	0.00003						
Selenium		ND	mg/L	0.0004						
Thallium		0.00003	mg/L	7E-06						
Method: E200.8								Batch: 118677		
Lab ID: MB-118677	9	Method Blank								Run: ICPMS206-B_180226A 02/26/18 18:58
Antimony		ND	mg/L	0.00004						
Arsenic		ND	mg/L	0.0002						
Barium		ND	mg/L	0.00005						
Cadmium		ND	mg/L	0.00003						
Cobalt		ND	mg/L	0.00002						
Lead		ND	mg/L	0.00003						
Molybdenum		ND	mg/L	0.00003						
Selenium		ND	mg/L	0.0004						
Thallium		ND	mg/L	7E-06						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS206-B_180228A		
Lab ID: QCS	5	Initial Calibration Verification Standard								02/28/18 11:11
Antimony		0.0485	mg/L	0.050	97	90	110			
Cadmium		0.0241	mg/L	0.0010	96	90	110			
Lead		0.0475	mg/L	0.010	95	90	110			
Molybdenum		0.0458	mg/L	0.0050	92	90	110			
Thallium		0.0478	mg/L	0.10	96	90	110			
Method: E200.8								Batch: 118676		
Lab ID: MB-118676	5	Method Blank								02/28/18 14:27
Antimony		ND	mg/L	0.00004						
Cadmium		ND	mg/L	0.00003						
Lead		ND	mg/L	0.00003						
Molybdenum		ND	mg/L	0.00003						
Thallium		0.00006	mg/L	7E-06						
Method: E200.8								Analytical Run: ICPMS206-B_180301A		
Lab ID: QCS		Initial Calibration Verification Standard								03/01/18 16:01
Selenium		0.0511	mg/L	0.0050	102	90	110			
Method: E200.8								Batch: 118676		
Lab ID: MB-118676		Method Blank								03/01/18 15:47
Selenium		ND	mg/L	0.0004						
Method: E200.8								Analytical Run: ICPMS206-B_180309A		
Lab ID: QCS	2	Initial Calibration Verification Standard								03/09/18 11:15
Selenium		0.0513	mg/L	0.0050	103	90	110			
Thallium		0.0488	mg/L	0.10	98	90	110			
Method: E200.8								Batch: 118676		
Lab ID: MB-118676	2	Method Blank								03/09/18 12:24
Selenium		ND	mg/L	0.0004						
Thallium		ND	mg/L	7E-06						
Method: E200.8								Batch: 118677		
Lab ID: MB-118677	2	Method Blank								03/09/18 12:28
Selenium		ND	mg/L	0.0004						
Thallium		ND	mg/L	7E-06						
Lab ID: LCS-118677	2	Laboratory Control Sample								03/09/18 14:42
Selenium		0.513	mg/L	0.0050	103	85	115			
Thallium		0.538	mg/L	0.0010	108	85	115			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8								Analytical Run: ICPMS206-B_180312A			
Lab ID: QCS		Initial Calibration Verification Standard									
Molybdenum		0.0474	mg/L	0.0050	95	90	110				
Method: E200.8								Batch: 118677			
Lab ID: MB-118677		Method Blank									
Molybdenum		ND	mg/L	0.00003				Run: ICPMS206-B_180312A			
Lab ID: LCS-118677		Laboratory Control Sample									
Molybdenum		0.511	mg/L	0.0050	102	85	115				

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS207-B_180222A		
Lab ID: QCS	11	Initial Calibration Verification Standard								02/23/18 13:16
Antimony		0.0510	mg/L	0.050	102	90	110			
Arsenic		0.0495	mg/L	0.0050	99	90	110			
Barium		0.0503	mg/L	0.10	101	90	110			
Beryllium		0.0257	mg/L	0.0010	103	90	110			
Cadmium		0.0256	mg/L	0.0010	102	90	110			
Chromium		0.0498	mg/L	0.010	100	90	110			
Cobalt		0.0542	mg/L	0.010	108	90	110			
Lead		0.0498	mg/L	0.010	100	90	110			
Molybdenum		0.0484	mg/L	0.0050	97	90	110			
Selenium		0.0509	mg/L	0.0050	102	90	110			
Thallium		0.0496	mg/L	0.10	99	90	110			
Method: E200.8								Batch: 118676		
Lab ID: MB-118676	11	Method Blank								Run: ICPMS207-B_180222A 02/23/18 15:34
Antimony		ND	mg/L	0.0004						
Arsenic		ND	mg/L	0.0001						
Barium		ND	mg/L	0.00009						
Beryllium		ND	mg/L	0.0001						
Cadmium		ND	mg/L	0.00003						
Chromium		0.0003	mg/L	0.0002						
Cobalt		ND	mg/L	0.00004						
Lead		ND	mg/L	0.00008						
Molybdenum		0.0001	mg/L	0.0001						
Selenium		ND	mg/L	0.0002						
Thallium		ND	mg/L	0.00005						
Lab ID: LCS-118676	11	Laboratory Control Sample								Run: ICPMS207-B_180222A 02/23/18 15:40
Antimony		0.503	mg/L	0.0050	101	85	115			
Arsenic		0.544	mg/L	0.0010	109	85	115			
Barium		0.469	mg/L	0.010	94	85	115			
Beryllium		0.244	mg/L	0.0010	98	85	115			
Cadmium		0.233	mg/L	0.0010	93	85	115			
Chromium		0.528	mg/L	0.0010	106	85	115			
Cobalt		0.480	mg/L	0.0010	96	85	115			
Lead		0.514	mg/L	0.0010	103	85	115			
Molybdenum		0.493	mg/L	0.0050	99	85	115			
Selenium		0.507	mg/L	0.0050	101	85	115			
Thallium		0.506	mg/L	0.0010	101	85	115			
Lab ID: C18020380-001AMS3	12	Sample Matrix Spike								Run: ICPMS207-B_180222A 02/23/18 15:43
Antimony		0.516	mg/L	0.0010	103	70	130			
Arsenic		0.534	mg/L	0.0010	107	70	130			
Barium		0.486	mg/L	0.050	92	70	130			
Beryllium		0.223	mg/L	0.0010	89	70	130			
Cadmium		0.221	mg/L	0.0010	88	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: 118676
Lab ID: C18020380-001AMS3	12	Sample Matrix Spike				Run: ICPMS207-B_180222A				02/23/18 15:43
Chromium		0.511	mg/L	0.0050	101	70	130			
Cobalt		0.469	mg/L	0.0050	94	70	130			
Lead		0.511	mg/L	0.0010	102	70	130			
Lithium		0.582	mg/L	0.10	92	70	130			
Molybdenum		0.490	mg/L	0.0010	98	70	130			
Selenium		0.539	mg/L	0.0010	108	70	130			
Thallium		0.500	mg/L	0.00050	100	70	130			
Lab ID: C18020380-001AMSD	12	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180222A				02/23/18 15:51
Antimony		0.515	mg/L	0.0010	103	70	130	0.2	20	
Arsenic		0.540	mg/L	0.0010	108	70	130	1.0	20	
Barium		0.489	mg/L	0.050	93	70	130	0.5	20	
Beryllium		0.227	mg/L	0.0010	91	70	130	1.7	20	
Cadmium		0.221	mg/L	0.0010	88	70	130	0.0	20	
Chromium		0.514	mg/L	0.0050	102	70	130	0.6	20	
Cobalt		0.467	mg/L	0.0050	93	70	130	0.3	20	
Lead		0.512	mg/L	0.0010	102	70	130	0.1	20	
Lithium		0.592	mg/L	0.10	94	70	130	1.8	20	
Molybdenum		0.497	mg/L	0.0010	99	70	130	1.4	20	
Selenium		0.535	mg/L	0.0010	107	70	130	0.8	20	
Thallium		0.494	mg/L	0.00050	99	70	130	1.2	20	
Lab ID: C18020380-020AMS3	12	Sample Matrix Spike				Run: ICPMS207-B_180222A				02/23/18 17:19
Antimony		0.541	mg/L	0.0010	108	70	130			
Arsenic		0.566	mg/L	0.0010	113	70	130			
Barium		0.494	mg/L	0.050	99	70	130			
Beryllium		0.238	mg/L	0.0010	95	70	130			
Cadmium		0.236	mg/L	0.0010	94	70	130			
Chromium		0.475	mg/L	0.0050	95	70	130			
Cobalt		0.468	mg/L	0.0050	92	70	130			
Lead		0.503	mg/L	0.0010	101	70	130			
Lithium		0.536	mg/L	0.10	98	70	130			
Molybdenum		0.485	mg/L	0.0010	97	70	130			
Selenium		0.574	mg/L	0.0010	114	70	130			
Thallium		0.490	mg/L	0.00050	98	70	130			
Lab ID: C18020380-020AMSD	12	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180222A				02/23/18 17:21
Antimony		0.543	mg/L	0.0010	109	70	130	0.3	20	
Arsenic		0.571	mg/L	0.0010	114	70	130	0.7	20	
Barium		0.502	mg/L	0.050	100	70	130	1.7	20	
Beryllium		0.243	mg/L	0.0010	97	70	130	2.2	20	
Cadmium		0.240	mg/L	0.0010	96	70	130	1.6	20	
Chromium		0.474	mg/L	0.0050	95	70	130	0.3	20	
Cobalt		0.476	mg/L	0.0050	93	70	130	1.8	20	
Lead		0.504	mg/L	0.0010	101	70	130	0.3	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8											
Lab ID: C18020380-020AMSD	12	Sample Matrix Spike Duplicate Run: ICPMS207-B_180222A									
Lithium		0.548	mg/L	0.10	100	70	130	2.3	20		
Molybdenum		0.491	mg/L	0.0010	98	70	130	1.2	20		
Selenium		0.580	mg/L	0.0010	115	70	130	0.9	20		
Thallium		0.495	mg/L	0.00050	99	70	130	1.0	20		
Method: E200.8											
Lab ID: QCS	4	Initial Calibration Verification Standard Analytical Run: ICPMS207-B_180227A									
Arsenic		0.0492	mg/L	0.0050	98	90	110			02/27/18 11:38	
Barium		0.0485	mg/L	0.10	97	90	110				
Beryllium		0.0245	mg/L	0.0010	98	90	110				
Selenium		0.0495	mg/L	0.0050	99	90	110				
Method: E200.8											
Lab ID: MB-118676	4	Method Blank Run: ICPMS207-B_180227A									
Arsenic		ND	mg/L	0.0001						02/27/18 13:30	
Barium		ND	mg/L	0.00009							
Beryllium		ND	mg/L	0.0001							
Selenium		0.0006	mg/L	0.0002							
Method: E200.8											
Lab ID: MB-118677	4	Method Blank Run: ICPMS207-B_180227A									
Arsenic		ND	mg/L	0.0001						02/27/18 13:33	
Barium		ND	mg/L	0.00009							
Beryllium		ND	mg/L	0.0001							
Selenium		0.0006	mg/L	0.0002							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1								Analytical Run: HGCV202-B_180223B		
Lab ID: ICV		Initial Calibration Verification Standard								02/23/18 13:35
Mercury		0.00181	mg/L	0.00010	90	90	110			
Method: E245.1								Batch: 118742		
Lab ID: LCS-118742		Laboratory Control Sample								02/23/18 13:42
Mercury		0.00180	mg/L	0.00010	89	85	115			
Lab ID: B18021162-012CMS		Sample Matrix Spike								02/23/18 13:46
Mercury		0.00180	mg/L	0.00010	89	70	130			
Lab ID: B18021162-012CMSD		Sample Matrix Spike Duplicate								02/23/18 13:48
Mercury		0.00180	mg/L	0.00010	88	70	130	0.3	30	
Lab ID: C18020380-016AMS		Sample Matrix Spike								02/23/18 14:29
Mercury		0.00174	mg/L	0.00010	85	70	130			
Lab ID: C18020380-016AMSD		Sample Matrix Spike Duplicate								02/23/18 14:31
Mercury		0.00173	mg/L	0.00010	85	70	130	0.6	30	
Lab ID: MB-118742		Method Blank								02/23/18 13:40
Mercury		0.00003	mg/L	1E-06						
Method: E245.1								Batch: 118743		
Lab ID: MB-118743		Method Blank								02/23/18 14:33
Mercury		0.00002	mg/L	1E-06						
Lab ID: LCS-118743		Laboratory Control Sample								02/23/18 14:35
Mercury		0.00185	mg/L	0.00010	91	85	115			
Lab ID: C18020380-017AMS		Sample Matrix Spike								02/23/18 14:43
Mercury		0.00180	mg/L	0.00010	88	70	130			
Lab ID: C18020380-017AMSD		Sample Matrix Spike Duplicate								02/23/18 14:44
Mercury		0.00180	mg/L	0.00010	88	70	130	0.0	30	
Lab ID: B18021298-006BMS		Sample Matrix Spike								02/23/18 15:26
Mercury		0.00136	mg/L	0.00010	66	70	130			S
Lab ID: B18021298-006BMSD		Sample Matrix Spike Duplicate								02/23/18 15:28
Mercury		0.00131	mg/L	0.00010	64	70	130	3.5	30	S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/13/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1										Analytical Run: HGCV202-B_180302A
Lab ID: ICV										03/02/18 13:37
Mercury		0.00188	mg/L	0.00010	94	90	110			
Method: E245.1										Batch: 118928
Lab ID: LCS-118928										03/02/18 13:44
Mercury		0.00187	mg/L	0.00010	92	85	115			
Lab ID: B18021780-001AMS										03/02/18 13:48
Mercury		0.00177	mg/L	0.00010	86	70	130			
Lab ID: B18021780-001AMSD										03/02/18 13:50
Mercury		0.00171	mg/L	0.00010	83	70	130	3.4	30	
Lab ID: MB-118928										03/02/18 13:43
Mercury		0.00002	mg/L	1E-06						
Method: E245.1										Analytical Run: HGCV202-B_180309B
Lab ID: ICV										03/09/18 14:32
Mercury		0.00188	mg/L	0.00010	94	90	110			
Method: E245.1										Batch: 119229
Lab ID: LCS-119229										03/09/18 14:39
Mercury		0.00189	mg/L	0.00010	94	85	115			
Lab ID: B18030327-001BMS										03/09/18 14:49
Mercury		0.00189	mg/L	0.00010	93	70	130			
Lab ID: B18030327-001BMSD										03/09/18 14:51
Mercury		0.00190	mg/L	0.00010	94	70	130	0.8	30	
Lab ID: MB-119140										03/09/18 15:19
Mercury		0.00003	mg/L	1E-06						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/07/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										
Lab ID: LCS-RA226-8847	Laboratory Control Sample						Run: G5000W_180220C			
Radium 226		9.7	pCi/L	96		80	120			03/05/18 10:48
Lab ID: MB-RA226-8847										
Radium 226	3	0.07	pCi/L	Run: G5000W_180220C						03/05/18 10:48
Radium 226 precision (\pm)		0.1	pCi/L							U
Radium 226 MDC		0.2	pCi/L							
Lab ID: C18020380-001BMS	Sample Matrix Spike						Run: G5000W_180220C			
Radium 226		17	pCi/L	64		70	130			03/05/18 10:48
- Spike response is outside of the acceptance range for this analysis. Since the LCS and the RPD recoveries are acceptable, the response is considered to be matrix related.										
Lab ID: C18020380-001BMSD	Sample Matrix Spike Duplicate						Run: G5000W_180220C			
Radium 226		21	pCi/L	81		70	130	19		03/05/18 10:48
Method: E903.0										
Lab ID: LCS-RA226-8848	Laboratory Control Sample						Run: G542M_180222B			
Radium 226		8.5	pCi/L	82		80	120			03/05/18 10:49
Lab ID: MB-RA226-8848										
Radium 226	3	0.2	pCi/L	Run: G542M_180222B						03/05/18 10:49
Radium 226 precision (\pm)		0.1	pCi/L							
Radium 226 MDC		0.2	pCi/L							
Lab ID: C18020380-019BMS	Sample Matrix Spike						Run: G542M_180222B			
Radium 226		19	pCi/L	85		70	130			03/05/18 10:49
Lab ID: C18020380-019BMSD	Sample Matrix Spike Duplicate						Run: G542M_180222B			
Radium 226		17	pCi/L	77		70	130	9.3		03/05/18 10:49

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp Dave Johnston Plant

Report Date: 03/07/18

Project: PERCM49

Work Order: C18020380

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05										
Lab ID: LCS-228-RA226-8847	Laboratory Control Sample						Run: TENNELEC-3_180220D		02/28/18 10:14	
Radium 228		9.4	pCi/L	101		80	120			
Lab ID: MB-RA226-8847										
Radium 228	3	-0.2	pCi/L	Run: TENNELEC-3_180220D						U
Radium 228 precision (\pm)		1.0	pCi/L							
Radium 228 MDC		2	pCi/L							
Lab ID: C18020380-012BMS	Sample Matrix Spike						Run: TENNELEC-3_180220D		02/28/18 10:14	
Radium 228		18	pCi/L	84		70	130			
Lab ID: C18020380-012BMSD	Sample Matrix Spike Duplicate						Run: TENNELEC-3_180220D		02/28/18 10:14	
Radium 228		18	pCi/L	87		70	130	3.5		20
Method: RA-05										
Lab ID: LCS-228-RA226-8848	Laboratory Control Sample						Run: TENNELEC-3_180222A		02/28/18 14:12	
Radium 228		8.6	pCi/L	90		80	120			
Lab ID: MB-RA226-8848										
Radium 228	3	0.09	pCi/L	Run: TENNELEC-3_180222A						U
Radium 228 precision (\pm)		0.9	pCi/L							
Radium 228 MDC		2	pCi/L							
Lab ID: C18020380-021BMS	Sample Matrix Spike						Run: TENNELEC-3_180222A		02/28/18 14:12	
Radium 228		19	pCi/L	81		70	130			
Lab ID: C18020380-021BMSD	Sample Matrix Spike Duplicate						Run: TENNELEC-3_180222A		02/28/18 14:13	
Radium 228		20	pCi/L	90		70	130	9.4		20

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

Work Order Receipt Checklist

PacifiCorp

C18020380

Login completed by: Dorian Quis

Date Received: 2/15/2018

Reviewed by: Kasey Vidick

Received by: kak

Reviewed Date: 2/16/2018

Carrier name: Hand Del

Shipping container/cooler in good condition? Yes No Not Present

Custody seals intact on all shipping container(s)/cooler(s)? Yes No Not Present

Custody seals intact on all sample bottles? Yes No Not Present

Chain of custody present? Yes No

Chain of custody signed when relinquished and received? Yes No

Chain of custody agrees with sample labels? Yes No

Samples in proper container/bottle? Yes No

Sample containers intact? Yes No

Sufficient sample volume for indicated test? Yes No

All samples received within holding time?
 (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)

Yes No Not Applicable

Temp Blank received in all shipping container(s)/cooler(s)? Yes No Not Applicable

Container/Temp Blank temperature: 1.1°C On Ice

Water - VOA vials have zero headspace? Yes No No VOA vials submitted

Water - pH acceptable upon receipt? Yes No Not Applicable

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

Chain of Custody & Analytical Request Record

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 Page 1 of 34
Account Information (Billing information)

Company/Name PacificCorp-UT						
Contact Jeff Tucker						
Phone						
Mailing Address						
City, State, Zip						
Email						
Receive Invoice	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	
Purchase Order	Quote	C4503 - Pacific Corp	Bottle Order			

Report Information (if different than Account Information)

Company/Name WET		
Contact Dave Erickson		
Phone (406) 782-5220		
Mailing Address		
City, State, Zip		
Email derickson@waterenvtech.com		
Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email
Special Report/Formats:		
<input type="checkbox"/> LEVEL IV <input type="checkbox"/> NELAC <input checked="" type="checkbox"/> EDD/EDT (contact laboratory) <input type="checkbox"/> Other _____		

Comments

Please CC Laura Watson with results (EDD csv and PDF)

Project Information

Project Name, PWSID, Permit, etc. PERCM49	
Sampler Name L. Watson	Sampler Phone 431-2447
Sample Origin State Montana	EPA/State Compliance <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MINING CLIENTS, please indicate sample type. *If ore has been processed or refined, call before sending.	
<input type="checkbox"/> Byproduct 11 (e)2 material <input type="checkbox"/> Unprocessed ore (NOT ground or refined)*	

Matrix Codes

A - Air
W - Water
S - Soils/
Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking
Water

Analysis Requested

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers	Matrix (See Codes Above)	Total Metals	Total Mercury	Alkalinity	TDS, pH, E300.0 Anions	Nitrogen, Nitrate+Nitrite	Radium 226 + Radium 228	fluoride	Appendix 4	See Attached
	Date	Time											
1 TB-NS-A	2/12/18	1730	2	W	✓	✓	✓	✓	✓	✓	✓	✓	X
2 FB-Z	2/13/18	1100	1	W	✓	✓	✓	✓	✓	✓	✓	✓	
3 284-WL		1215	4	W	✓	✓	✓	✓	✓	✓	✓	✓	
4 285-WL		1245	4	W	✓	✓	✓	✓	✓	✓	✓	✓	
5 JB-N6-WL		1415	4	W	✓	✓	✓	✓	✓	✓	✓	✓	
6 JB-N1-WL		1430	4	W	✓	✓	✓	✓	✓	✓	✓	✓	
7 DW-P-2		1530	4	W	✓	✓	✓	✓	✓	✓	✓	✓	
8 TB-FX-1		1615	4	W	✓	✓	✓	✓	✓	✓	✓	✓	
9 TB-NZ-WL		1715	4	W	✓	✓	✓	✓	✓	✓	✓	✓	
10 JB-N2-AL		1730	4	W	✓	✓	✓	✓	✓	✓	✓	✓	

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

RUSH TAT C18020380

Custody Record MUST be signed	Relinquished by (print) Dalton W. Hillman	Date/Time 2/15/18 8:04	Signature D. Hillman	Received by (print)	Date/Time	Signature				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time 2/15/18 8:22	Signature Laura D. Watson				
LABORATORY USE ONLY										
Shipped By Dale	Cooler ID(s) Various	Custody Seals Y NC B	Intact Y N	Receipt Temp °C Various	Temp Blank Y N	On-Ice Y N	CC Cash Check	Payment Type	Amount \$	Receipt Number (cash/check only)

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All subcontracted data will be clearly noted on your analytical report.

Chain of Custody & Analytical Request Record

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Report Information (if different than Account Information)

Account Information (Billing Information)	
Company/Name PacificCorp-UT	
Contact	Jeff Tucker
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Invoice	<input type="checkbox"/> Hard Copy <input checked="" type="checkbox"/> Email
Purchase Order	<input type="checkbox"/> Quote <input checked="" type="checkbox"/> C4503 - Pacific Corp
	<input type="checkbox"/> Receive Report <input type="checkbox"/> Hard Copy <input checked="" type="checkbox"/> Email
	<input type="checkbox"/> Bottle Order

Report Information (if different than Account Information)	
Company/Name WET	
Contact	Dave Erickson
Phone	(406) 782-5220
Mailing Address	
City, State, Zip	
Email	derickson@waterenvtech.com
Receive Report	<input type="checkbox"/> Hard Copy <input checked="" type="checkbox"/> Email
Special Report formats:	<input type="checkbox"/> LEVEL IV <input type="checkbox"/> NELAC <input checked="" type="checkbox"/> EDD/EDT (contract laboratory) <input type="checkbox"/> Other

Comments

Please CC Laura Watson with results (EDD csv and PDF)

Matrix Codes		Analysis Requested	
A - Air			
W - Water			
S - Solids			
V - Vegetation			
B - Biosolids			
O - Other			
DW - Drinking Water			

Total Metals
Total Mercury
Alkalinity
TDS, pH, E300.0 Anions
Nitrogen, Nitrate+Nitrite
Radium 226 + Radium 228
fluoride

Appendix IV

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

See Attached
RUSH TAT
E-mail ID
Email ID
Email ID

Page 2 of 3

Custody

Record MUST be signed	Retirnished by (print) <i>Jeff Tucker</i>	Date/Time <i>2/15/18 8:50 AM</i>	Signature <i>Jeff Tucker</i>	Received by (print)	Date/Time <i>2/15/18 8:50 AM</i>	Signature <i>Jeff Tucker</i>				
Shipped By	Cooler ID(s) <i>10000000</i>	Custodian Seals <i>Y N C B Y N</i>	Intact <i>Y N</i>	Receipt Temp Temp/Blank <i>55N</i>	Office <i>Y N</i>	Payment Type <i>CC</i>	Amount <i>\$ 0.00</i>	Received by Laboratory (print) <i>Jeff Tucker</i>	Date/Time <i>2/15/18 8:50 AM</i>	Signature <i>Jeff Tucker</i>

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.

This serves as notice of this possibility. All subcontracted data will be clearly noted on your analytical report.



Chain of Custody & Analytical Request Record

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Account Information *(Billing information)*

Company/Name	PacificCorp-UT				
Contact	Jeff Tucker				
Phone					
Mailing Address					
City, State, Zip					
Email					
Receive Invoice	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email
Purchase Order	Quote C4503 - Pacific Corp		Bottle Order		

Report Information (*if different than Account Information*)

Company/Name WET	
Contact	Dave Erickson
Phone	(406) 782-5220
Mailing Address	
City, State, Zip	
Email	derickson@waterenvtech.com
Receive Report	<input type="checkbox"/> Hard Copy <input checked="" type="checkbox"/> Email
Special Report/Formats:	
<input type="checkbox"/> LEVEL IV <input type="checkbox"/> NELAC <input checked="" type="checkbox"/> EDD/EDT (contact laboratory) <input type="checkbox"/> Other _____	

Comments

Please CC Laura Watson with results (EDD csv and PDF)

Project Information

Project Name, PWSID, Permit, etc. PERCM49	
Sampler Name Dwilliams	Sampler Phone MO 6-249-0173
Sample Origin State Montana	EPA/State Compliance <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MINING CLIENTS, please indicate sample type. *If ore has been processed or refined, call before sending.	
<input type="checkbox"/> Byproduct 11 (e)2 material	<input type="checkbox"/> Unprocessed ore (NOT ground or refined)*

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature		Received by (print)	Date/Time	Signature
	Dalton Williams	2/15/18 8:49	<i>DeWitt</i>				
LABORATORY USE ONLY							
Shipped By	Coder ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type
<i>DeWitt</i>	Various	Y N C B	Y N	°C	Y N	Y N	CC Cash Check
							Amount \$
							Receipt Number (cash/check only)

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly noted on your analytical report.

Chain of Custody & Analytical Request Record

www.energylab.com

Page _____ of _____

Account Information (Billing information)

Company/Name		PacificCorp-UT			
Contact	Jeff Tucker				
Phone					
Mailing Address					
City, State, Zip					
Email					
Receive Invoice	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email
Purchase Order	Quote		Bottle Order		
		C4503 - Pacific Corp			

Report Information (if different than Account Information)

Company/Name		WET	
Contact	Dave Erickson		
Phone	(406) 782-5220		
Mailing Address			
City, State, Zip			
Email	derickson@waterenvtech.com		
Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	
Special Report/Formats:			
<input type="checkbox"/> LEVEL IV <input type="checkbox"/> NELAC <input checked="" type="checkbox"/> EDD/EDT (contact laboratory) <input type="checkbox"/> Other _____			

Comments

Please CC Laura Watson with results (EDD csv and PDF)

Project Information

Project Name, PWSID, Permit, etc. PERCM49	
Sampler Name	Sampler Phone 406-249-0173
Sample Origin State Montana	EPA/State Compliance <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MINING CLIENTS, please indicate sample type. *If one has been processed or refined, call before sending. <input type="checkbox"/> Byproduct 11 (e)2 material <input type="checkbox"/> Unprocessed ore (NOT ground or refined)*	

Matrix Codes		Analysis Requested							
A - Air W - Water S - Soils/ Solids V - Vegetation B - Bioassay O - Other DW - Drinking Water		Total Metals	Total Mercury	Alkalinity	TDS, pH, E300.0 Anions	Nitrogen, Nitrate+Nitrite	Radium 226 + Radium 228	fluoride	Appendix IV
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>							
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>							
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<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>							
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Attachment B

Field Summary Data – May 2018

Facility Name: Jim Bridger Power Plant – FGD-1
Event Description: Detection Monitoring
Event Dates: May 22-23, 2018
Field Personnel: Laura Watson, Mandy Machinal

ACTIVITY SUMMARY. WET personnel arrived onsite May 22, 2018 and performed groundwater sampling at the CCR FGD-1 unit. 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 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:

- 285-WA
- 1284-WL
- 685-WL
- JB-N10-A
- 984-WA
- 566-WA
- JB-WA-6
- WA-3
- WA-4
- JB-N5-A
- JB-N11-A
- JB-N12-A
- JB-N11-L
- JB-N12-L

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 Energy Laboratories in Casper, WY for analysis on May 24, 2018. The following details dates for conducting fieldwork and post-fieldwork data-processing:

- Date(s) fieldwork completed: May 22 and 23, 2018
- Date(s) unvalidated lab data received: June 28, 2018
- Data validation completion date: July 18, 2018

The following information is attached to this summary as a supplement:

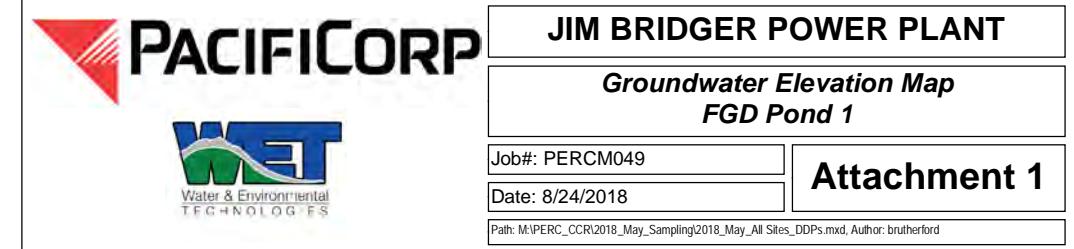
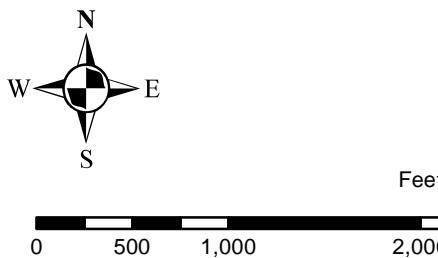
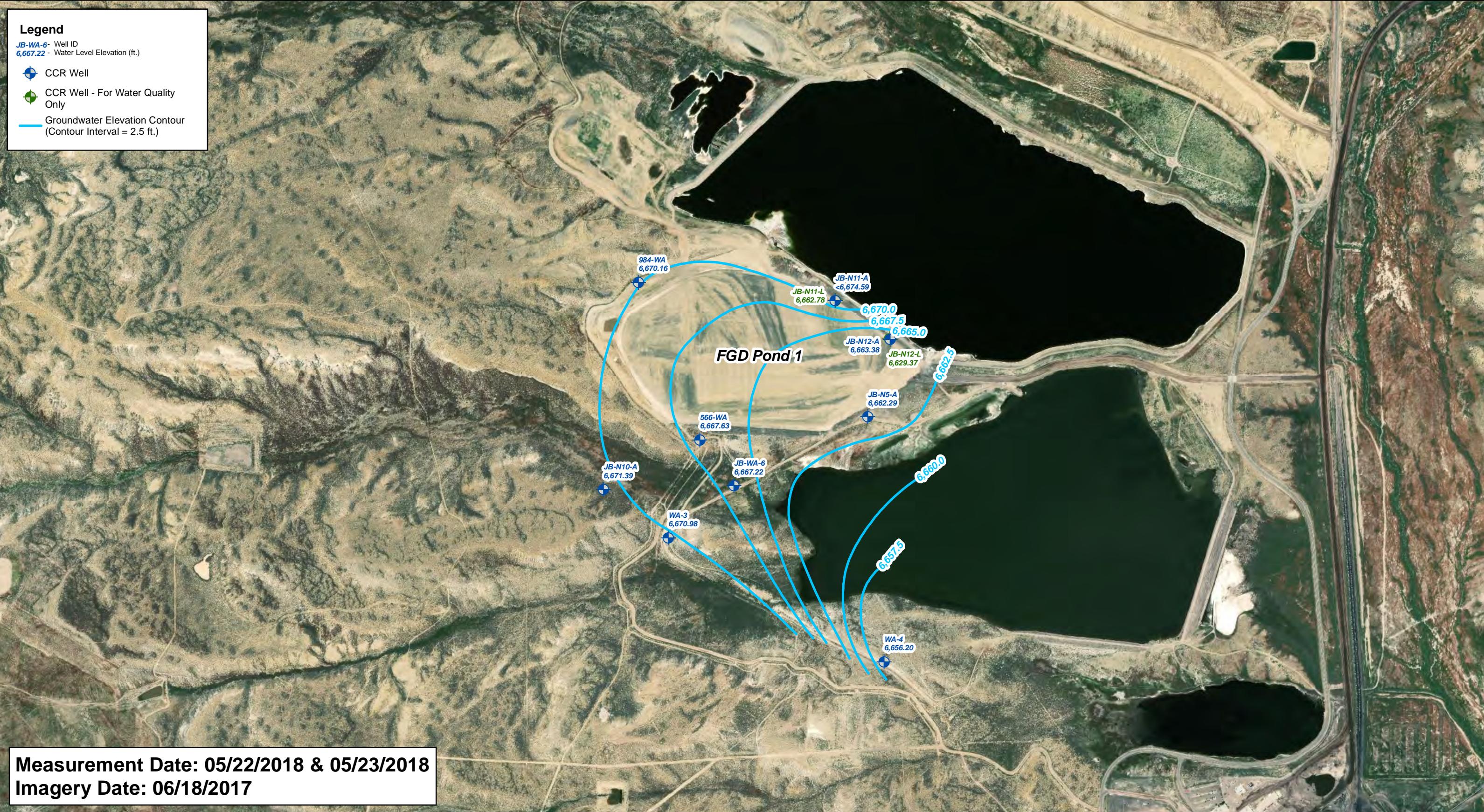
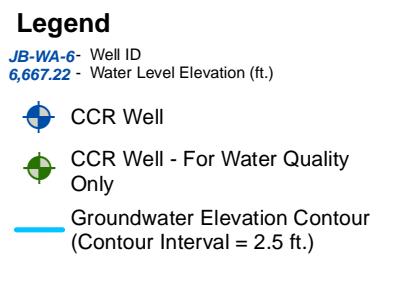
- Attachment A: Groundwater Contour Map
- Attachment B: Data Validation Summary
- Attachment C: Statistical Analysis
- Attachment D: Field Data Sheets
- Attachment E: Laboratory Analytical Reports

SAP DEVIATIONS.

- Well 285-WA was inaccessible, therefore no sample or parameters were collected.
- Well 685-WL was inaccessible, therefore no sample or parameters were collected.

Attachment A:

Groundwater Contour Map



Attachment B:

Data Validation Summary

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Jim Bridger sampled 5/22/2018	
Validator:	Tim Driscoll 7/3/2018	
Reviewer:	Pat Seccomb 7-18-18	
Laboratory:	Energy Laboratories	
Laboratory Work Order#:	C18050868	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix III: B, Ca, Cl, ¹ F, pH, S0 ₄ , TDS Appendix IV: Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li, Hg, Mo, Se, Tl, Ra ²²⁶ + Ra ²²⁸	
Review Element:	Complete / Criteria Met? (Yes/No)	If no, describe:
Chain of Custody:	Yes	
Field Documentation:	Yes	
Holding Times & Sample Preservation:	Yes	
Calibrations:	Yes	
Blanks:	No	There were low-level detections in a laboratory method blank that resulted in J+ qualification, detailed below.
Laboratory Control Sample:	Yes	
Laboratory Duplicate:	Yes	
Matrix Spike:	Yes	
Overall Assessment:		
<p>The following samples were qualified due to low-level detections in method blanks:</p> <ul style="list-style-type: none"> • Arsenic was qualified J+ in samples JB-FX-1, JB-N2-AL, JB-N2-WL, JB-N3-AL, JB-N10-A, JB-WA-6. • Molybdenum was qualified J+ in samples 1284-WL, JB-N1-WL, JB-N1-AL, JB-N2-AL, JB-WL-5, JB-FX-2, WA-3, JB-WA-6, and JB-N5-A. • Chromium was qualified J+ in samples JB-N2-AL, JB-N2-WL, JB-N3-AL, JB-N10-A, and JB-WA-6. • Lead was qualified J+ in samples JB-N2-AL, JB-N2-WL, JB-N3-AL, JB-N10-A, and JB-WA-6. • Selenium was qualified J+ in samples JB-N2-AL, WA-3, 566-WA, JB-N10-A, and JB-WA-6. <p>No further qualifications were required.</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 FGD Pond 1 at the Jim Bridger Power Plant located near Point of Rocks, Wyoming. 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 in along with a discussion of the methods used to compare upgradient with downgradient water quality.

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 potentially been impacted by the FGD Pond 1. Familiarity with numerical and distributional characteristics of the upgradient wells aid 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 FGD Pond 1.

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 25th percentile of the data, the median is the 50th percentile of the data, and the third quartile is the 75th percentile of the data. The 25th 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 25th 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 FGD Pond 1, histograms and normal-quantile 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 2018).

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 limit (MDL) is plotted on the histogram for non-detect observations. A line was added to the histograms presenting non-detect values to show the location of the MDL on the graph. Figure C.1 below is a histogram of radium data for the upgradient wells for the FGD Pond 1. It is provided here to illustrate data distribution using a histogram. All of the histograms used to examine the analytes from the FGD Pond 1 upgradient well data, are provided in at the end of this appendix in Figure C.3.

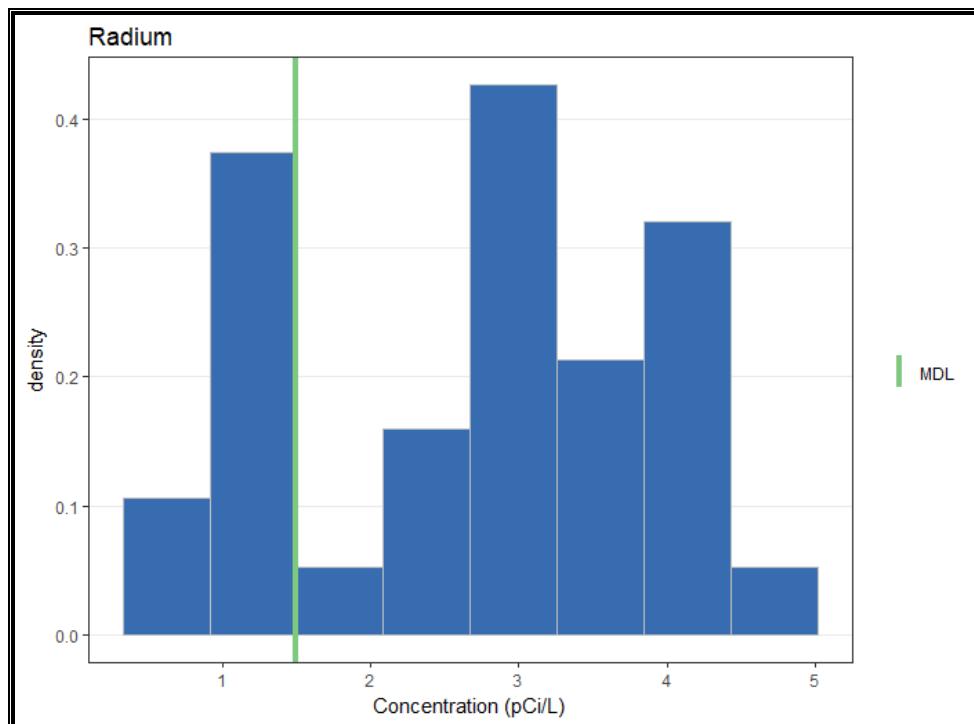


Figure C.1. Histogram of radium data from the FGD Pond 1 upgradient wells.

2.2.2 Normal-Quantile Plots

A normal-quantile plot is a graphical tool used to determine if the data follow a normal distribution and to look for outliers. When the data follow a normal distribution, the points on the graph lie along a straight line. Any deviations from a straight line are indicative of deviations from normality. It is important to note that no real-world data set is perfectly normal, so a certain amount of deviation from the line is to be expected even in data that are sufficiently normal to perform normality based statistics. Normal-quantile plots in this document were generated using both non-detects and detected values. The MDL was used to plot a non-detected value. Detected values are denoted by solid circles and non-detected values are identified by hollow circles. The gray area shows the region of acceptable deviations from normality. Figure C.2 uses the same radium data points used to develop the Figure C.1. None of the points fall outside of the gray region. This indicates that the data are approximately normally distributed. All of the normal-quantile plots used to examine the FGD Pond 1 upgradient well data are provided at the end of this appendix in Figure C.3.

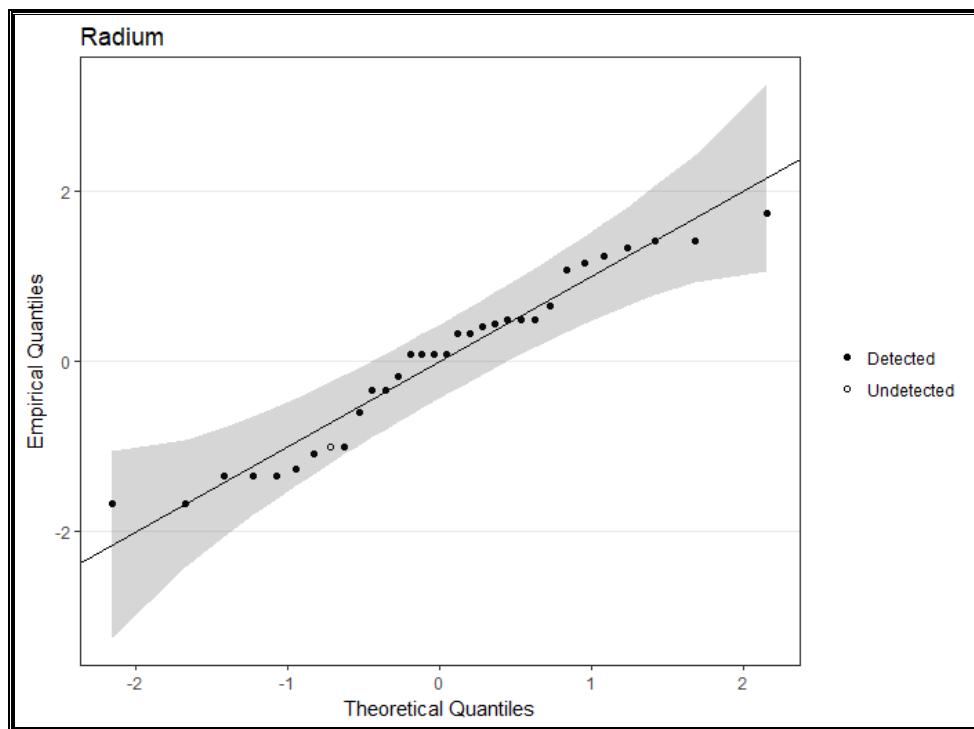


Figure C.2. Normal quantile plot of radium data for the FGD Pond 1 upgradient wells

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 for lead, molybdenum, and thallium data in the FGD Pond 1 data. However, none of them are large enough to indicate an error so they were retained in the dataset.

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. Arsenic, barium, beryllium, cadmium, chromium, lead, selenium, and thallium have more than 50% non-detects so Kaplan-Meier will not be used for their analysis. Antimony and mercury were not detected in any of the samples so no statistical analysis will be done on them. The boron, cobalt, lithium, and molybdenum data contain more than 15% non-detects, but over half of the data were detected. As a result, Kaplan-Meier was used to compute means, standard deviations, and statistical limits used to compare the upgradient downgradient water quality for these analytes.

2.3 Summary Results

Table C.1 provides summary statistics for the FGD Pond 1 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. Only analytes that were detected in at least one upgradient sample are shown in the table.

Table C.1. Summary statistics for the FGD Pond 1 upgradient wells

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Arsenic	1284-WL	12	0	NA	NA	NA	NA
Arsenic	285-WA	10	0	NA	NA	NA	NA
Arsenic	JB-N10-A	10	10	0.002	0.003	0.001	43%
Arsenic	Pooled	32	10	NA	NA	NA	NA
Barium	1284-WL	12	0	NA	NA	NA	NA
Barium	285-WA	10	0	NA	NA	NA	NA
Barium	JB-N10-A	10	2	NA	NA	NA	NA
Barium	Pooled	32	2	NA	NA	NA	NA
Beryllium	1284-WL	12	0	NA	NA	NA	NA
Beryllium	285-WA	10	0	NA	NA	NA	NA
Beryllium	JB-N10-A	10	10	0.07	0.07	0.01	7%
Beryllium	Pooled	32	10	NA	NA	NA	NA
Boron	1284-WL	11	11	0.61	0.61	0.06	10%
Boron	285-WA	9	4	NA	NA	NA	NA
Boron	JB-N10-A	9	9	0.23	0.24	0.03	13%
Boron	Pooled	29	24	0.25	0.32	0.24	76%
Cadmium	1284-WL	12	0	NA	NA	NA	NA
Cadmium	285-WA	10	0	NA	NA	NA	NA
Cadmium	JB-N10-A	10	10	0.008	0.008	0.0005	6%
Cadmium	Pooled	32	10	NA	NA	NA	NA
Calcium	1284-WL	11	11	100	102	7.5	7%
Calcium	285-WA	9	9	224	223	7.9	4%
Calcium	JB-N10-A	9	9	444	452	26	6%
Calcium	Pooled	29	29	222	248	149	60%
Chloride	1284-WL	11	11	67	67	4.1	6%
Chloride	285-WA	9	9	10	10	0.6	6%
Chloride	JB-N10-A	9	9	6.0	6.3	1.3	21%
Chloride	Pooled	29	29	10	31	29	96%
Chromium	1284-WL	12	0	NA	NA	NA	NA
Chromium	285-WA	10	0	NA	NA	NA	NA
Chromium	JB-N10-A	10	7	0.005	0.005	0.001	26%
Chromium	Pooled	32	7	NA	NA	NA	NA
Cobalt	1284-WL	12	12	0.01	0.01	0.00	21%
Cobalt	285-WA	10	0	NA	NA	NA	NA
Cobalt	JB-N10-A	10	10	0.185	0.187	0.008	4%

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Cobalt	Pooled	32	22	0.012	0.065	0.084	130%
Fluoride	1284-WL	11	11	0.8	0.8	0.08	9%
Fluoride	285-WA	9	9	0.2	0.2	0.01	7%
Fluoride	JB-N10-A	9	9	5.4	5.1	2.9	57%
Fluoride	Pooled	29	29	0.8	2.0	2.7	137%
Lead	1284-WL	12	0	NA	NA	NA	NA
Lead	285-WA	10	2	NA	NA	NA	NA
Lead	JB-N10-A	10	10	0.002	0.003	0.003	101%
Lead	Pooled	32	12	NA	NA	NA	NA
Lithium	1284-WL	12	12	0.20	0.20	0	0%
Lithium	285-WA	10	0	NA	NA	NA	NA
Lithium	JB-N10-A	10	10	0.40	0.43	0.05	11%
Lithium	Pooled	32	22	0.20	0.27	0.11	41%
Molybdenum	1284-WL	12	10	0.001	0.004	0.008	229%
Molybdenum	285-WA	10	9	0.001	0.002	0.003	143%
Molybdenum	JB-N10-A	10	0	NA	NA	NA	NA
Molybdenum	Pooled	32	19	0.001	0.002	0.005	228%
pH	1284-WL	11	11	7.69	7.69	0.08	1%
pH	285-WA	9	9	7.18	7.18	0.03	0%
pH	JB-N10-A	9	9	3.97	3.94	0.10	3%
pH	Pooled	29	29	7.20	6.37	1.67	26%
Radium	1284-WL	12	11	3.2	2.8	1.4	48%
Radium	285-WA	10	10	3.1	3.3	0.9	27%
Radium	JB-N10-A	10	10	1.5	1.9	1.0	53%
Radium	Pooled	32	31	2.8	2.7	1.2	45%
Selenium	1284-WL	12	3	NA	NA	NA	NA
Selenium	285-WA	10	0	NA	NA	NA	NA
Selenium	JB-N10-A	10	10	0.003	0.003	0.001	35%
Selenium	Pooled	32	13	NA	NA	NA	NA
Sulfate	1284-WL	11	11	1800	1815	93	5%
Sulfate	285-WA	9	9	746	746	33	4%
Sulfate	JB-N10-A	9	9	3300	3326	140	4%
Sulfate	Pooled	29	29	1800	1952	1044	53%
TDS	1284-WL	11	11	2990	2989	68	2%
TDS	285-WA	9	9	1510	1519	23	2%

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
TDS	JB-N10-A	9	9	4770	4823	203	4%
TDS	Pooled	29	29	2990	3102	1333	43%
Thallium	1284-WL	12	2	NA	NA	NA	NA
Thallium	285-WA	10	0	NA	NA	NA	NA
Thallium	JB-N10-A	10	0	NA	NA	NA	NA
Thallium	Pooled	32	2	NA	NA	NA	NA

Table C.2 provides the five-number summaries for the FGD Pond 1 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 is a non-detects it is denoted using a less-than (<) symbol. Analytes that do not contain any detects are not listed in the tables. Only analytes that were detected in at least one sample are shown in the table.

Table C.2. Five-number summary for the FGD Pond 1 upgradient wells.

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Arsenic	1284-WL	<0.001	<0.001	<0.001	<0.001	<0.002
Arsenic	285-WA	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	JB-N10-A	0.002	0.002	0.002	0.002	0.005
Arsenic	Pooled	<0.001	<0.001	<0.001	0.002	0.005
Barium	1284-WL	<0.001	<0.050	<0.050	<0.050	<0.050
Barium	285-WA	<0.050	<0.050	<0.050	<0.050	<0.050
Barium	JB-N10-A	<0.050	<0.050	<0.050	<0.050	0.070
Barium	Pooled	<0.001	<0.050	<0.050	<0.050	0.070
Beryllium	1284-WL	<0.001	<0.001	<0.001	<0.001	<0.001
Beryllium	285-WA	<0.001	<0.001	<0.001	<0.001	<0.001
Beryllium	JB-N10-A	0.060	0.064	0.070	0.071	0.076
Beryllium	Pooled	<0.001	<0.001	<0.001	0.064	0.076
Boron	1284-WL	0.48	0.61	0.61	0.65	0.70
Boron	285-WA	<0.05	<0.05	<0.05	0.05	0.06
Boron	JB-N10-A	0.20	0.22	0.23	0.26	0.30
Boron	Pooled	<0.05	0.05	0.25	0.61	0.70
Cadmium	1284-WL	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	285-WA	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	JB-N10-A	0.007	0.007	0.008	0.008	0.008

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Cadmium	Pooled	<0.001	<0.001	<0.001	0.007	0.008
Calcium	1284-WL	93	97.5	100	103.5	121
Calcium	285-WA	212	220	224	225	239
Calcium	JB-N10-A	422	434	444	463	507
Calcium	Pooled	93	103	222	431	507
Chloride	1284-WL	59	66.5	67	68	76
Chloride	285-WA	9.0	9.9	10	10	11
Chloride	JB-N10-A	4.1	6.0	6.0	7.0	8.0
Chloride	Pooled	4.1	8.0	10	67	76
Chromium	1284-WL	<0.001	<0.001	<0.005	<0.005	<0.005
Chromium	285-WA	<0.001	<0.005	<0.005	<0.005	<0.005
Chromium	JB-N10-A	<0.004	<0.005	0.005	0.007	0.007
Chromium	Pooled	<0.001	<0.005	<0.005	<0.005	0.007
Cobalt	1284-WL	0.007	0.009	0.012	0.013	0.015
Cobalt	285-WA	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	JB-N10-A	0.177	0.181	0.185	0.190	0.205
Cobalt	Pooled	<0.005	<0.005	0.012	0.179	0.205
Fluoride	1284-WL	0.7	0.8	0.8	0.8	1.0
Fluoride	285-WA	0.16	0.2	0.2	0.2	0.2
Fluoride	JB-N10-A	0.3	5.0	5.4	7.0	8.0
Fluoride	Pooled	0.16	0.2	0.8	1.0	8.0
Lead	1284-WL	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	285-WA	<0.001	<0.001	<0.001	<0.001	0.002
Lead	JB-N10-A	0.001	0.001	0.002	0.004	0.010
Lead	Pooled	<0.001	<0.001	<0.001	0.001	0.010
Lithium	1284-WL	0.2	0.2	0.2	0.2	0.2
Lithium	285-WA	<0.1	<0.1	<0.1	<0.1	<0.1
Lithium	JB-N10-A	0.4	0.4	0.4	0.5	0.5
Lithium	Pooled	<0.1	<0.1	0.2	0.4	0.5
Molybdenum	1284-WL	<0.001	0.001	0.001	0.002	0.030
Molybdenum	285-WA	<0.001	0.001	0.001	0.002	0.011
Molybdenum	JB-N10-A	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	Pooled	<0.001	<0.001	0.001	0.001	0.030
pH	1284-WL	7.53	7.64	7.69	7.74	7.80
pH	285-WA	7.13	7.18	7.18	7.20	7.23
pH	JB-N10-A	3.72	3.92	3.97	3.98	4.11

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
pH	Pooled	3.72	3.99	7.20	7.68	7.80
Radium	1284-WL	<0.7	1.8	3.2	4.1	4.3
Radium	285-WA	2.3	2.8	3.1	4.4	4.8
Radium	JB-N10-A	0.7	1.1	1.5	3.1	3.3
Radium	Pooled	<0.7	1.5	2.8	3.4	4.8
Selenium	1284-WL	<0.001	<0.001	<0.001	<0.001	0.003
Selenium	285-WA	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	JB-N10-A	0.002	0.003	0.003	0.003	0.006
Selenium	Pooled	<0.001	<0.001	<0.001	0.003	0.006
Sulfate	1284-WL	1650	1765	1800	1835	1980
Sulfate	285-WA	702	719	746	769	790
Sulfate	JB-N10-A	3140	3250	3300	3380	3600
Sulfate	Pooled	702	790	1800	3180	3600
TDS	1284-WL	2810	2975	2990	3030	3070
TDS	285-WA	1490	1500	1510	1540	1560
TDS	JB-N10-A	4540	4760	4770	4890	5270
TDS	Pooled	1490	1540	2990	4680	5270
Thallium	1284-WL	<0.0005	<0.0005	<0.0005	<0.0010	0.0304
Thallium	285-WA	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Thallium	JB-N10-A	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Thallium	Pooled	<0.0005	<0.0005	<0.0005	<0.0005	0.0304

3.0 UPGRAIDENT AND DOWNGRADIENT 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, was used to compute a UTL, which serves as the background value. The larger of the UTL and MCL was used as the groundwater protection limit (GWPL). Data obtained from the downgradient wells were compared point-by-point to the GWPLs 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 Limits

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

κ = multiplier from EPA Unified Guidance, March 2009

S = standard deviation of the background data

3.1.1 Normal Distribution

Histograms and normal-quantile plots were used to visually inspect the data for deviations from normality and to determine if outliers were present. This examination reveals the lead, molybdenum, and thallium data contain outliers. 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 greater of the maximum detected value and the largest MDL 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 close to 0.05 as selected 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.3 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 detected. An appropriate transformation was not found for any of the analytes. Non-parametric UTLs were computed for all of the analytes except for radium.

Table C.3. Shapiro-Wilk Test for the FGD Pond 1 upgradient wells.

Analyte	Well	W-Statistic	P-Value	Normal
Boron	Pooled	0.8398	0.0005	Not Normal
Calcium	Pooled	0.8219	0.0002	Not Normal
Chloride	Pooled	0.6962	<0.0001	Not Normal
Cobalt	Pooled	0.6328	<0.0001	Not Normal
Fluoride	Pooled	0.6573	<0.0001	Not Normal
Lithium	Pooled	0.8131	<0.0001	Not Normal
Molybdenum	Pooled	0.2806	<0.0001	Not Normal
pH	Pooled	0.6944	<0.0001	Not Normal
Radium	Pooled	0.9476	0.1230	Normal
Sulfate	Pooled	0.8503	0.0008	Not Normal
TDS	Pooled	0.8491	0.0007	Not Normal

3.1.2 Upper Tolerance Limits and Groundwater Protection Limit

This section contains the GWPL computed for each analyte. Table C.4 lists the UTL, MCL, and GWPL for each of the analytes detected in the upgradient wells. The following criteria was used for determining each GWPL:

- 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 maximum detected value and the largest MDL 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 GWPL.

Graphs were constructed for each of the analytes that had at least one detectable measurement in the downgradient wells. The graphs illustrate the GWPL as a horizontal line with the measurements from each of the downgradient wells plotted on the same graph. Non-detects are represented by hollow grey circles on the graphs. These graphs clearly depict how the downgradient measurements compare to the GWPL. Results above the GWPL line represent values exceeding the GWPL. As the graphs illustrate, arsenic, boron, cadmium, calcium, chloride, cobalt, fluoride, lead, lithium, molybdenum, pH, radium, selenium, sulfate, and total dissolved solids exceed the GWPL. Table C.4 list the GWPLs and the wells that exceed for each analyte and list the downgradient wells that exceed the UTLs (Figure C.4).

Table C.4. Comparison of downgradient wells to the groundwater protection limit.

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Ground Water Protection Limit (mg/L)	Downgradient Wells that Exceed Upper Tolerance Limit
Antimony	0.001	0.006	0.006	Within Limit
Arsenic	0.005	0.01	0.01	566-WA, JB-N12-L, WA-4
Barium	0.07	2	2	Within Limit
Beryllium	0.076	0.004	0.076	Within Limit
Boron	0.70	NA	0.7	566-WA
Cadmium	0.008	0.005	0.008	566-WA
Calcium	507	NA	507	JB-WA-6
Chloride	76	NA	76	984-WA, JB-N12-L, JB-N5-A
Chromium	0.007	0.1	0.1	Within Limit
Cobalt	0.205	0.006	0.205	566-WA, WA-4
Fluoride	8.0	4	8	WA-4
Lead	0.01	0.015	0.015	JB-N12-L
Lithium	0.5	0.040	0.5	JB-N11-L, JB-N12-L, WA-4
Mercury	0.001	0.002	0.002	Within Limit
Molybdenum	0.03	0.100	0.100	JB-N11-A, JB-N11-L, JB-N12-A, JB-N12-L
pH Basic Range	7.80	NA	7.80	JB-N12-A
pH Acidic Range	3.72	NA	3.72	WA-4
Radium	5.22	5	5.218	JB-N5-A
Selenium	0.006	0.05	0.05	JB-N11-L, JB-N12-L
Sulfate	3600	NA	3600	566-WA, 984-WA, JB-N12-L, JB-N5-A, JB-WA-6, WA-4
TDS	5270	NA	5270	984-WA, JB-N12-L, JB-N5-A, JB-WA-6, WA-4
Thallium	0.0304	0.002	0.0304	Within Limit

4.0 CONCLUSIONS

Data were collected from wells FGD Pond 1 near the Jim Bridger Power Plant. A comprehensive data analysis was completed on the upgradient wells to ensure that comparisons between upgradient and downgradient wells were done correctly. Exceedances were noted for arsenic, boron, cadmium, calcium, chloride, cobalt, fluoride, lead, lithium, molybdenum, pH, radium, selenium, sulfate, and total dissolved solids in the downgradient wells for the FGD Pond 1.

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.

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Sanitas Technologies, 2016, Sanitas, www.sanitastech.com, Shawnee, Kansas.

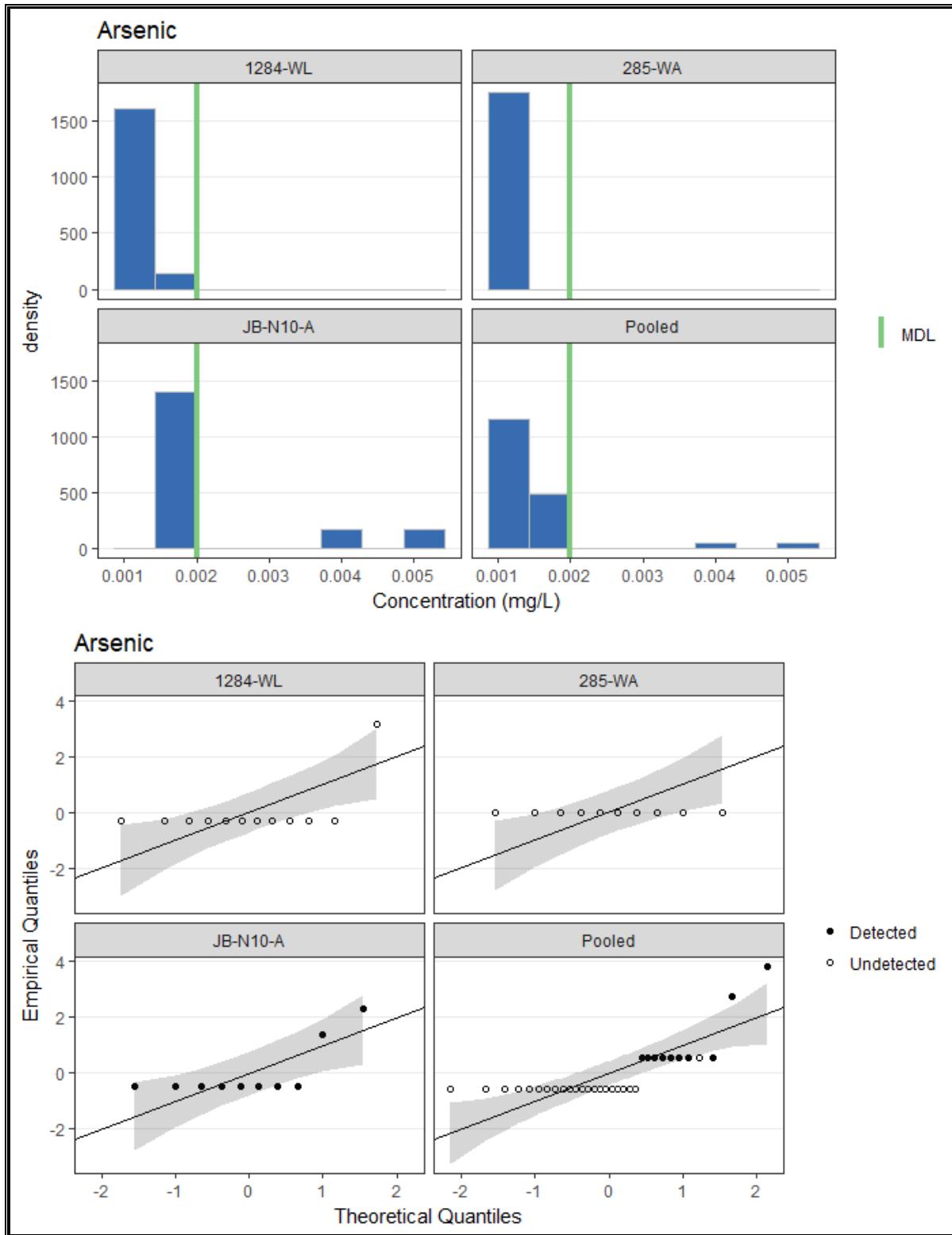


Figure C.3. Summary statistics plots for the FGD Pond 1.

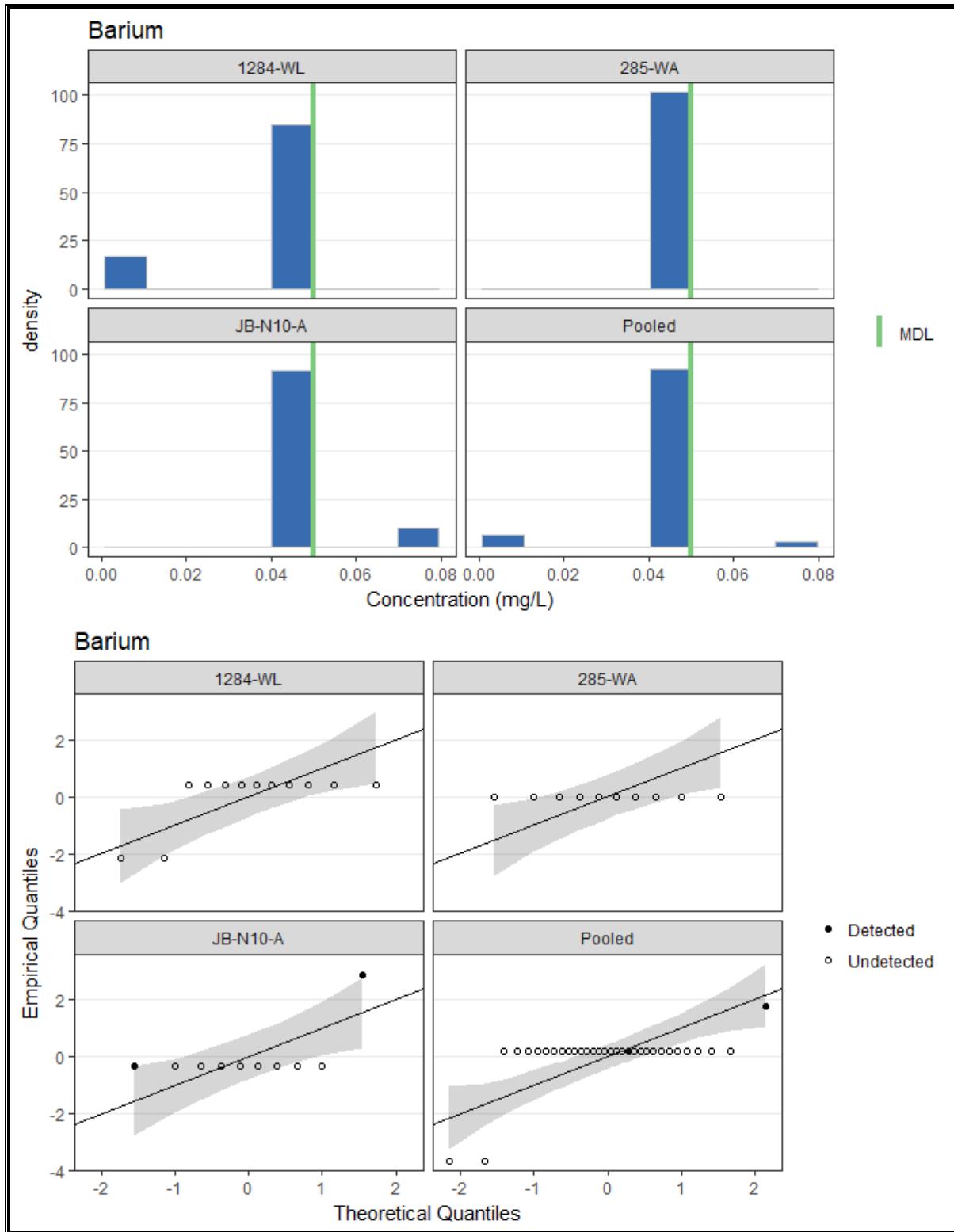


Figure C.3 (cont). Summary statistics plots for the FGD Pond 1.

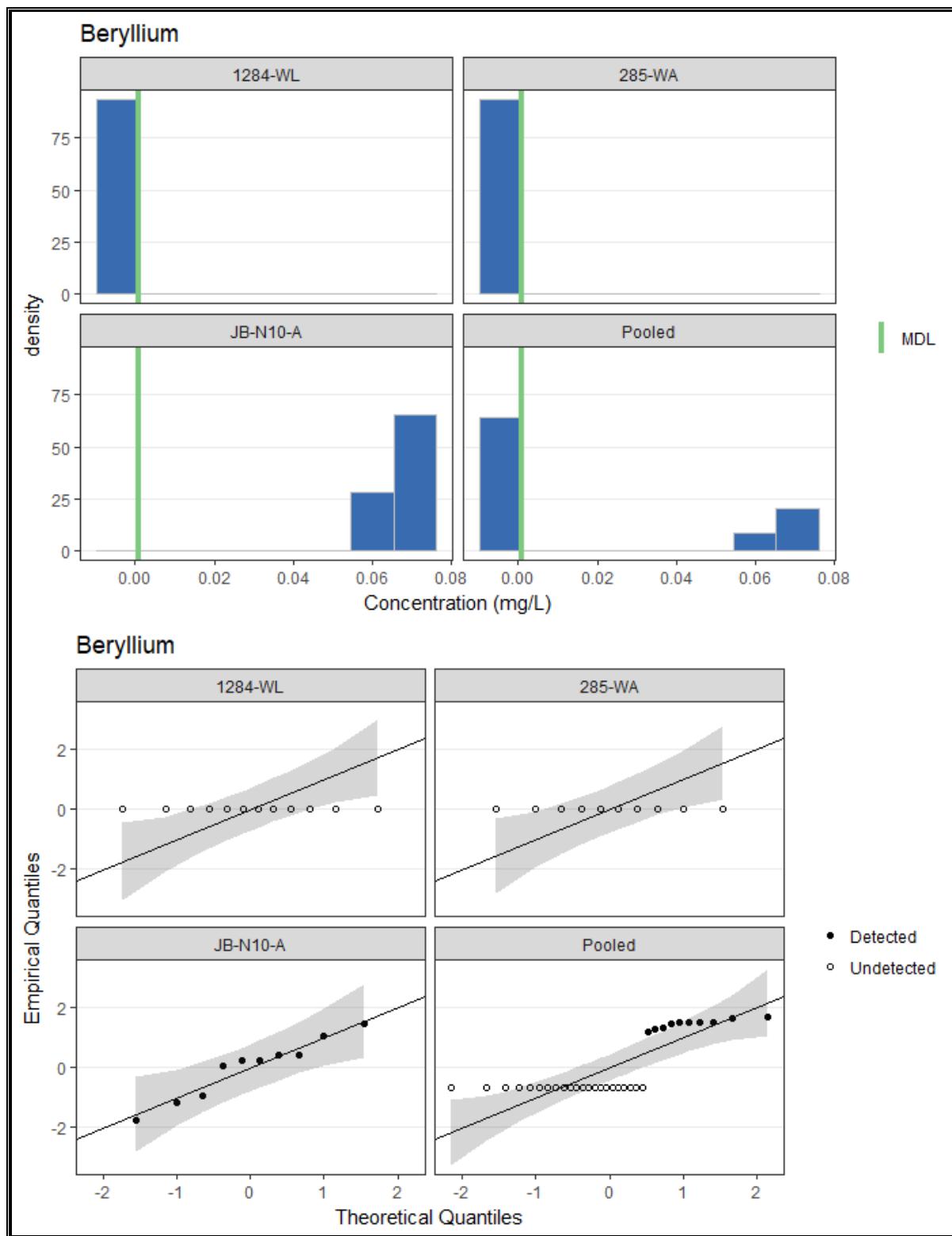


Figure C.3 (cont). Summary statistics plots for the FGD Pond 1.

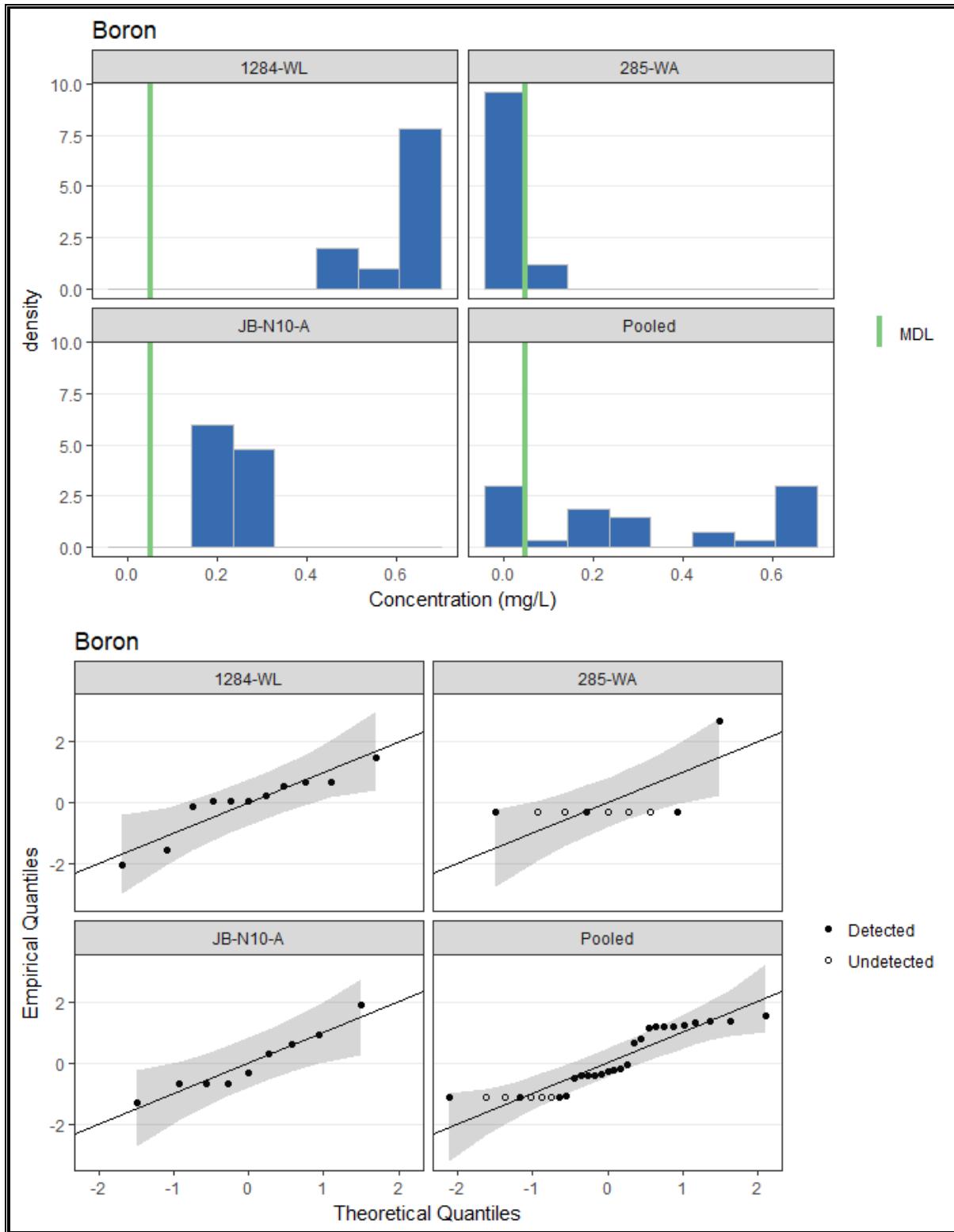


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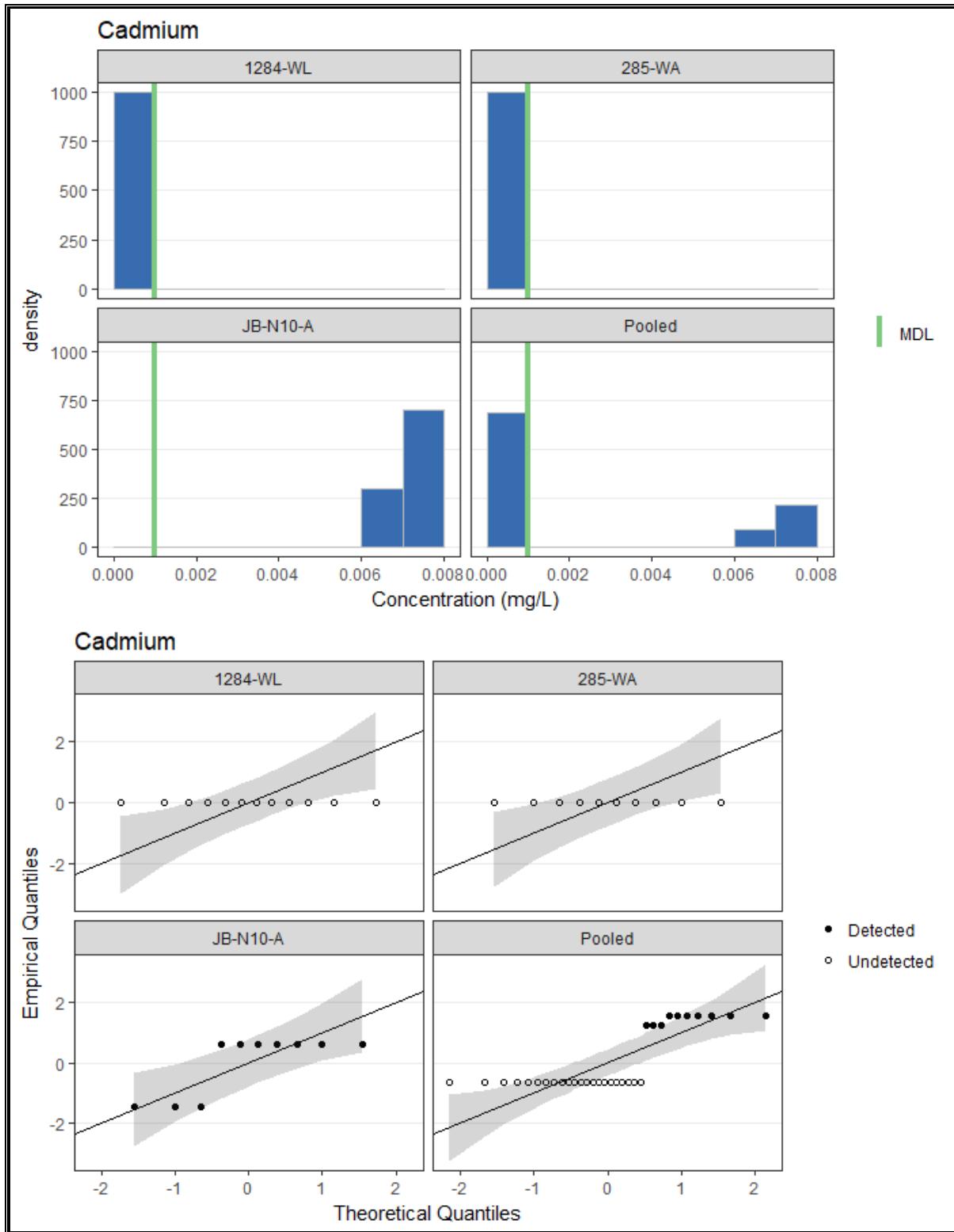


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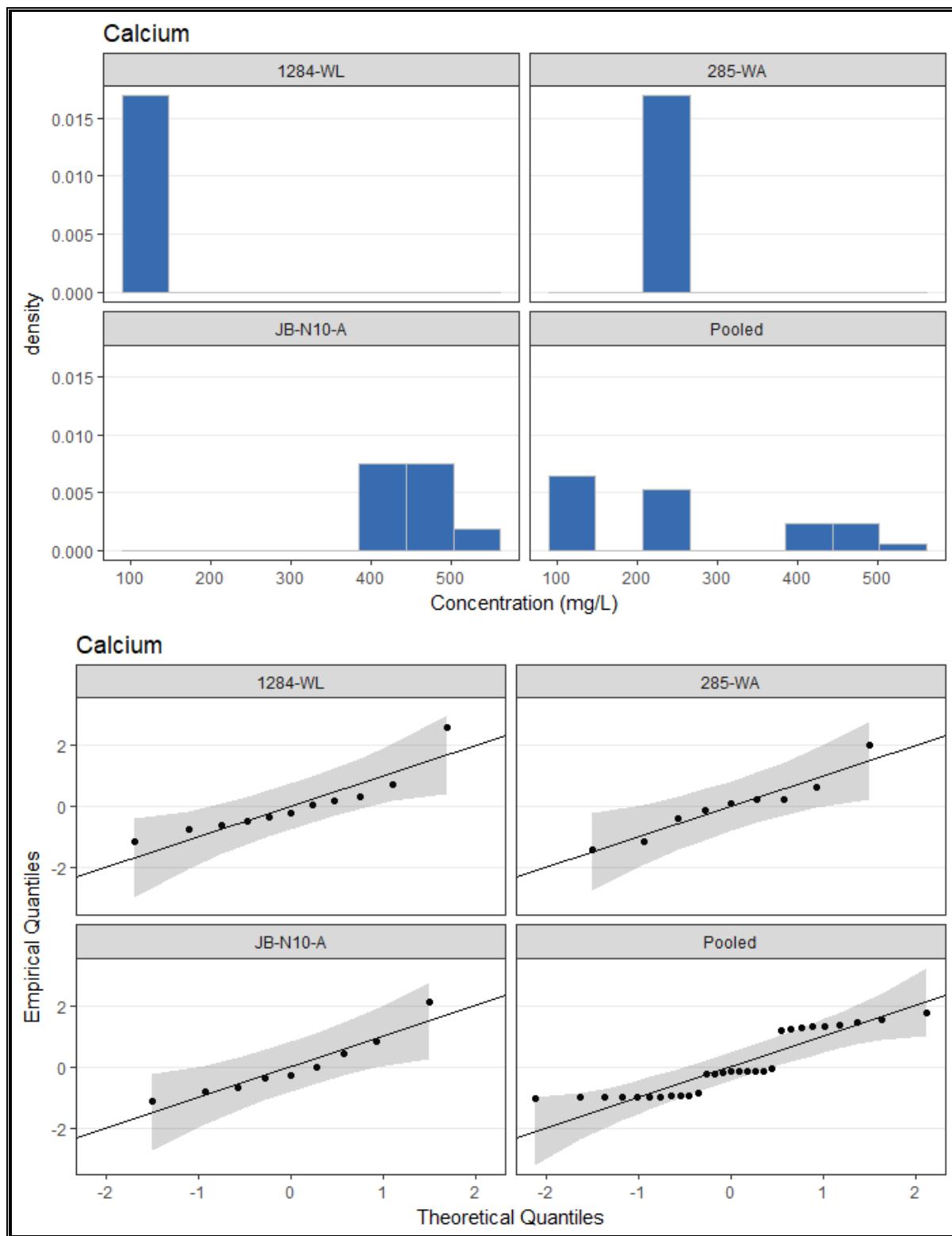


Figure C.3 (cont). Summary statistics plots for the FGD Pond 1.

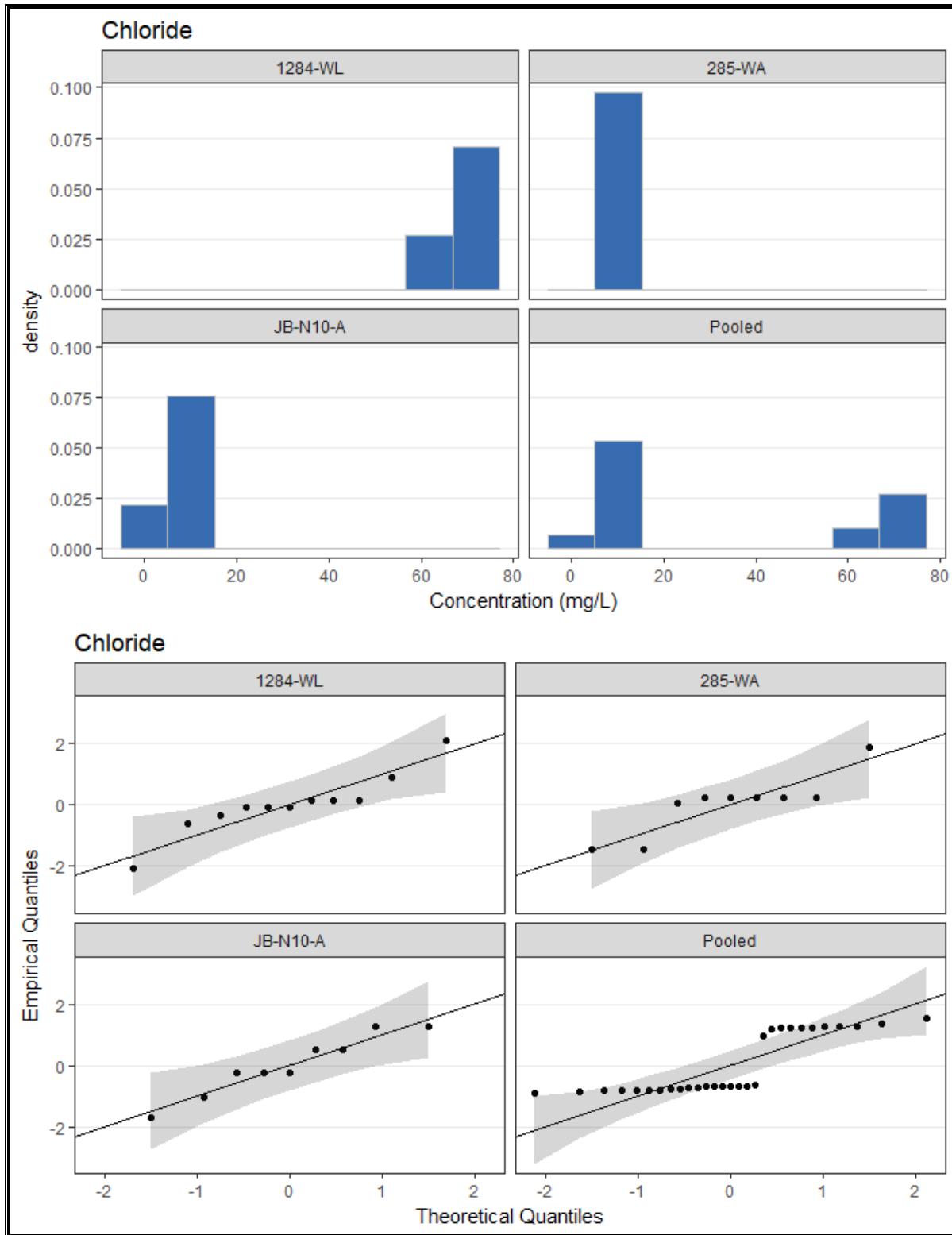


Figure C.3 (cont). Summary statistics plots for the FGD Pond 1.

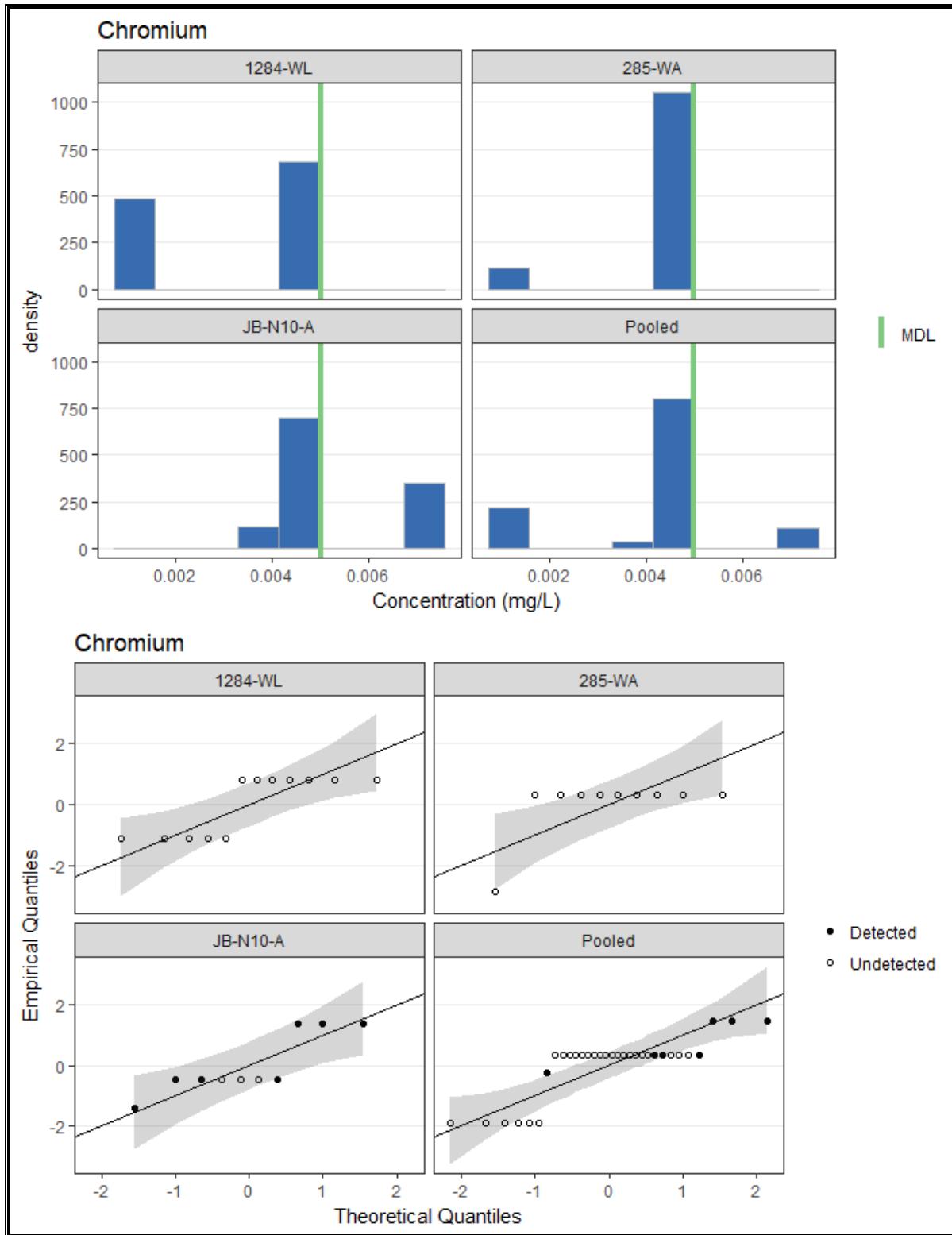


Figure C.3 (cont). Summary statistics plots for the FGD Pond 1.

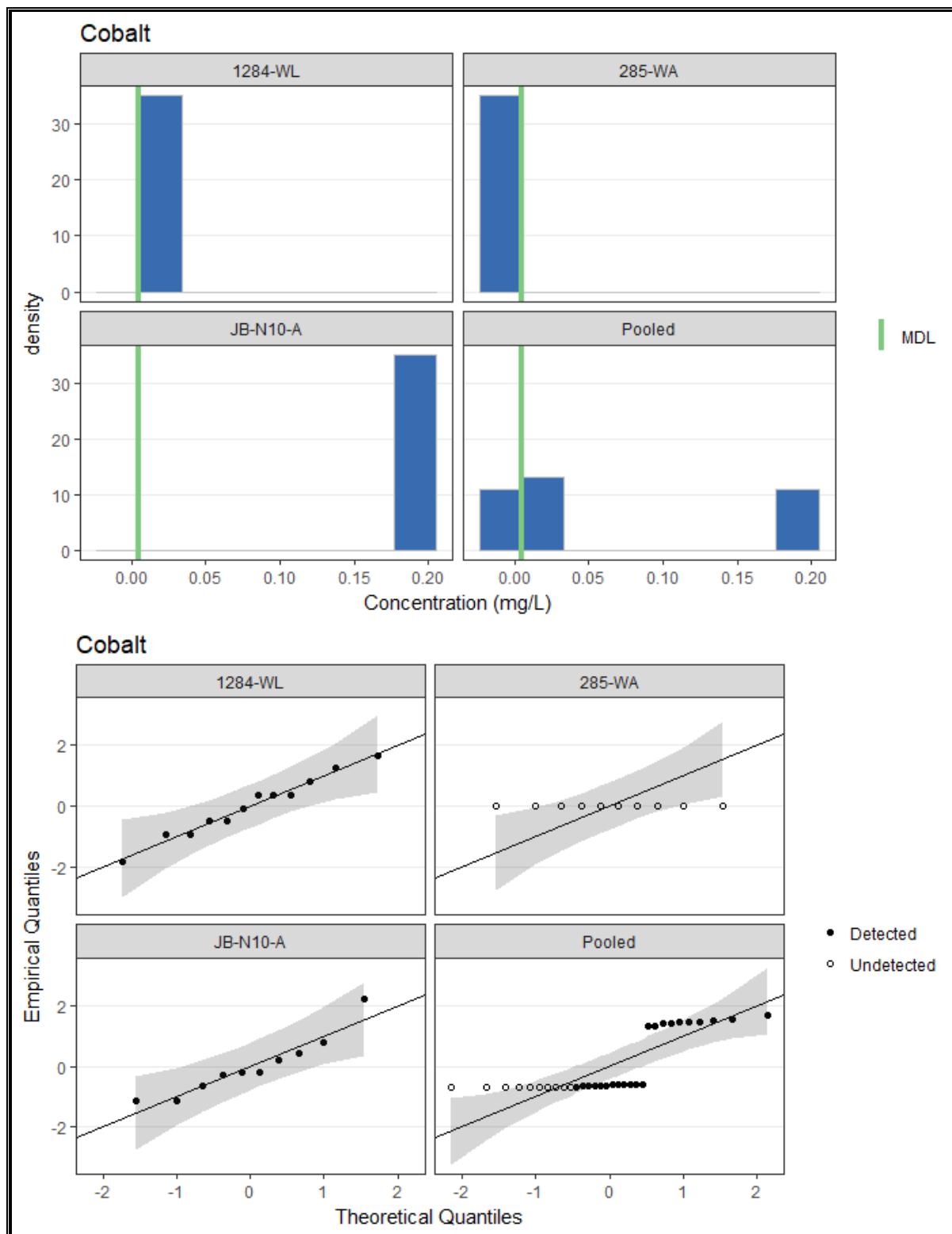


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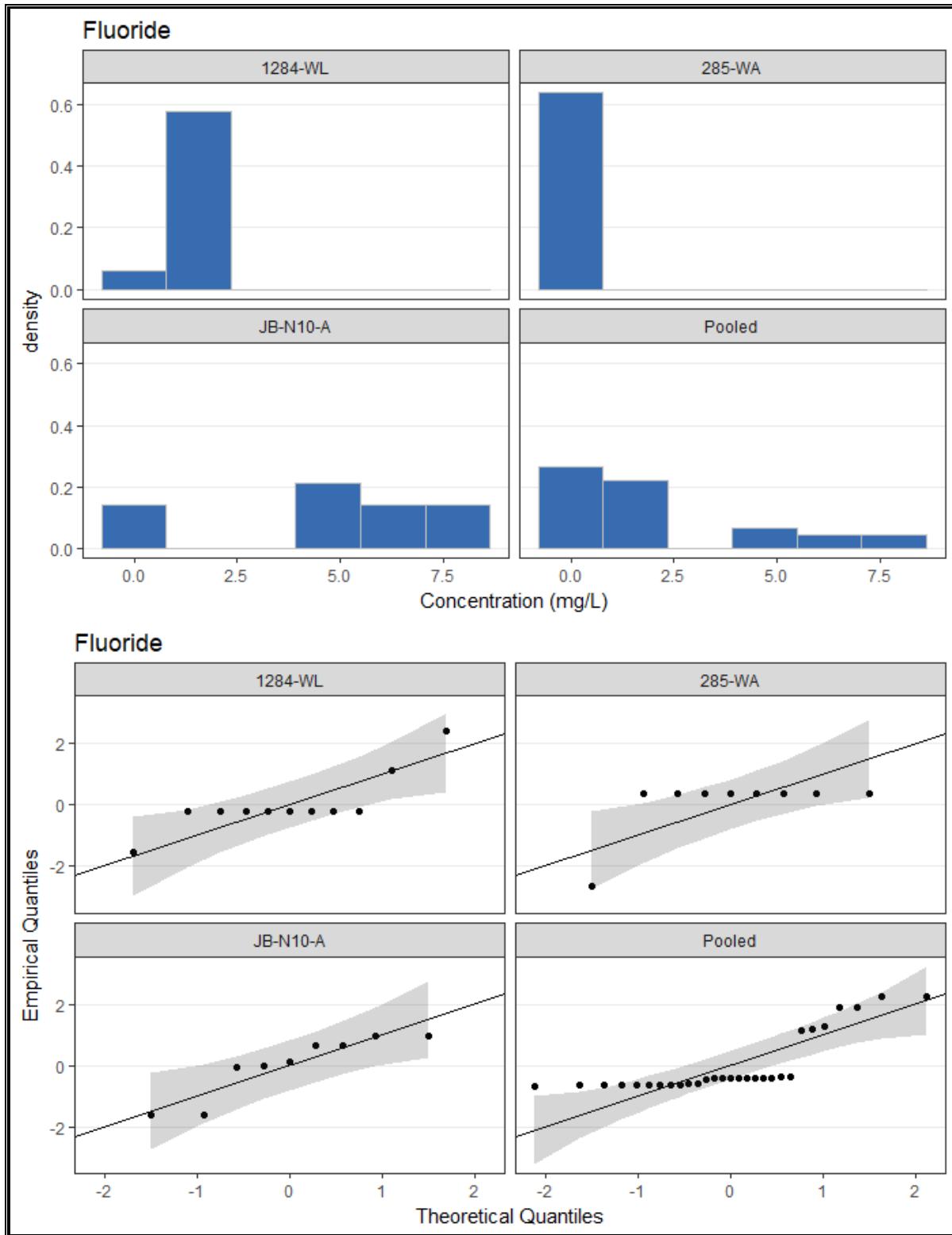


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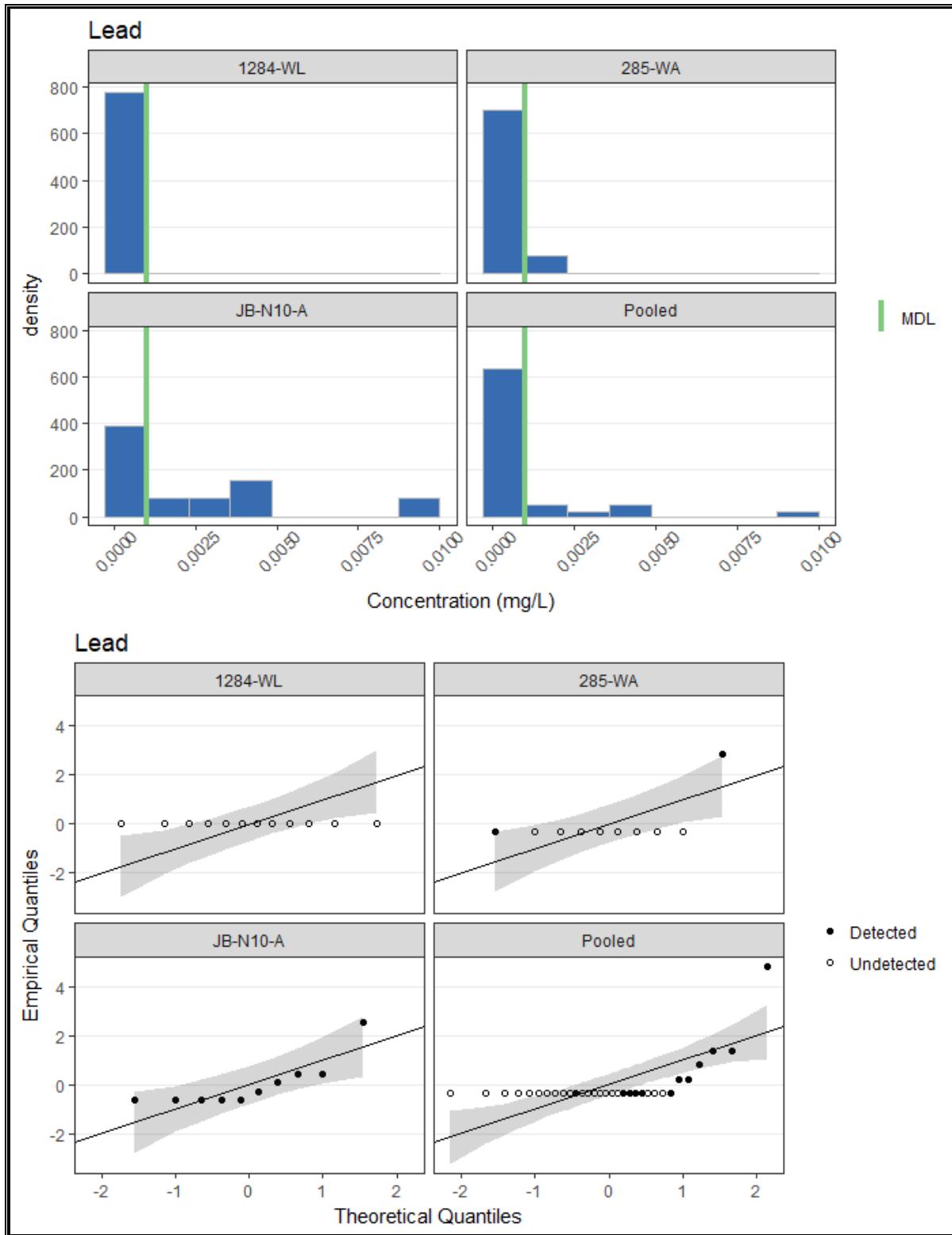


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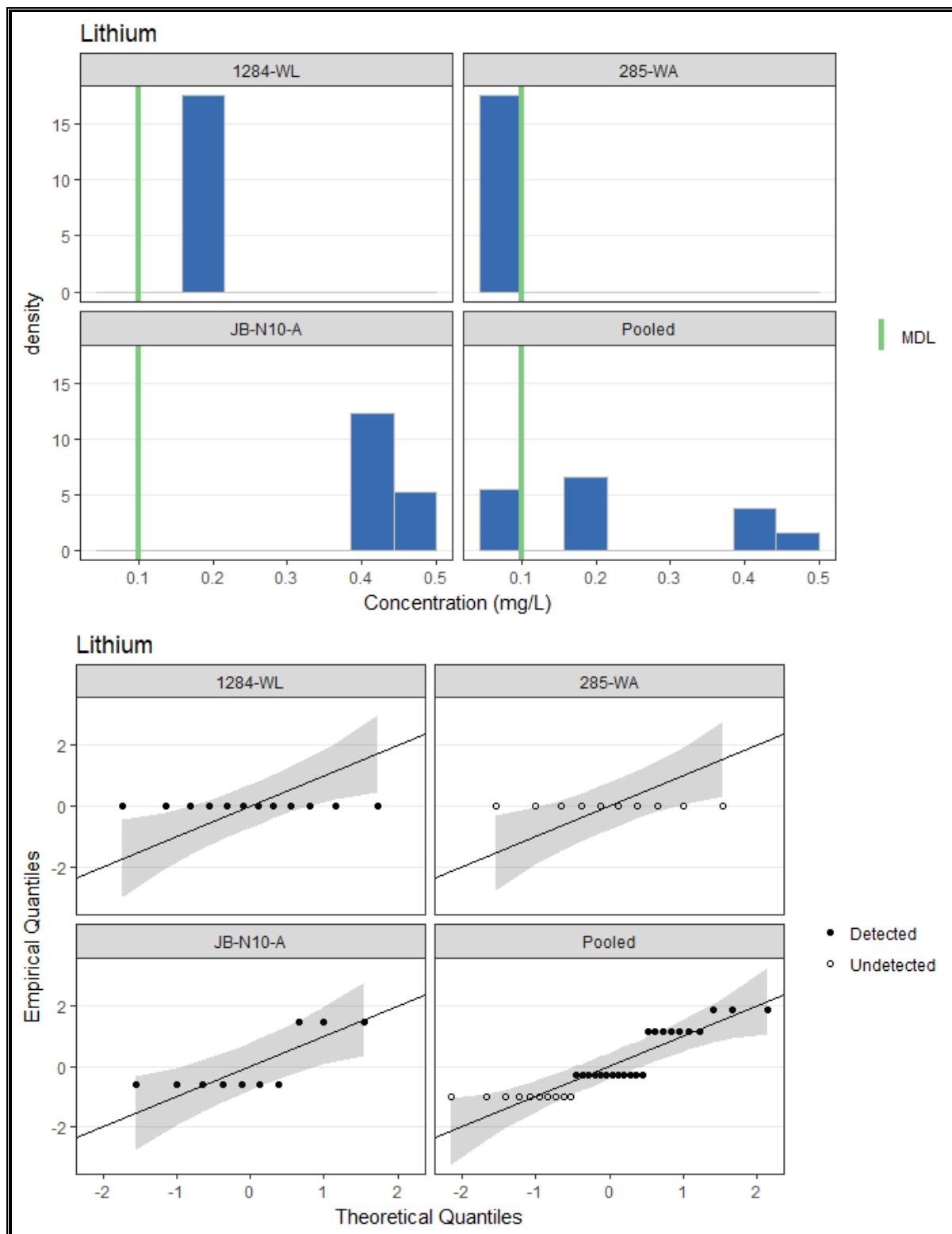


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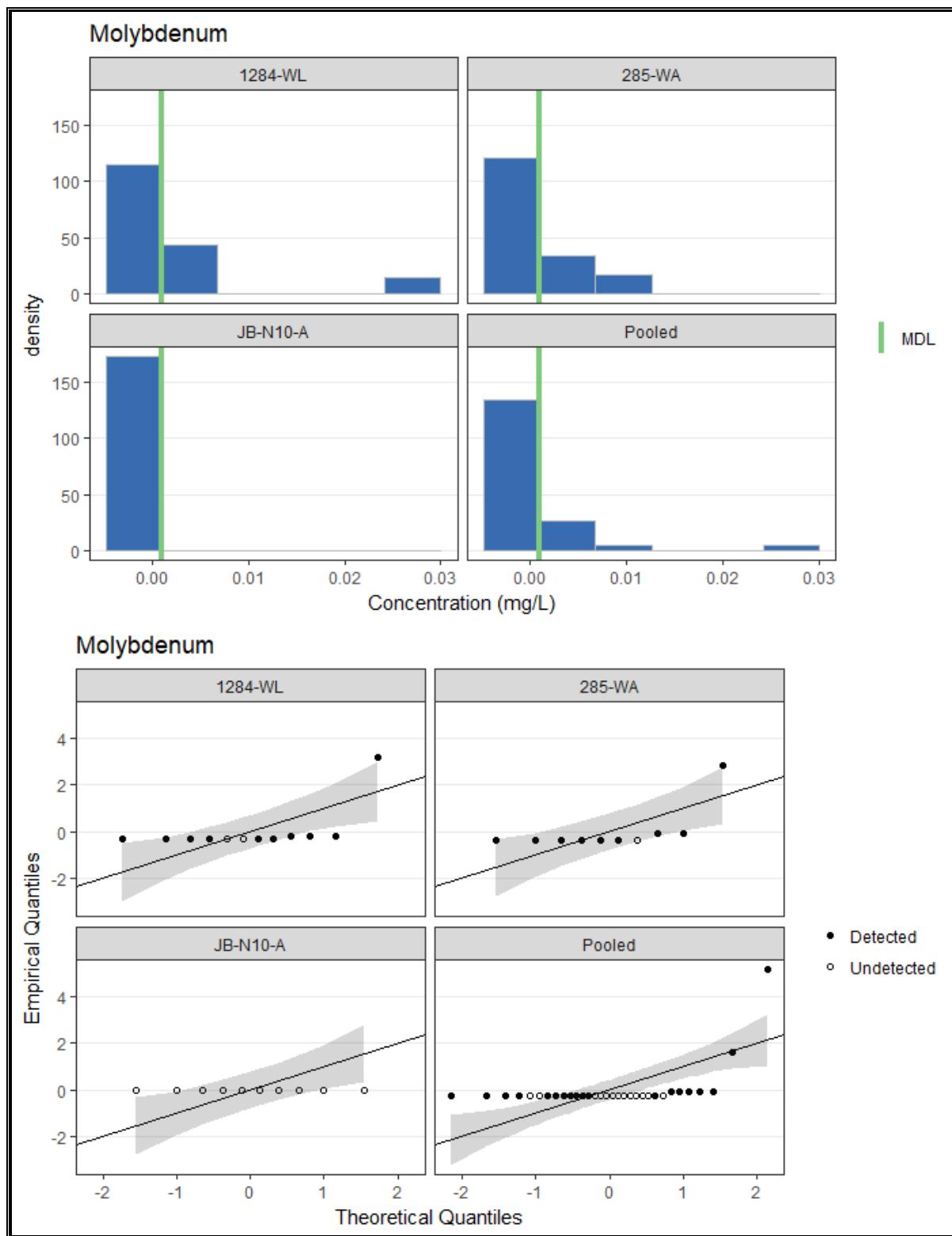


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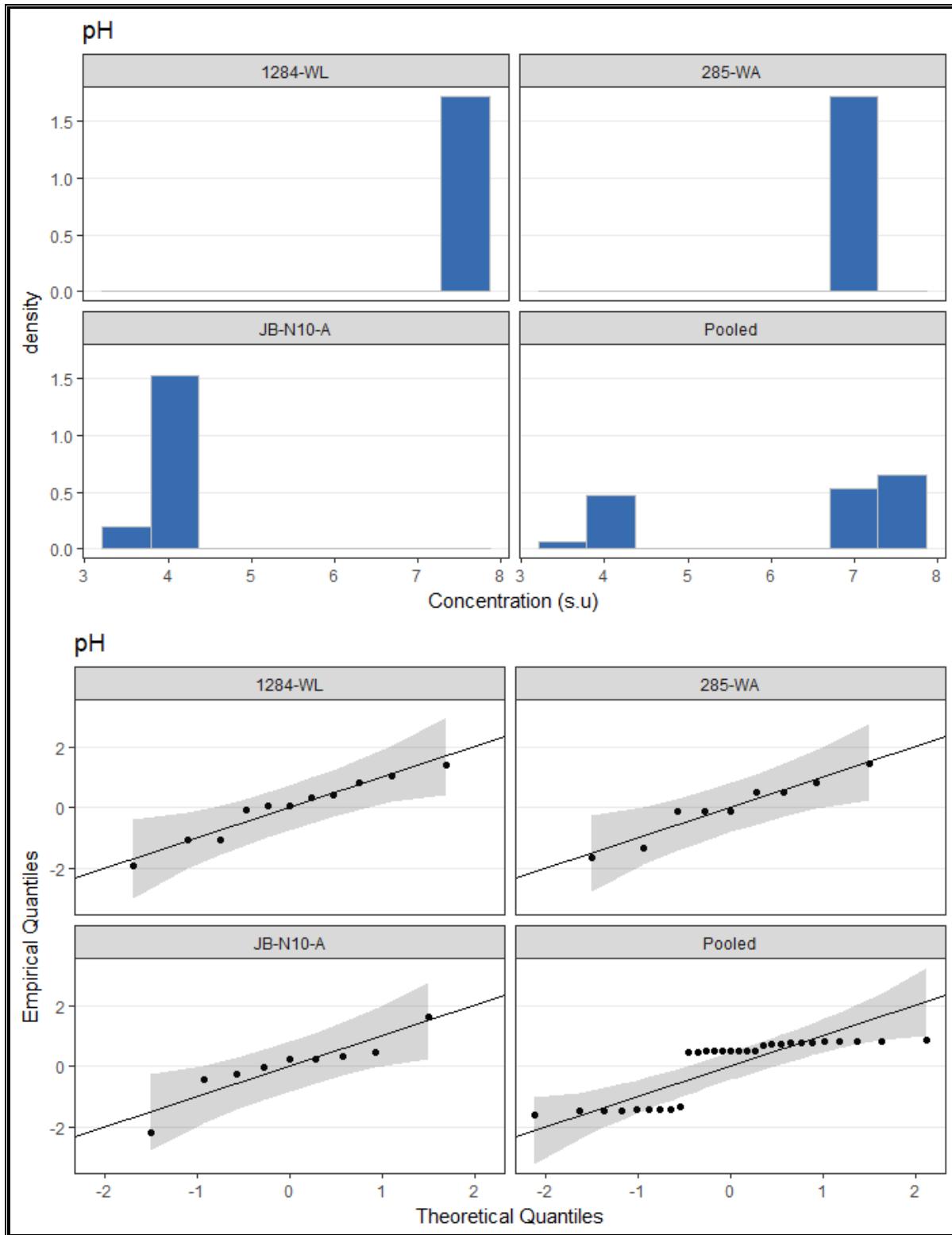


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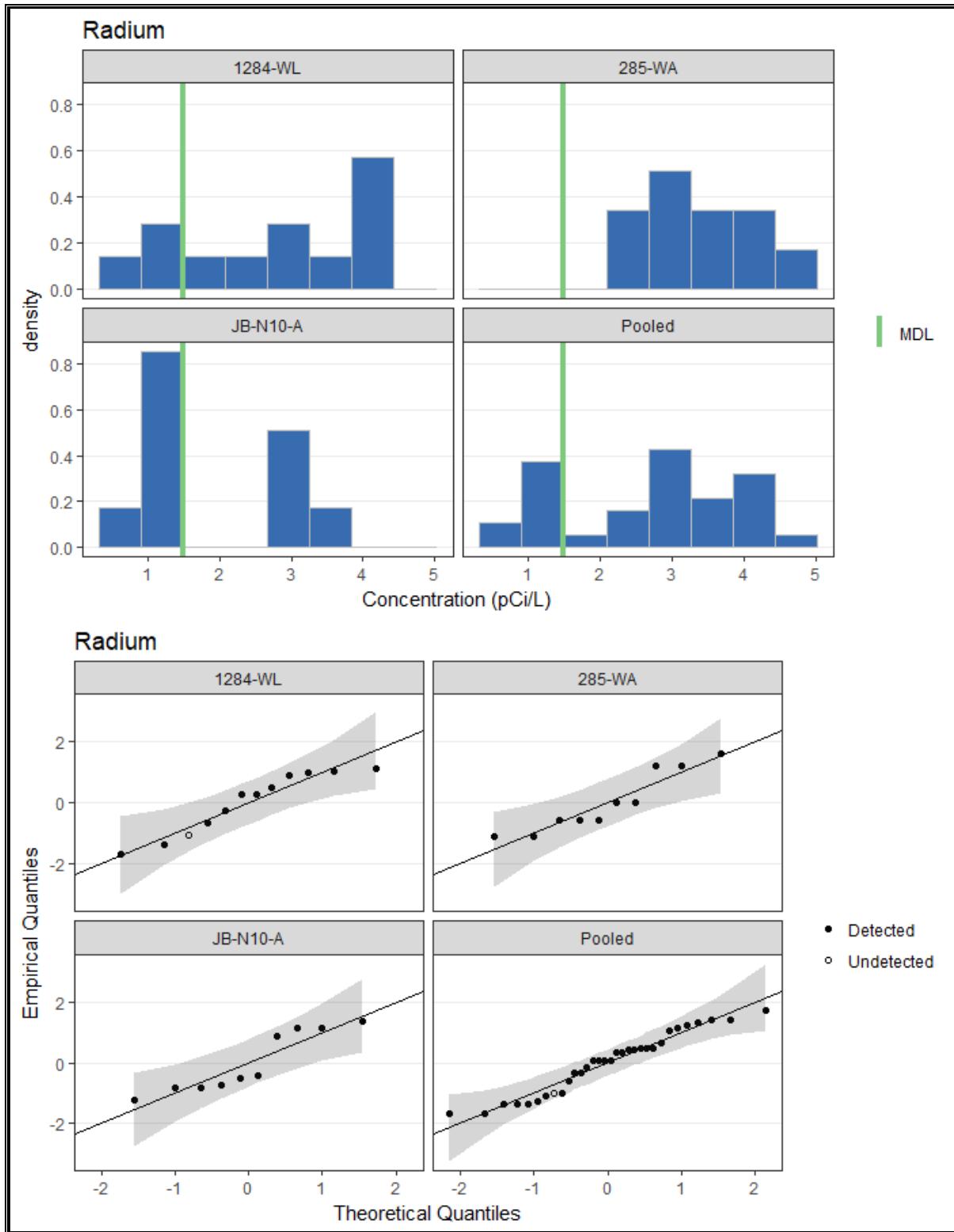


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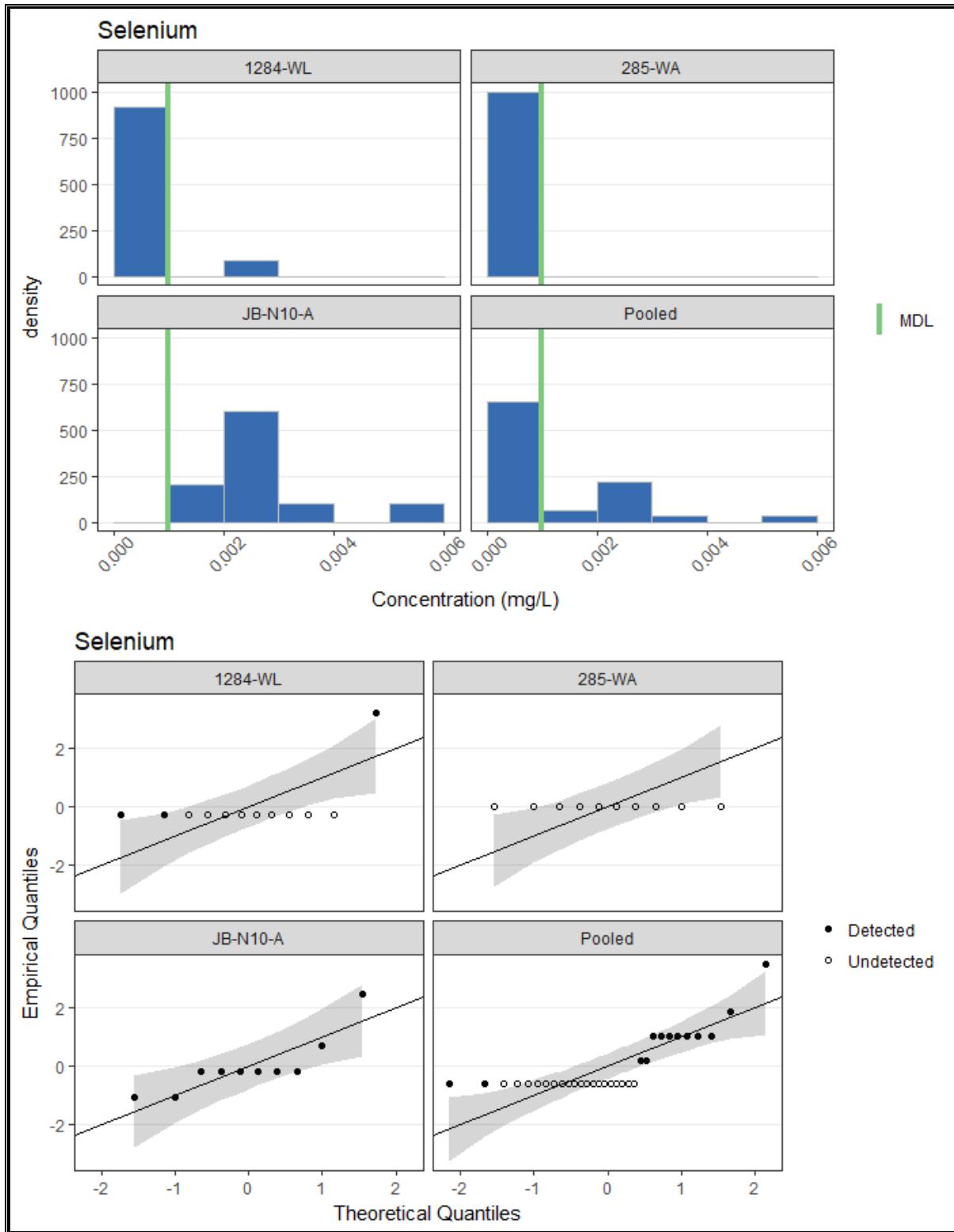


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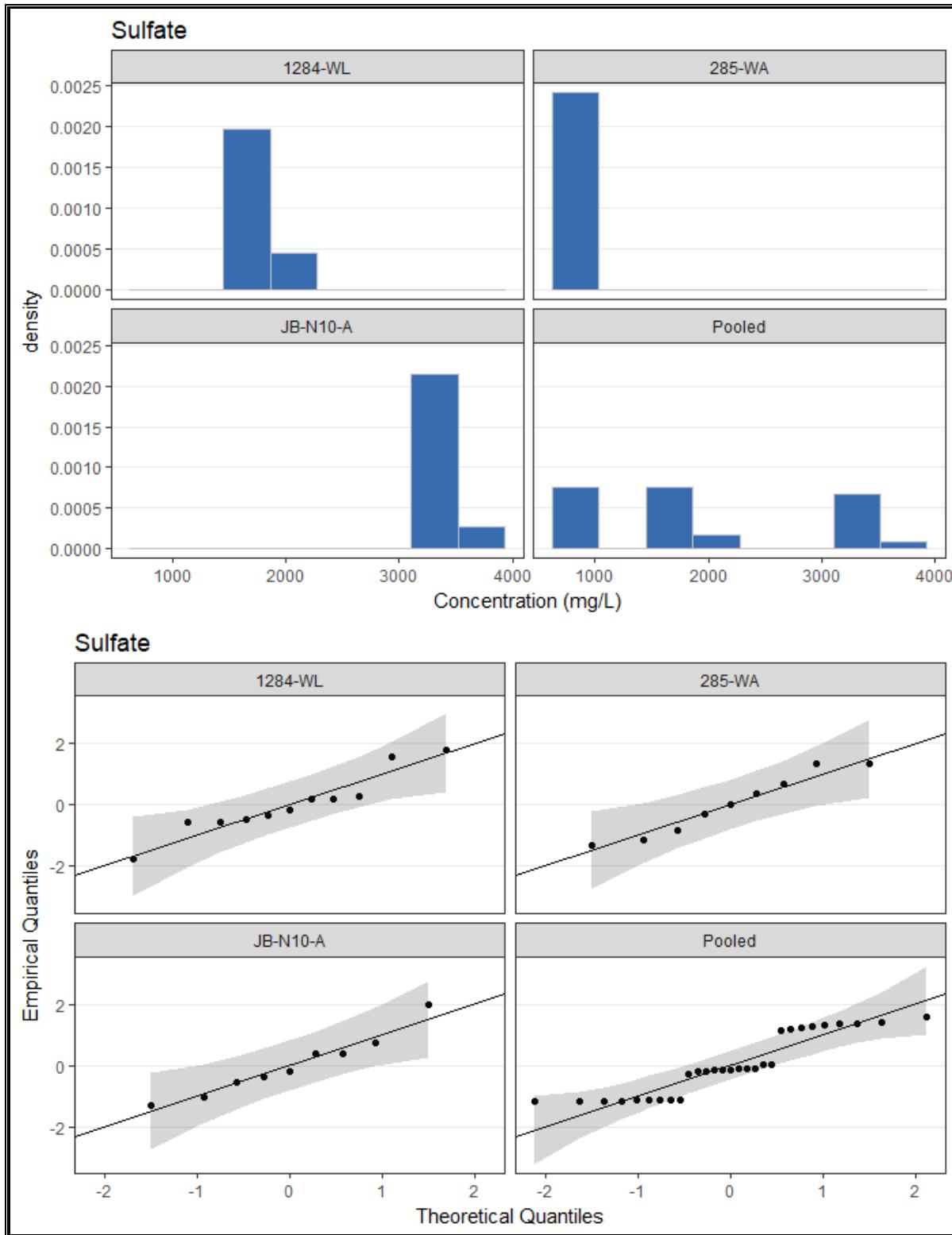


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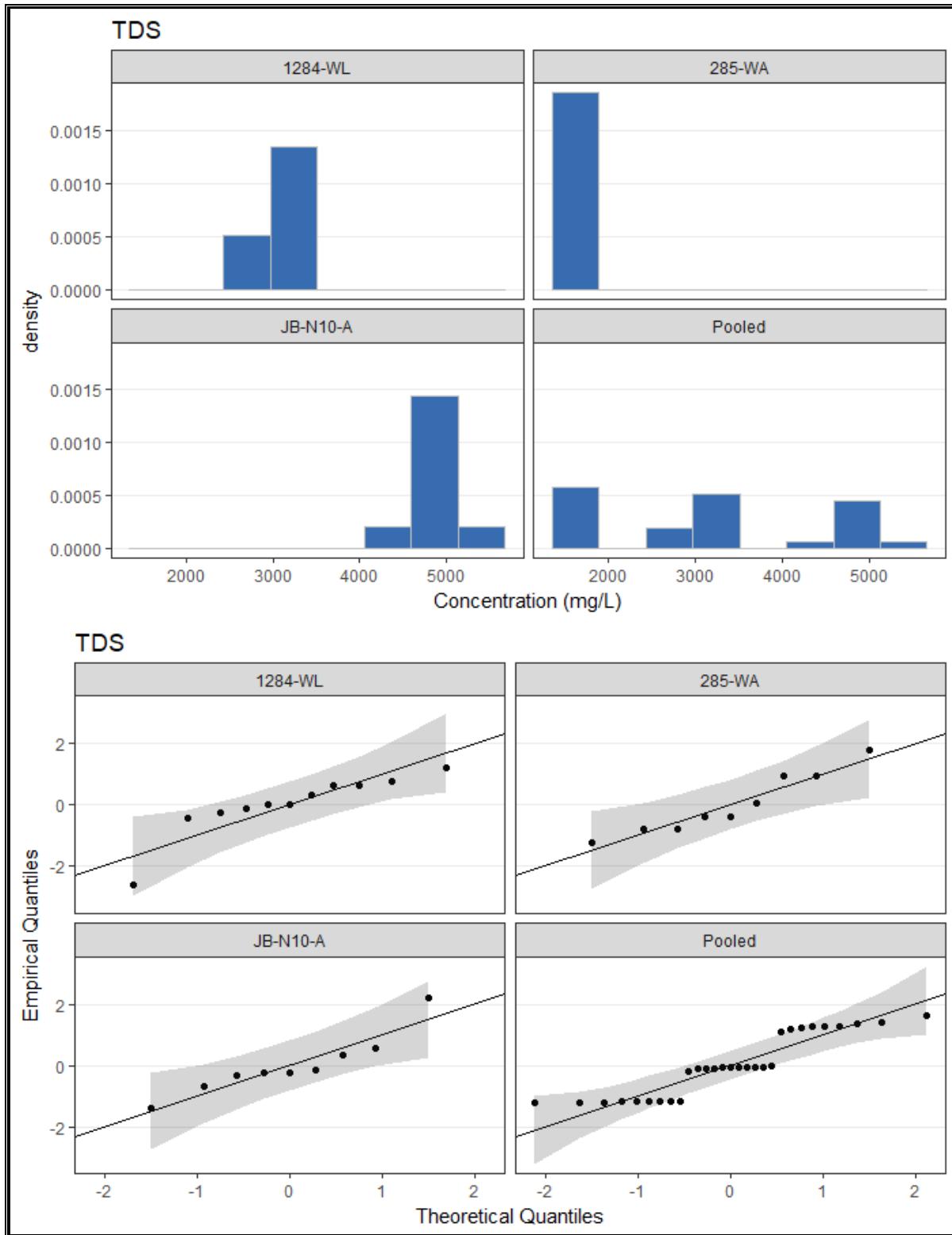


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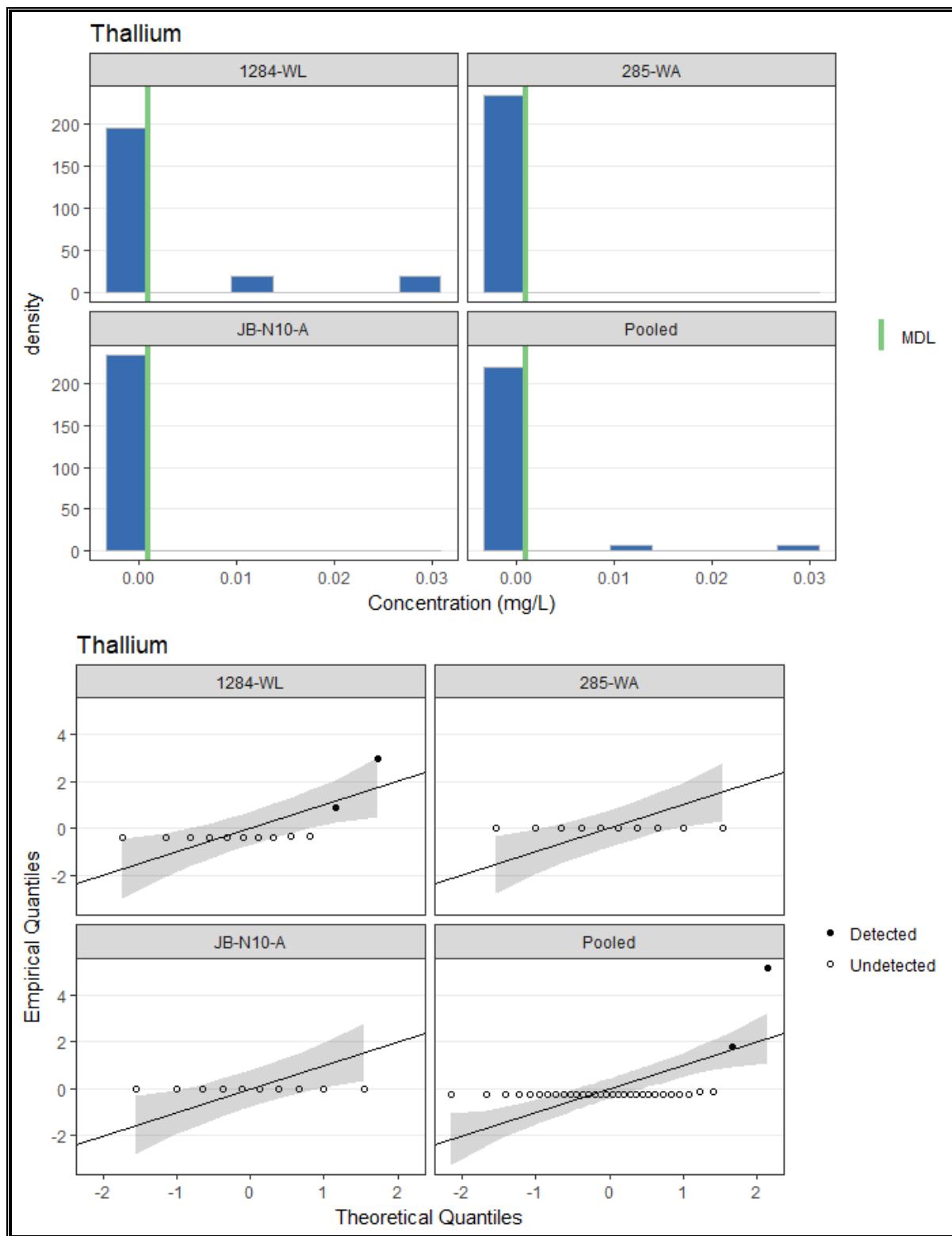


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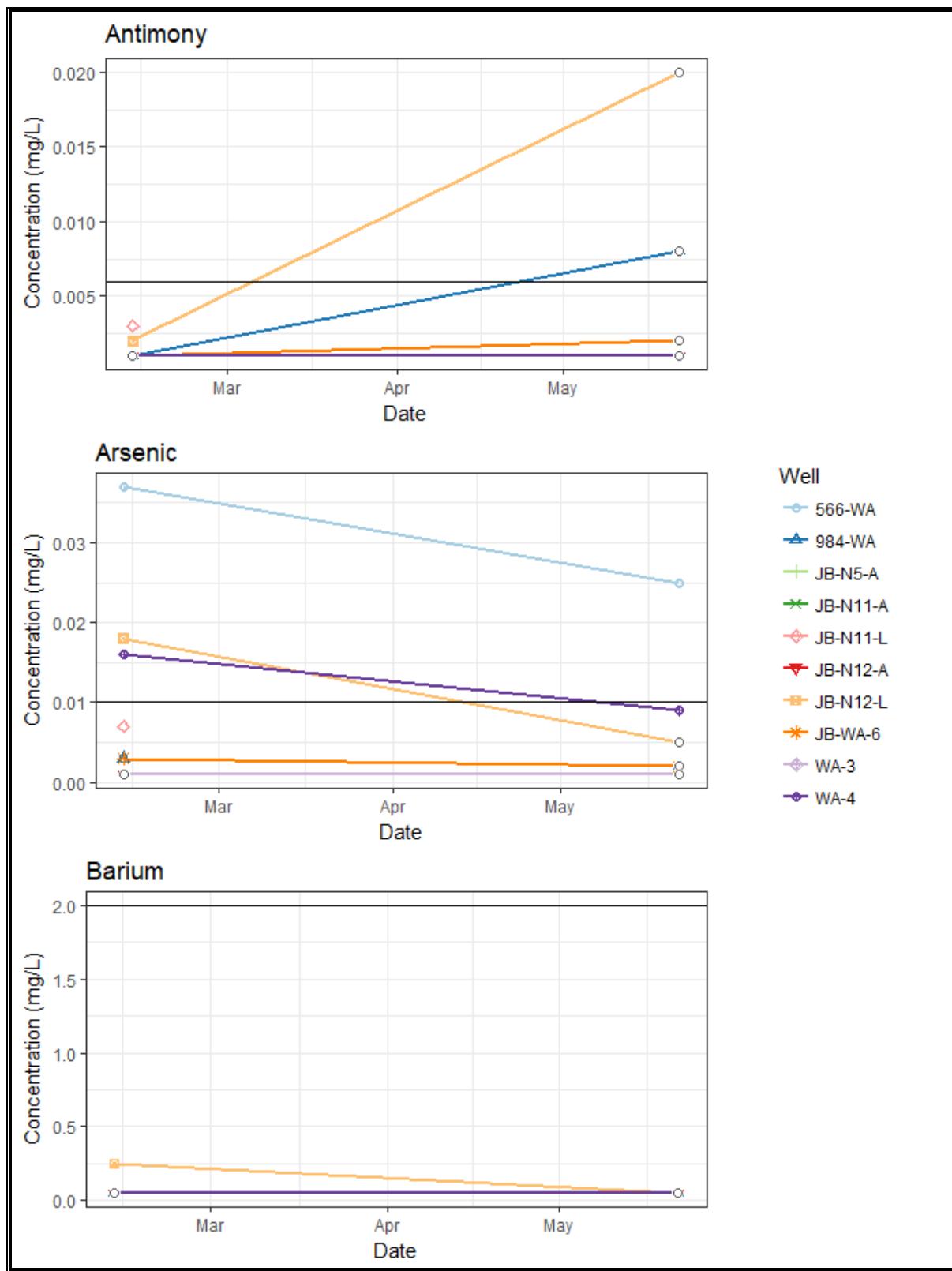


Figure C.4. Upper tolerance limit plots for the FGD Pond 1.

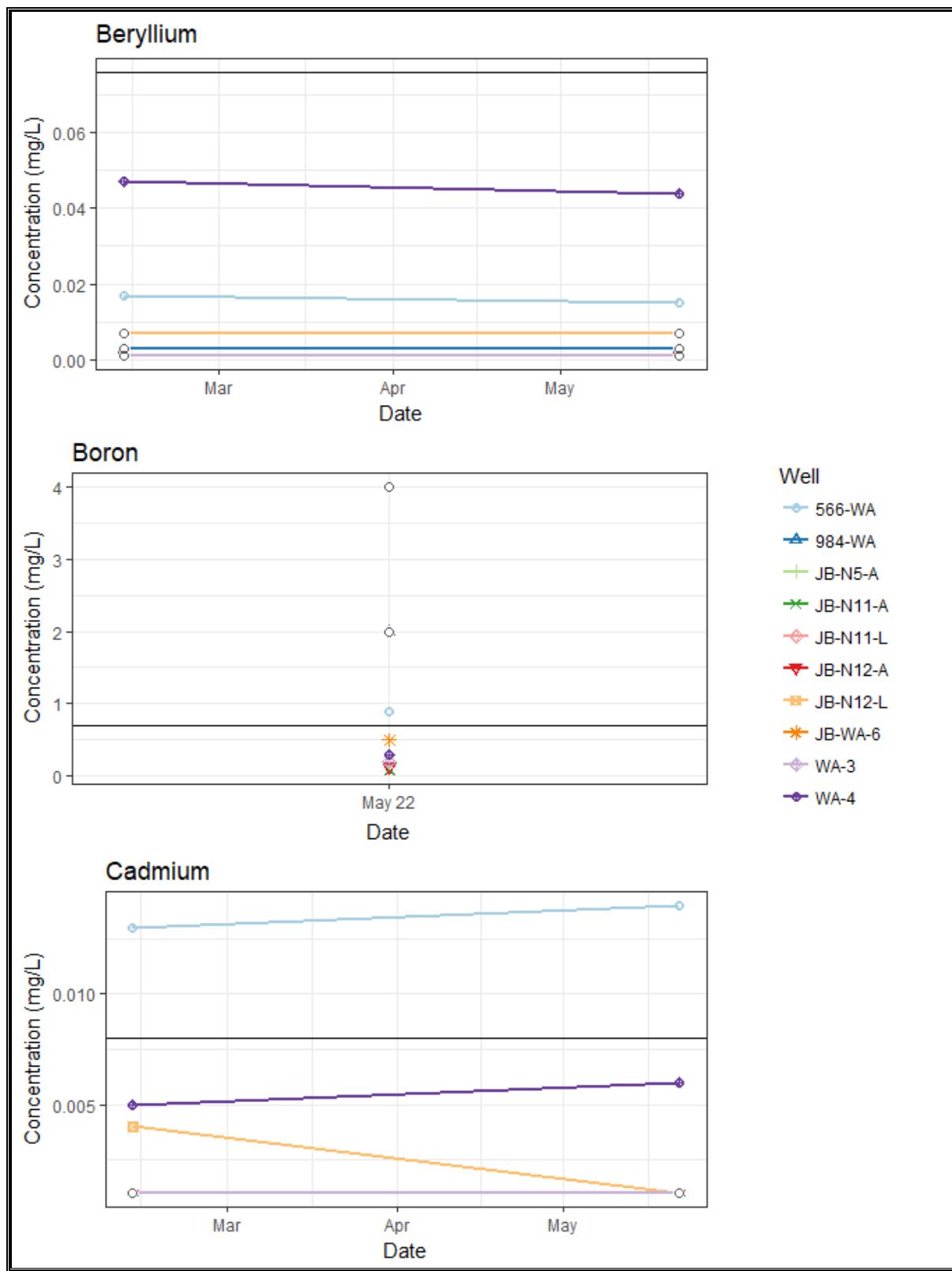


Figure C.4 (cont). Upper tolerance limit plots for the FGD Pond 1.

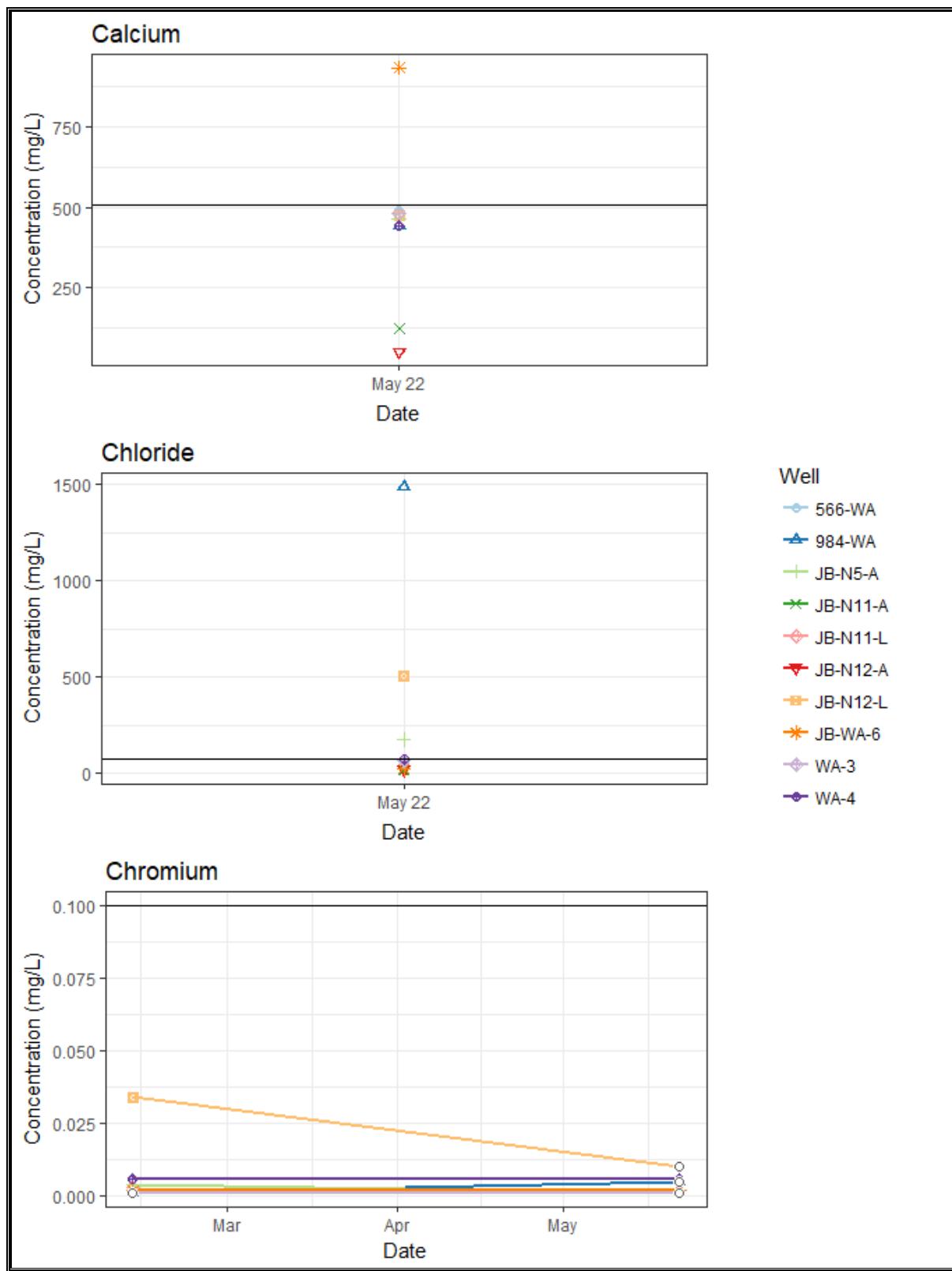


Figure C.4 (cont). Upper tolerance limit plots for the FGD Pond 1.

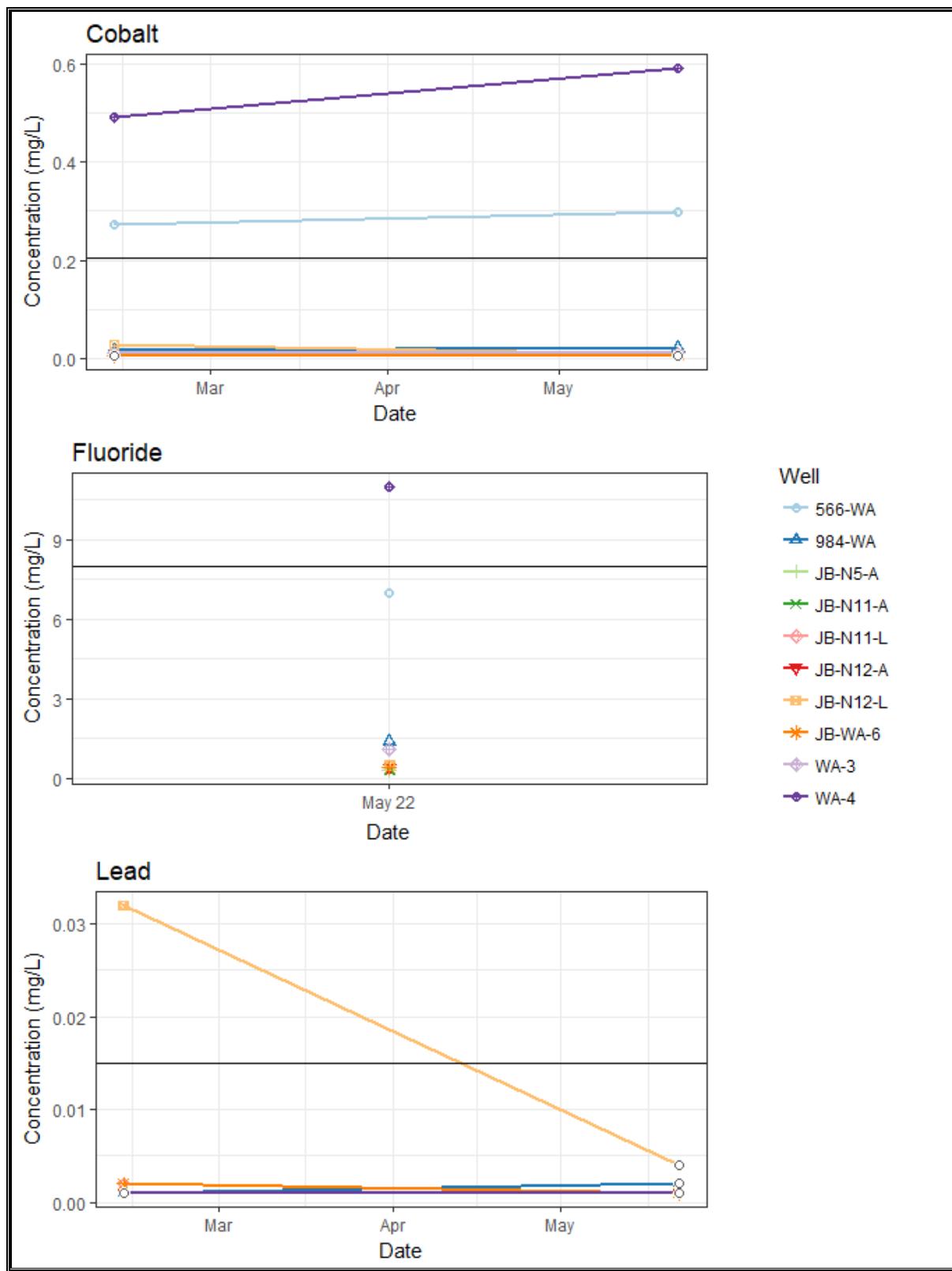


Figure C.4 (cont). Upper tolerance limit plots for the FGD Pond 1.

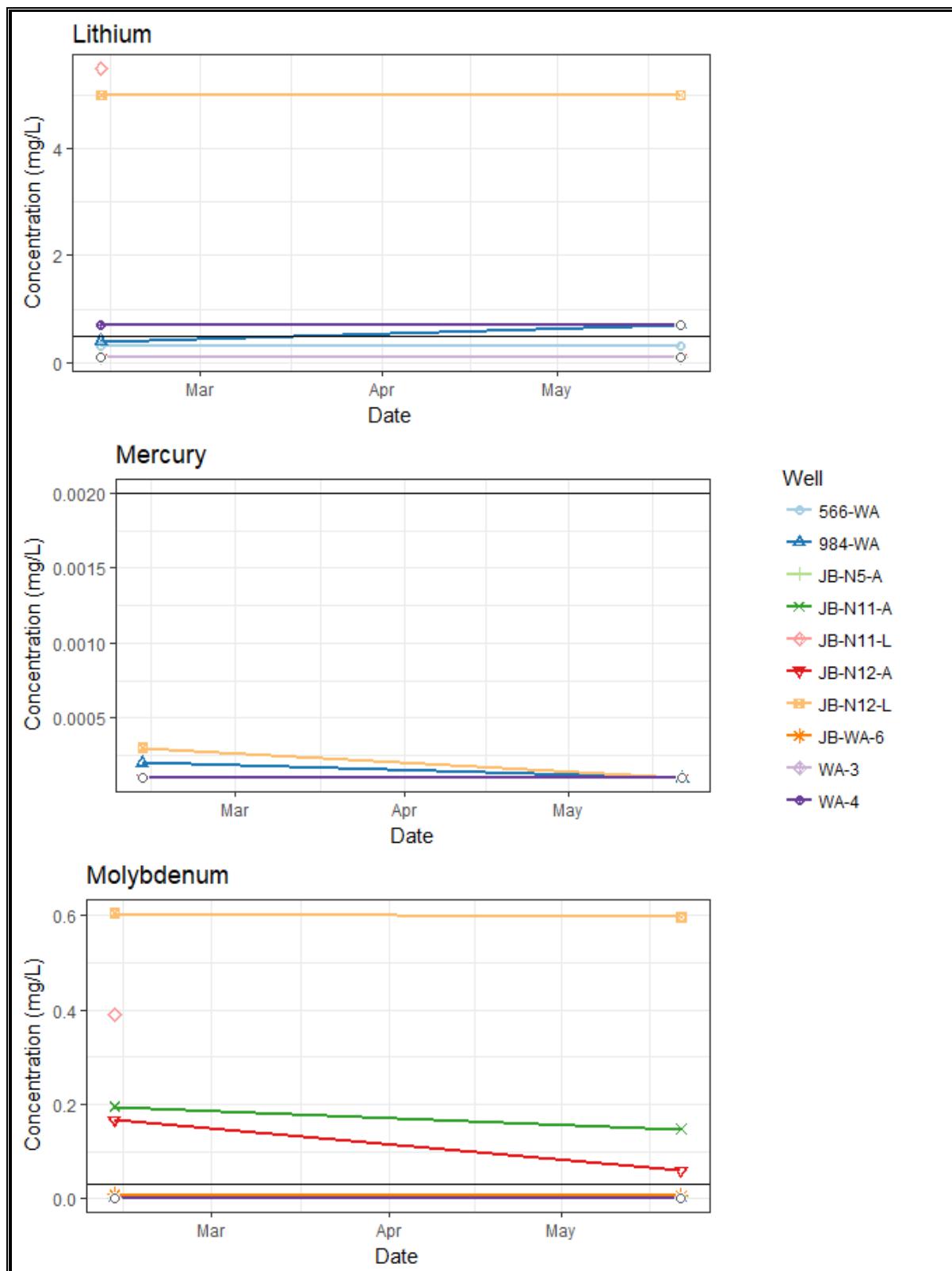


Figure C.4 (cont). Upper tolerance limit plots for the FGD Pond 1.

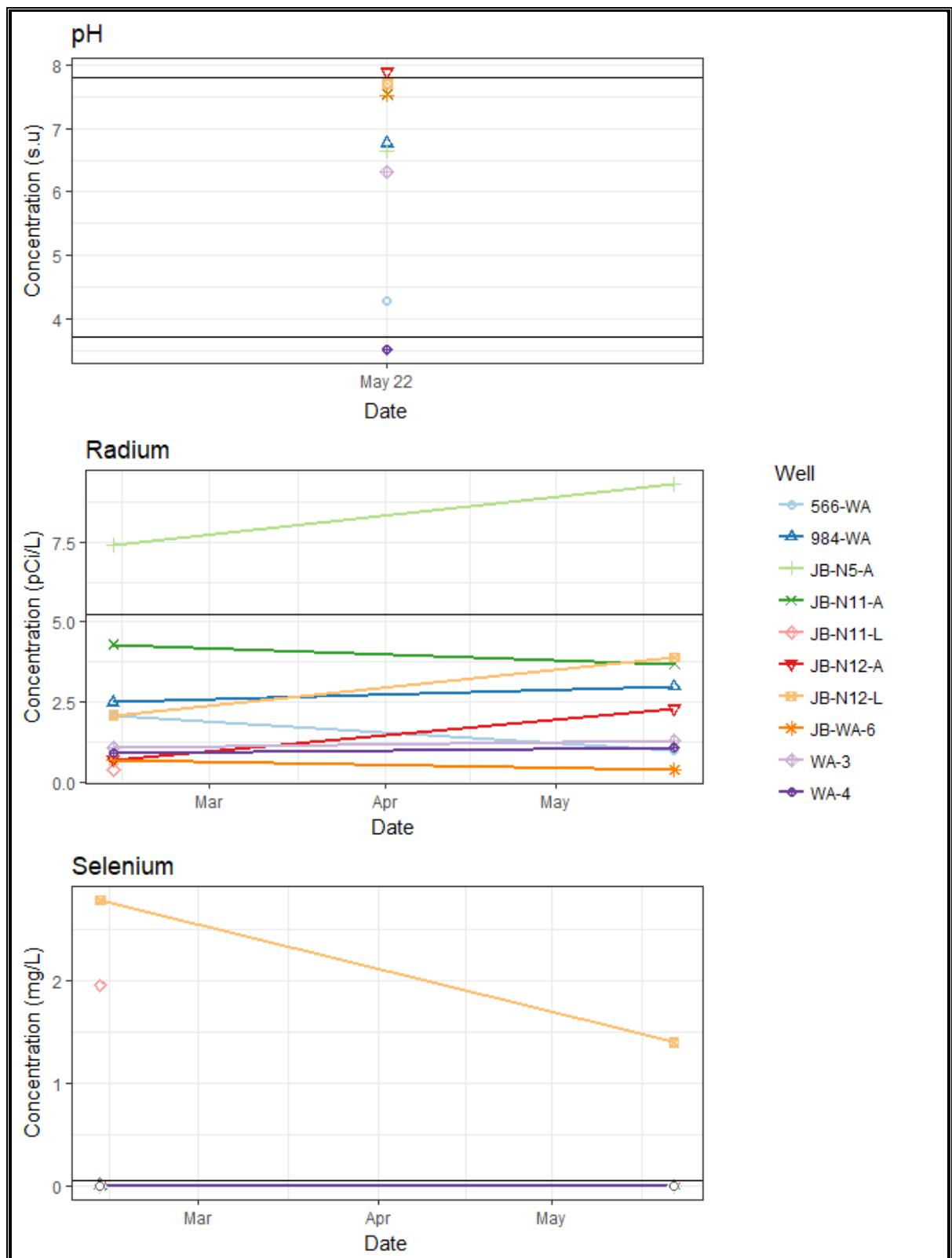


Figure C.4 (cont). Upper tolerance limit plots for the FGD Pond 1.

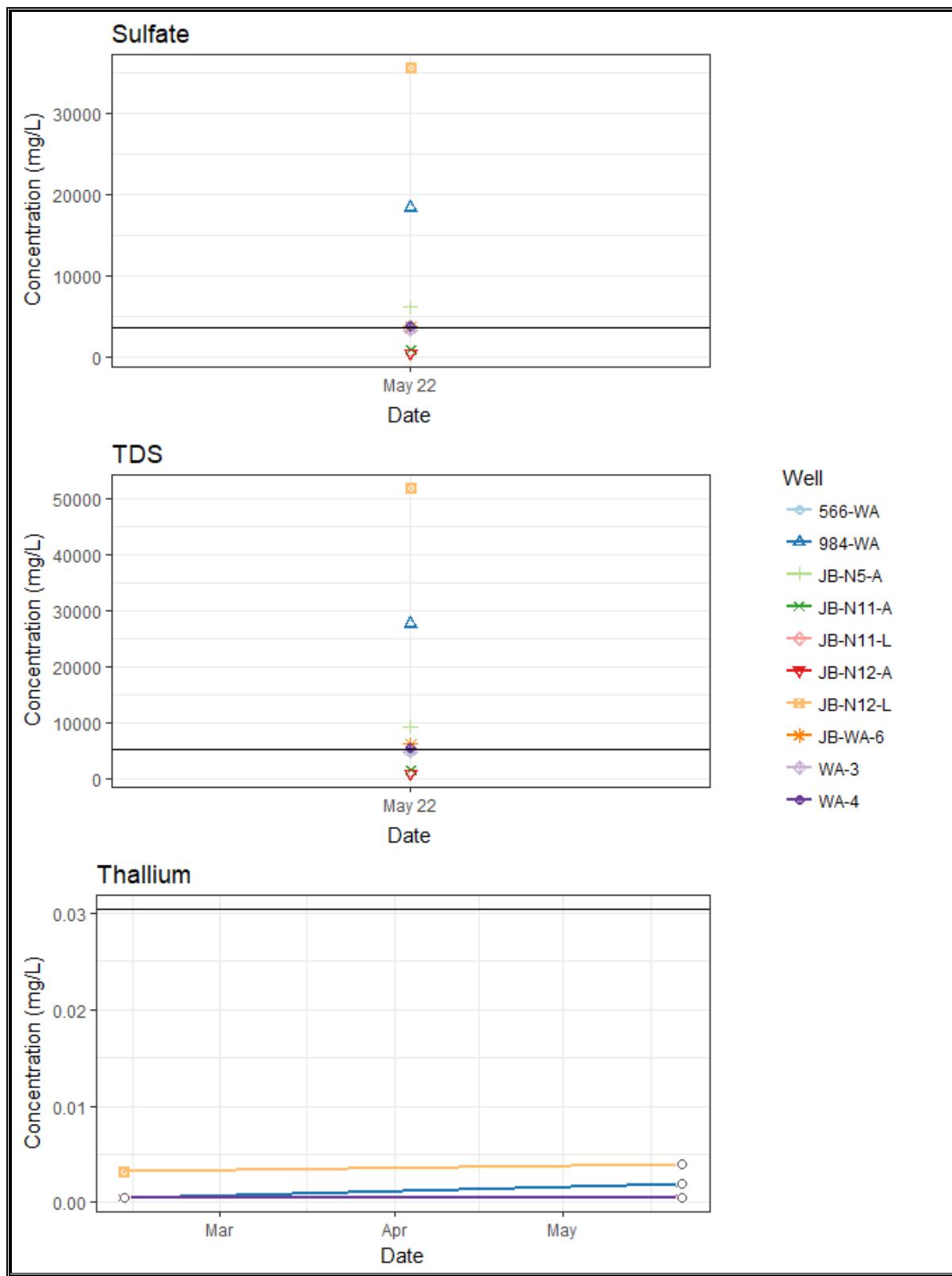


Figure C.4 (cont). Upper tolerance limit plots for the FGD Pond 1.

Attachment D:

Field Data Sheets



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	WA-3	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, breeze, 50s		
Depth to Water (ft):	30.67		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	9.10	4,443	0.08	5.99	211.20	26.70
8	9.10	4,424	0.08	6.00	210.60	26.70
10	9.10	4,443	0.08	6.00	210.50	7.12

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	09:50
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Containers	Preservatives	Analytes/Comments
(1) 1/2 gal poly	HNO3	Radium 226 + 228
(1) 250 mL poly	HNO3	Total metals, Total mercury
(1) 250 mL poly	H2SO4	Nitrate + Nitrite
(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:

Dup-1 @ 0955. FB-1 @ 1000



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	JB-WA-6	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/23/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Rainy, 50s		
Depth to Water (ft):	14.83		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	8.10	5,543	0.09	7.17	164.60	
8	8.00	5,550	0.09	7.19	164.70	
10	8.00	5,547	0.09	7.17	164.80	

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	12:40
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	LW	Project Number:	PERCM049
Sample ID:	1284-WL	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	55F, OVERCAST, BREEZE		
Depth to Water (ft):	13.12		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
4	8.90	4,865	0.35	7.40	28.50	51.90
6	8.90	4,869	0.28	7.40	258.30	51.90
8	8.90	4,865	0.43	7.41	258.00	40.30

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	09:00
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
		Radium 226 + 228	
		Total metals, Total mercury	
		Nitrate + Nitrite	
		TDS, pH, anions, fluoride, alkalinity	

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	WA-4	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/23/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny, 60s		
Depth to Water (ft):	56.08		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	9.20	4,434	0.50	3.12	313.10	
8	9.10	4,438	0.47	3.12	313.60	
10	9.10	4,442	0.48	3.13	313.50	

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	10:20
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	JB-N10-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/23/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny, 60s		
Depth to Water (ft):	31.58		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	8.90	4,354	3.00	3.30	454.10	
8	8.90	4,350	2.98	3.33	453.50	
10	9.00	4,350	2.97	3.33	452.10	

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	09:50
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	JB-N5-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, wind, 50s		
Depth to Water (ft):	44.48		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	10.40	8,287	0.49	6.37	2.80	46.40
8	10.40	8,377	0.44	6.38	-2.40	46.40
10	10.30	8,405	0.37	6.38	-6.20	89.70

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	15:00
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	JB-N12-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump		
Field Conditions:	Cloudy, rain, lightening		
Depth to Water (ft):	43.27		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	9.70	1,443	5.50	7.70	-8.20	10.50
8	9.70	1,140	5.55	7.73	-17.80	10.50
10	9.70	1,116	5.59	7.74	-18.30	3.24

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	14:00
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:



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Butte, Montana 59701
Phone: 406-782-5220
Fax: 406-723-1537

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	JB-N12-L	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, wind, 50s		
Depth to Water (ft):	77.5		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	10.50	39,536	0.06	7.74	102.40	11.20
8	10.50	40,115	0.06	7.72	102.90	11.20
10	10.40	40,313	0.06	7.70	104.70	462.00

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	13:25
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	JB-N11-L	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, wind, 50s		
Depth to Water (ft):	42.95		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	9.90	50,554	0.49	7.83	49.40	34.90
8	10.00	50,519	0.47	7.83	52.00	34.90
10	10.00	50,542	0.50	7.82	61.10	51.70

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	12:30
Containers		Preservatives	Analytes/Comments
(1) 1/2 gal poly		HNO3	Radium 226 + 228
(1) 250 mL poly		HNO3	Total metals, Total mercury
(1) 250 mL poly		H2SO4	Nitrate + Nitrite
(1) 1-L poly		None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	566-WA	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, breeze, 50s		
Depth to Water (ft):	27.34		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	9.70	4,634	0.62	4.13	290.80	12.90
8	9.70	4,632	0.60	4.15	291.30	12.90
10	9.70	4,688	0.61	4.16	290.90	2.25

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	10:55
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	JB-N11-A	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, wind, 50s		
Depth to Water (ft):	>31.15		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	10.00	2,108	0.50	7.34	-39.40	7.17
8	10.00	2,102	0.45	7.34	-37.30	7.17
10	9.90	2,098	0.37	7.34	-32.60	22.80

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	12:15
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:



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Butte, Montana 59701
Phone: 406-782-5220
Fax: 406-723-1537

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	984-WA	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/22/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, breeze, 50s		
Depth to Water (ft):	40.49		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
6	10.80	24,477	0.10	6.65	19.70	61.10
8	10.60	22,222	0.09	6.64	-0.70	61.10
10	10.50	22,084	0.08	6.64	-5.40	16.10

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	11:45
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
Analytes/Comments			
Radium 226 + 228			
Total metals, Total mercury			
Nitrate + Nitrite			
TDS, pH, anions, fluoride, alkalinity			

Comments/Observations:



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Butte, Montana 59701
Phone: 406-782-5220
Fax: 406-723-1537

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	285-WA	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/23/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, rain		
Depth to Water (ft):	NA		

FIELD PARAMETERS

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

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	16:13
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
		Analytes/Comments	
		Radium 226 + 228	
		Total metals, Total mercury	
		Nitrate + Nitrite	
		TDS, pH, anions, fluoride, alkalinity	

Comments/Observations:

Could not access due to rainy conditions



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

Project Name:	Jim Bridger Power Plant CCR Monitoring - FGD-1		
Sampler Initials:	Mm	Project Number:	PERCM049
Sample ID:	685-WL	Project Location:	Point of Rocks WY
Water Disposal:	Ground	Sample Date:	5/23/2018
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy, rain		
Depth to Water (ft):	NA		

FIELD PARAMETERS

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

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	16:13
Containers		Preservatives	
(1) 1/2 gal poly		HNO3	
(1) 250 mL poly		HNO3	
(1) 250 mL poly		H2SO4	
(1) 1-L poly		None	
		Analytes/Comments	
		Radium 226 + 228	
		Total metals, Total mercury	
		Nitrate + Nitrite	
		TDS, pH, anions, fluoride, alkalinity	

Comments/Observations:

Could not access due to rainy conditions

Attachment E:

Laboratory Analytical Reports

ANALYTICAL SUMMARY REPORT

June 28, 2018

PacifiCorp
1591 Tank Farm Road
Glenrock, WY 82637

Work Order: C18050868 Quote ID: C5218 - Pacific Corp

Project Name: PERCM49

Energy Laboratories, Inc. Casper WY received the following 30 samples for PacifiCorp on 5/24/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C18050868-001	1284-WC	05/22/18 09:00	05/24/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Mercury, Total Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total Solids, Total Dissolved
C18050868-002	JB-FX-1	05/22/18 10:30	05/24/18	Aqueous	Same As Above
C18050868-003	DUP-2	05/22/18 10:45	05/24/18	Aqueous	Same As Above
C18050868-004	JB-N1-WL	05/22/18 11:30	05/24/18	Aqueous	Same As Above
C18050868-005	JB-N1-AL	05/22/18 12:00	05/24/18	Aqueous	Same As Above
C18050868-006	FB-2	05/22/18 12:30	05/24/18	Aqueous	Same As Above
C18050868-007	JB-N2-AL	05/22/18 13:15	05/24/18	Aqueous	Same As Above
C18050868-008	JB-N2-WL	05/22/18 13:45	05/24/18	Aqueous	Same As Above
C18050868-009	JB-N3-AL	05/22/18 14:30	05/24/18	Aqueous	Same As Above
C18050868-010	JB-N3-WL	05/22/18 15:00	05/24/18	Aqueous	Same As Above
C18050868-011	JB-WL-4	05/22/18 16:00	05/24/18	Aqueous	Same As Above
C18050868-012	JB-WL-5	05/22/18 16:45	05/24/18	Aqueous	Same As Above
C18050868-013	JB-FX-2	05/22/18 17:15	05/24/18	Aqueous	Same As Above
C18050868-014	WA-3	05/22/18 09:50	05/24/18	Aqueous	Same As Above
C18050868-015	984-WA	05/22/18 11:45	05/24/18	Aqueous	Same As Above
C18050868-016	JB-NII-A	05/22/18 12:15	05/24/18	Aqueous	Same As Above
C18050868-017	DUP-1	05/22/18 09:55	05/24/18	Aqueous	Same As Above
C18050868-018	FB-1	05/22/18 10:00	05/24/18	Aqueous	Same As Above

ANALYTICAL SUMMARY REPORT

C18050868-019	566-WA	05/22/18 10:55	05/24/18	Aqueous	Metals by ICP/ICPMS, Total Acidity, Total as CaCO ₃ Alkalinity Mercury, Total Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total Solids, Total Dissolved
C18050868-020	285-WA	05/22/18 09:20	05/24/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Cancelled Sample Mercury, Total Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total Solids, Total Dissolved
C18050868-021	JB-N11-L	05/22/18 12:30	05/24/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Mercury, Total Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total Solids, Total Dissolved
C18050868-022	JB-NI2-L	05/22/18 13:25	05/24/18	Aqueous	Same As Above
C18050868-023	JB-N12-A	05/22/18 14:00	05/24/18	Aqueous	Same As Above
C18050868-024	JB-WA-6	05/22/18 15:00	05/24/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Cancelled Sample Mercury, Total Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Solids, Total Dissolved

ANALYTICAL SUMMARY REPORT

C18050868-025	JB-N10-A	05/23/18 09:50	05/24/18	Aqueous	Metals by ICP/ICPMS, Total Acidity, Total as CaCO ₃ Alkalinity Mercury, Total Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total Solids, Total Dissolved
C18050868-026	WA-4	05/23/18 10:20	05/24/18	Aqueous	Same As Above
C18050868-027	JB-N7-AL	05/23/18 11:10	05/24/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Mercury, Total Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Mercury by CVAA Radium 226 + Radium 228 Radium 226, Total Radium 228, Total Solids, Total Dissolved
C18050868-028	JB-N7-WL	05/23/18 11:40	05/24/18	Aqueous	Same As Above
C18050868-029	JB-WA-6	05/23/18 12:40	05/24/18	Aqueous	Same As Above
C18050868-030	JB-N5-A	05/22/18 15:00	05/24/18	Aqueous	Same As Above

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these test results, please call.

Report Approved By:



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Gillette, WY **866.686.7175** • Helena, MT **877.472.0711**

CLIENT: PacifiCorp
Project: PERCM49
Work Order: C18050868

Report Date: 06/28/18

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-001
Client Sample ID: 1284-WC

Report Date: 06/28/18
Collection Date: 05/22/18 09:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	304	mg/L		5	A2320 B		05/25/18 18:27 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 18:27 / ljl
Bicarbonate as HCO ₃	371	mg/L		5	A2320 B		05/25/18 18:27 / ljl
Chloride	68	mg/L	D	2	E300.0		05/25/18 23:19 / ljl
Fluoride	0.8	mg/L		0.1	A4500-F C		05/29/18 11:44 / ljl
Sulfate	1960	mg/L	D	8	E300.0		05/25/18 23:19 / ljl
Calcium	97	mg/L		1	E200.7		06/07/18 07:54 / eli-b
Magnesium	51	mg/L		1	E200.7		06/07/18 18:36 / eli-b
Potassium	17	mg/L		1	E200.7		06/07/18 18:36 / eli-b
Sodium	833	mg/L	D	8	E200.7		06/07/18 18:36 / eli-b
PHYSICAL PROPERTIES							
pH	7.60	s.u.	H	0.01	A4500-H B		05/24/18 18:40 / ljl
pH Measurement Temp		20 °C			A4500-H B		05/24/18 18:40 / ljl
Solids, Total Dissolved TDS @ 180 C	3030	mg/L	D	40	A2540 C		05/25/18 15:32 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.56	mg/L		0.01	E353.2		05/25/18 14:51 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/06/18 03:15 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		06/06/18 03:15 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 03:15 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/06/18 03:15 / eli-b
Boron	0.7	mg/L	D	0.2	E200.7		06/07/18 18:36 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 03:15 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/06/18 03:15 / eli-b
Cobalt	0.007	mg/L		0.005	E200.8		06/06/18 03:15 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/06/18 03:15 / eli-b
Lithium	0.2	mg/L		0.1	E200.7		06/07/18 18:36 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		05/31/18 13:24 / eli-b
Molybdenum	0.001	mg/L		0.001	E200.8		06/06/18 03:15 / eli-b
Selenium	ND	mg/L		0.001	E200.8		06/06/18 03:15 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/08/18 17:52 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.4	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.4	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	2.9	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 228 precision (±)	1.2	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 226 + Radium 228	4.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-001
Client Sample ID: 1284-WC

Report Date: 06/28/18
Collection Date: 05/22/18 09:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-002
Client Sample ID: JB-FX-1

Report Date: 06/28/18
Collection Date: 05/22/18 10:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	675	mg/L		5	A2320 B		05/25/18 18:37 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 18:37 / ljl
Bicarbonate as HCO ₃	823	mg/L		5	A2320 B		05/25/18 18:37 / ljl
Chloride	399	mg/L	D	10	E300.0		05/25/18 23:38 / ljl
Fluoride	0.3	mg/L		0.1	A4500-F C		05/29/18 11:46 / ljl
Sulfate	19100	mg/L	D	40	E300.0		05/25/18 23:38 / ljl
Calcium	357	mg/L	D	4	E200.7		06/07/18 07:58 / eli-b
Magnesium	2730	mg/L	D	3	E200.7		06/07/18 18:40 / eli-b
Potassium	55	mg/L	D	5	E200.7		06/07/18 18:40 / eli-b
Sodium	3810	mg/L	D	80	E200.7		06/07/18 18:40 / eli-b
PHYSICAL PROPERTIES							
pH	7.49	s.u.	H	0.01	A4500-H B		05/24/18 18:45 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 18:45 / ljl
Solids, Total Dissolved TDS @ 180 C	27600	mg/L	D	200	A2540 C		05/25/18 15:32 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	179	mg/L	D	2	E353.2		05/25/18 14:52 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/06/18 03:20 / eli-b
Arsenic	0.004	mg/L		0.001	E200.8		06/08/18 17:54 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 03:20 / eli-b
Beryllium	ND	mg/L	D	0.003	E200.8		06/06/18 03:20 / eli-b
Boron	ND	mg/L	D	2	E200.7		06/07/18 18:40 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 03:20 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/08/18 17:54 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 03:20 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/08/18 17:54 / eli-b
Lithium	1.7	mg/L	D	0.7	E200.7		06/07/18 18:40 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		05/31/18 13:26 / eli-b
Molybdenum	0.009	mg/L		0.001	E200.8		06/06/18 15:13 / eli-b
Selenium	0.166	mg/L	D	0.002	E200.8		06/08/18 17:54 / eli-b
Thallium	ND	mg/L	D	0.001	E200.8		06/08/18 17:54 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.4	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.3	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	3.1	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 228 precision (±)	1.4	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 228 MDC	1.4	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 226 + Radium 228	4.4	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.4	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-002
Client Sample ID: JB-FX-1

Report Date: 06/28/18
Collection Date: 05/22/18 10:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.4	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-003
Client Sample ID: DUP-2

Report Date: 06/28/18
Collection Date: 05/22/18 10:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	674	mg/L		5	A2320 B		05/25/18 18:46 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 18:46 / ljl
Bicarbonate as HCO ₃	823	mg/L		5	A2320 B		05/25/18 18:46 / ljl
Chloride	394	mg/L	D	10	E300.0		05/25/18 23:56 / ljl
Fluoride	0.3	mg/L		0.1	A4500-F C		05/29/18 11:49 / ljl
Sulfate	18900	mg/L	D	40	E300.0		05/25/18 23:56 / ljl
Calcium	395	mg/L	D	4	E200.7		06/07/18 08:02 / eli-b
Magnesium	3020	mg/L	D	3	E200.7		06/07/18 18:44 / eli-b
Potassium	56	mg/L	D	5	E200.7		06/07/18 18:44 / eli-b
Sodium	4180	mg/L	D	80	E200.7		06/07/18 18:44 / eli-b
PHYSICAL PROPERTIES							
pH	7.50	s.u.	H	0.01	A4500-H B		05/24/18 18:48 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 18:48 / ljl
Solids, Total Dissolved TDS @ 180 C	27200	mg/L	D	200	A2540 C		05/25/18 15:32 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	175	mg/L	D	2	E353.2		05/25/18 14:54 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/06/18 03:25 / eli-b
Arsenic	0.005	mg/L		0.001	E200.8		06/06/18 15:24 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 03:25 / eli-b
Beryllium	ND	mg/L	D	0.003	E200.8		06/06/18 03:25 / eli-b
Boron	ND	mg/L	D	2	E200.7		06/07/18 18:44 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 03:25 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/08/18 17:57 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 03:25 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/06/18 15:24 / eli-b
Lithium	1.8	mg/L	D	0.7	E200.7		06/07/18 18:44 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		05/31/18 13:28 / eli-b
Molybdenum	0.003	mg/L		0.001	E200.8		06/06/18 03:25 / eli-b
Selenium	0.182	mg/L	D	0.005	E200.8		06/06/18 03:25 / eli-b
Thallium	ND	mg/L	D	0.001	E200.8		06/08/18 17:57 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.3	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	2.3	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.1	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	3.5	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-003
Client Sample ID: DUP-2

Report Date: 06/28/18
Collection Date: 05/22/18 10:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-004
Client Sample ID: JB-N1-WL

Report Date: 06/28/18
Collection Date: 05/22/18 11:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	1220	mg/L		5	A2320 B		05/25/18 18:56 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 18:56 / ljl
Bicarbonate as HCO ₃	1480	mg/L		5	A2320 B		05/25/18 18:56 / ljl
Chloride	949	mg/L	D	20	E300.0		05/26/18 00:15 / ljl
Fluoride	0.2	mg/L		0.1	A4500-F C		05/29/18 11:52 / ljl
Sulfate	22700	mg/L	D	80	E300.0		05/26/18 00:15 / ljl
Calcium	394	mg/L	D	20	E200.7		06/07/18 08:06 / eli-b
Magnesium	1560	mg/L	D	8	E200.7		06/07/18 18:48 / eli-b
Potassium	55	mg/L	D	10	E200.7		06/07/18 18:48 / eli-b
Sodium	8030	mg/L	D	200	E200.7		06/07/18 18:48 / eli-b
PHYSICAL PROPERTIES							
pH	7.28	s.u.	H	0.01	A4500-H B		05/24/18 18:51 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 18:51 / ljl
Solids, Total Dissolved TDS @ 180 C	33400	mg/L	D	200	A2540 C		05/25/18 15:32 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.88	mg/L		0.01	E353.2		05/25/18 14:55 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.01	E200.8		06/06/18 03:29 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		06/06/18 03:29 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 03:29 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/06/18 15:26 / eli-b
Boron	ND	mg/L	D	4	E200.7		06/07/18 18:48 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 03:29 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/08/18 18:00 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 03:29 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/08/18 18:00 / eli-b
Lithium	3	mg/L	D	2	E200.7		06/07/18 18:48 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		05/31/18 13:29 / eli-b
Molybdenum	0.002	mg/L	D	0.002	E200.8		06/06/18 03:29 / eli-b
Selenium	ND	mg/L	D	0.006	E200.8		06/06/18 03:29 / eli-b
Thallium	ND	mg/L	D	0.001	E200.8		06/08/18 18:00 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.7	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.4	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.1	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	3.4	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.2	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	5.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-004
Client Sample ID: JB-N1-WL

Report Date: 06/28/18
Collection Date: 05/22/18 11:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-005
Client Sample ID: JB-N1-AL

Report Date: 06/28/18
Collection Date: 05/22/18 12:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	789	mg/L		5	A2320 B		05/25/18 19:05 / jjl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 19:05 / jjl
Bicarbonate as HCO ₃	963	mg/L		5	A2320 B		05/25/18 19:05 / jjl
Chloride	620	mg/L	D	20	E300.0		05/26/18 00:33 / jjl
Fluoride	0.4	mg/L		0.1	A4500-F C		05/29/18 11:54 / jjl
Sulfate	26000	mg/L	D	80	E300.0		05/26/18 00:33 / jjl
Calcium	431	mg/L	D	20	E200.7		06/07/18 08:10 / eli-b
Magnesium	3180	mg/L	D	8	E200.7		06/07/18 18:51 / eli-b
Potassium	72	mg/L	D	10	E200.7		06/07/18 18:51 / eli-b
Sodium	7360	mg/L	D	200	E200.7		06/07/18 18:51 / eli-b
PHYSICAL PROPERTIES							
pH	7.61	s.u.	H	0.01	A4500-H B		05/24/18 18:54 / jjl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 18:54 / jjl
Solids, Total Dissolved TDS @ 180 C	36300	mg/L	D	500	A2540 C		05/25/18 15:32 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	494	mg/L	D	2	E353.2		05/25/18 14:56 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.01	E200.8		06/06/18 03:34 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		06/06/18 03:34 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 03:34 / eli-b
Beryllium	ND	mg/L	D	0.004	E200.8		06/06/18 03:34 / eli-b
Boron	ND	mg/L	D	4	E200.7		06/07/18 18:51 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 03:34 / eli-b
Chromium	0.015	mg/L	D	0.002	E200.8		06/06/18 15:42 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 03:34 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/08/18 18:02 / eli-b
Lithium	2	mg/L	D	2	E200.7		06/07/18 18:51 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		05/31/18 13:31 / eli-b
Molybdenum	0.002	mg/L		0.001	E200.8		06/08/18 18:02 / eli-b
Selenium	0.011	mg/L	D	0.006	E200.8		06/06/18 03:34 / eli-b
Thallium	ND	mg/L	D	0.001	E200.8		06/08/18 18:02 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.0	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.3	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.1	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	2.1	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.1	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	3.2	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-005
Client Sample ID: JB-N1-AL

Report Date: 06/28/18
Collection Date: 05/22/18 12:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-006
Client Sample ID: FB-2

Report Date: 06/28/18
Collection Date: 05/22/18 12:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	ND	mg/L		5	A2320 B		05/25/18 19:09 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 19:09 / ljl
Bicarbonate as HCO ₃	ND	mg/L		5	A2320 B		05/25/18 19:09 / ljl
Chloride	ND	mg/L		1	E300.0		05/26/18 00:52 / ljl
Fluoride	ND	mg/L		0.1	A4500-F C		05/29/18 12:00 / ljl
Sulfate	ND	mg/L		1	E300.0		05/26/18 00:52 / ljl
Calcium	ND	mg/L		1	E200.7		06/07/18 19:31 / eli-b
Magnesium	ND	mg/L		1	E200.7		06/07/18 19:31 / eli-b
Potassium	ND	mg/L		1	E200.7		06/07/18 19:31 / eli-b
Sodium	ND	mg/L		1	E200.7		06/07/18 19:31 / eli-b
PHYSICAL PROPERTIES							
pH	6.02	s.u.	H	0.01	A4500-H B		05/24/18 18:57 / ljl
pH Measurement Temp		20 °C			A4500-H B		05/24/18 18:57 / ljl
Solids, Total Dissolved TDS @ 180 C	ND	mg/L		10	A2540 C		05/25/18 15:32 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01	E353.2		05/25/18 14:57 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 03:39 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Boron	ND	mg/L		0.05	E200.7		06/07/18 19:31 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 03:39 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Lithium	ND	mg/L		0.1	E200.7		06/07/18 19:31 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		05/31/18 13:33 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Selenium	ND	mg/L		0.001	E200.8		06/06/18 03:39 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/08/18 18:05 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.3	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	3.5	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 228 precision (±)	1.3	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 228 MDC	2.0	pCi/L			RA-05		06/06/18 09:01 / plj
Radium 226 + Radium 228	3.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report RL - Analyte reporting limit.

MCL - Maximum contaminant level.

Definitions: QCL - Quality control limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-006
Client Sample ID: FB-2

Report Date: 06/28/18
Collection Date: 05/22/18 12:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	2.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-007
Client Sample ID: JB-N2-AL

Report Date: 06/28/18
Collection Date: 05/22/18 13:15
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	867	mg/L		5	A2320 B		05/25/18 19:38 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 19:38 / ljl
Bicarbonate as HCO ₃	1060	mg/L		5	A2320 B		05/25/18 19:38 / ljl
Chloride	544	mg/L	D	10	E300.0		05/26/18 01:10 / ljl
Fluoride	0.4	mg/L		0.1	A4500-F C		05/29/18 12:10 / ljl
Sulfate	12100	mg/L	D	40	E300.0		05/26/18 01:10 / ljl
Calcium	410	mg/L	D	4	E200.7		06/07/18 19:35 / eli-b
Magnesium	1360	mg/L	D	2	E200.7		06/07/18 19:35 / eli-b
Potassium	57	mg/L	D	3	E200.7		06/07/18 19:35 / eli-b
Sodium	3800	mg/L	D	40	E200.7		06/07/18 19:35 / eli-b
PHYSICAL PROPERTIES							
pH	7.44	s.u.	H	0.01	A4500-H B		05/24/18 19:00 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:00 / ljl
Solids, Total Dissolved TDS @ 180 C	19400	mg/L	D	100	A2540 C		05/25/18 15:33 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	165	mg/L	D	1	E353.2		05/25/18 14:58 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/06/18 03:43 / eli-b
Arsenic	0.001	mg/L		0.001	E200.8		06/08/18 18:08 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 03:43 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/06/18 15:48 / eli-b
Boron	1.5	mg/L	D	0.9	E200.7		06/07/18 19:35 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 03:43 / eli-b
Chromium	0.003	mg/L		0.001	E200.8		06/08/18 18:08 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 03:43 / eli-b
Lead	0.003	mg/L		0.001	E200.8		06/06/18 15:48 / eli-b
Lithium	1.3	mg/L	D	0.4	E200.7		06/07/18 19:35 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		05/31/18 13:35 / eli-b
Molybdenum	0.005	mg/L		0.001	E200.8		06/06/18 03:43 / eli-b
Selenium	0.006	mg/L	D	0.005	E200.8		06/06/18 15:48 / eli-b
Thallium	ND	mg/L	D	0.001	E200.8		06/08/18 18:08 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.5	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	0.2	pCi/L	U		RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.0	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	0.7	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-007
Client Sample ID: JB-N2-AL

Report Date: 06/28/18
Collection Date: 05/22/18 13:15
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-008
Client Sample ID: JB-N2-WL

Report Date: 06/28/18
Collection Date: 05/22/18 13:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	896	mg/L		5	A2320 B		05/25/18 19:57 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 19:57 / ljl
Bicarbonate as HCO ₃	1090	mg/L		5	A2320 B		05/25/18 19:57 / ljl
Chloride	485	mg/L	DH	10	E300.0		06/21/18 18:57 / ljl
Fluoride	0.3	mg/L		0.1	A4500-F C		05/29/18 12:16 / ljl
Sulfate	14700	mg/L	DH	40	E300.0		06/21/18 18:57 / ljl
Calcium	432	mg/L	D	4	E200.7		06/07/18 19:39 / eli-b
Magnesium	1520	mg/L	D	2	E200.7		06/22/18 12:04 / eli-b
Potassium	42	mg/L	D	3	E200.7		06/22/18 12:04 / eli-b
Sodium	4690	mg/L	D	40	E200.7		06/22/18 12:04 / eli-b
- H - Original analysis was done within hold time. Data is from recheck analysis.							
PHYSICAL PROPERTIES							
pH	7.22	s.u.	H	0.01	A4500-H B		05/24/18 19:03 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:03 / ljl
Solids, Total Dissolved TDS @ 180 C	22200	mg/L	D	200	A2540 C		05/25/18 15:33 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.15	mg/L		0.01	E353.2		05/25/18 15:00 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/06/18 04:01 / eli-b
Arsenic	0.001	mg/L		0.001	E200.8		06/06/18 16:07 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 04:01 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/06/18 16:07 / eli-b
Boron	ND	mg/L	D	0.9	E200.7		06/07/18 19:39 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 04:01 / eli-b
Chromium	0.003	mg/L	D	0.002	E200.8		06/06/18 16:07 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 04:01 / eli-b
Lead	0.002	mg/L		0.001	E200.8		06/06/18 16:07 / eli-b
Lithium	1.8	mg/L	D	0.4	E200.7		06/07/18 19:39 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/15/18 14:57 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/06/18 16:07 / eli-b
Selenium	ND	mg/L	D	0.005	E200.8		06/06/18 04:01 / eli-b
Thallium	ND	mg/L	D	0.002	E200.8		06/07/18 17:04 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.3	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.4	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.1	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	1.5	pCi/L	U		RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.1	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	2.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-008
Client Sample ID: JB-N2-WL

Report Date: 06/28/18
Collection Date: 05/22/18 13:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 precision (\pm)	1.2	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-009
Client Sample ID: JB-N3-AL

Report Date: 06/28/18
Collection Date: 05/22/18 14:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	1010	mg/L		5	A2320 B		05/25/18 20:06 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 20:06 / ljl
Bicarbonate as HCO ₃	1230	mg/L		5	A2320 B		05/25/18 20:06 / ljl
Chloride	473	mg/L	D	10	E300.0		06/02/18 08:10 / ljl
Fluoride	0.4	mg/L		0.1	A4500-F C		05/29/18 12:21 / ljl
Sulfate	15000	mg/L	D	40	E300.0		06/02/18 08:10 / ljl
Calcium	474	mg/L	D	4	E200.7		06/07/18 19:43 / eli-b
Magnesium	2500	mg/L	D	2	E200.7		06/07/18 19:43 / eli-b
Potassium	38	mg/L	D	3	E200.7		06/07/18 19:43 / eli-b
Sodium	3570	mg/L	D	40	E200.7		06/07/18 19:43 / eli-b
PHYSICAL PROPERTIES							
pH	7.32	s.u.	H	0.01	A4500-H B		05/24/18 19:06 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:06 / ljl
Solids, Total Dissolved TDS @ 180 C	23000	mg/L	D	200	A2540 C		05/25/18 15:33 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	127	mg/L	D	0.5	E353.2		05/25/18 15:03 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/06/18 04:06 / eli-b
Arsenic	0.002	mg/L		0.001	E200.8		06/06/18 16:09 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 04:06 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/06/18 16:09 / eli-b
Boron	0.9	mg/L	D	0.9	E200.7		06/07/18 19:43 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 04:06 / eli-b
Chromium	0.004	mg/L	D	0.002	E200.8		06/06/18 16:09 / eli-b
Cobalt	0.006	mg/L		0.005	E200.8		06/06/18 04:06 / eli-b
Lead	0.002	mg/L		0.001	E200.8		06/06/18 16:09 / eli-b
Lithium	1.5	mg/L	D	0.4	E200.7		06/07/18 19:43 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:34 / eli-b
Molybdenum	0.005	mg/L		0.001	E200.8		06/06/18 04:06 / eli-b
Selenium	0.033	mg/L	D	0.005	E200.8		06/06/18 04:06 / eli-b
Thallium	ND	mg/L	D	0.002	E200.8		06/07/18 17:50 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.4	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 precision (±)	0.1	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 226 MDC	0.1	pCi/L			E903.0		06/11/18 11:01 / arh
Radium 228	0.02	pCi/L	U		RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	0.9	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	0.4	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	0.9	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-009
Client Sample ID: JB-N3-AL

Report Date: 06/28/18
Collection Date: 05/22/18 14:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-010
Client Sample ID: JB-N3-WL

Report Date: 06/28/18
Collection Date: 05/22/18 15:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	888	mg/L		5	A2320 B		05/25/18 20:15 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 20:15 / ljl
Bicarbonate as HCO ₃	1080	mg/L		5	A2320 B		05/25/18 20:15 / ljl
Chloride	779	mg/L	D	10	E300.0		05/26/18 02:42 / ljl
Fluoride	0.3	mg/L		0.1	A4500-F C		05/29/18 12:23 / ljl
Sulfate	7680	mg/L	D	40	E300.0		05/26/18 02:42 / ljl
Calcium	313	mg/L	D	2	E200.7		06/07/18 19:47 / eli-b
Magnesium	562	mg/L		1	E200.7		06/07/18 19:47 / eli-b
Potassium	23	mg/L		1	E200.7		06/07/18 19:47 / eli-b
Sodium	3170	mg/L	D	20	E200.7		06/07/18 19:47 / eli-b
PHYSICAL PROPERTIES							
pH	7.27	s.u.	H	0.01	A4500-H B		05/24/18 19:09 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:09 / ljl
Solids, Total Dissolved TDS @ 180 C	12500	mg/L	D	100	A2540 C		05/25/18 15:33 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.24	mg/L		0.01	E353.2		05/25/18 15:07 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.004	E200.8		06/06/18 04:15 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/06/18 04:15 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/06/18 04:15 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/06/18 15:29 / eli-b
Boron	0.9	mg/L	D	0.4	E200.7		06/07/18 19:47 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/06/18 04:15 / eli-b
Chromium	0.002	mg/L		0.001	E200.8		06/06/18 15:29 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/06/18 04:15 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/06/18 15:29 / eli-b
Lithium	1.1	mg/L	D	0.2	E200.7		06/07/18 19:47 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:36 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/06/18 15:29 / eli-b
Selenium	ND	mg/L	D	0.002	E200.8		06/06/18 04:15 / eli-b
Thallium	0.0021	mg/L	D	0.0008	E200.8		06/07/18 17:25 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 precision (±)	0.3	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 228	1.5	pCi/L	U		RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.1	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	2.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-010
Client Sample ID: JB-N3-WL

Report Date: 06/28/18
Collection Date: 05/22/18 15:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-011
Client Sample ID: JB-WL-4

Report Date: 06/28/18
Collection Date: 05/22/18 16:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	1420	mg/L		5	A2320 B		05/25/18 20:27 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 20:27 / ljl
Bicarbonate as HCO ₃	1730	mg/L		5	A2320 B		05/25/18 20:27 / ljl
Chloride	1630	mg/L	D	10	E300.0		05/26/18 03:37 / ljl
Fluoride	0.5	mg/L		0.1	A4500-F C		05/29/18 12:26 / ljl
Sulfate	13800	mg/L	D	40	E300.0		05/26/18 03:37 / ljl
Calcium	111	mg/L	D	9	E200.7		06/07/18 04:45 / eli-b
Magnesium	287	mg/L	D	3	E200.7		06/07/18 04:45 / eli-b
Potassium	19	mg/L	D	5	E200.7		06/07/18 04:45 / eli-b
Sodium	6920	mg/L	D	80	E200.7		06/08/18 18:20 / eli-b
PHYSICAL PROPERTIES							
pH	7.68	s.u.	H	0.01	A4500-H B		05/24/18 19:20 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:20 / ljl
Solids, Total Dissolved TDS @ 180 C	22500	mg/L	D	200	A2540 C		05/25/18 15:33 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	1.05	mg/L		0.01	E353.2		05/25/18 15:08 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/07/18 17:54 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		06/07/18 17:54 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 17:54 / eli-b
Beryllium	ND	mg/L	D	0.003	E200.8		06/07/18 17:54 / eli-b
Boron	ND	mg/L	D	2	E200.7		06/07/18 04:45 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 17:54 / eli-b
Chromium	ND	mg/L	D	0.005	E200.8		06/07/18 17:54 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 17:54 / eli-b
Lead	ND	mg/L	D	0.002	E200.8		06/07/18 17:54 / eli-b
Lithium	1.4	mg/L	D	0.7	E200.7		06/07/18 04:45 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:38 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 17:54 / eli-b
Selenium	ND	mg/L	D	0.005	E200.8		06/07/18 17:54 / eli-b
Thallium	ND	mg/L	D	0.002	E200.8		06/07/18 17:54 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.5	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 228	4.1	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.4	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	4.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.4	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-011
Client Sample ID: JB-WL-4

Report Date: 06/28/18
Collection Date: 05/22/18 16:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-012
Client Sample ID: JB-WL-5

Report Date: 06/28/18
Collection Date: 05/22/18 16:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	660	mg/L		5	A2320 B		05/25/18 20:35 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 20:35 / ljl
Bicarbonate as HCO ₃	805	mg/L		5	A2320 B		05/25/18 20:35 / ljl
Chloride	666	mg/L	D	10	E300.0		05/26/18 03:56 / ljl
Fluoride	0.3	mg/L		0.1	A4500-F C		05/29/18 12:29 / ljl
Sulfate	9660	mg/L	D	40	E300.0		05/26/18 03:56 / ljl
Calcium	467	mg/L	D	4	E200.7		06/07/18 04:49 / eli-b
Magnesium	1080	mg/L	D	2	E200.7		06/07/18 04:49 / eli-b
Potassium	26	mg/L	D	3	E200.7		06/07/18 04:49 / eli-b
Sodium	2540	mg/L	D	40	E200.7		06/07/18 04:49 / eli-b
PHYSICAL PROPERTIES							
pH	7.27	s.u.	H	0.01	A4500-H B		05/24/18 19:26 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:26 / ljl
Solids, Total Dissolved TDS @ 180 C	15600	mg/L	D	100	A2540 C		05/25/18 15:34 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	25.6	mg/L	D	0.1	E353.2		05/25/18 15:09 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.004	E200.8		06/07/18 17:58 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 17:58 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 17:58 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 17:58 / eli-b
Boron	0.9	mg/L	D	0.9	E200.7		06/07/18 04:49 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 17:58 / eli-b
Chromium	ND	mg/L	D	0.002	E200.8		06/07/18 17:58 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 17:58 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 17:58 / eli-b
Lithium	0.9	mg/L	D	0.4	E200.7		06/07/18 04:49 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:39 / eli-b
Molybdenum	0.006	mg/L		0.001	E200.8		06/07/18 17:58 / eli-b
Selenium	ND	mg/L	D	0.002	E200.8		06/07/18 17:58 / eli-b
Thallium	ND	mg/L	D	0.0008	E200.8		06/07/18 17:58 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.0	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 precision (±)	0.3	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 228	2.2	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.4	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	3.2	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.4	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-012
Client Sample ID: JB-WL-5

Report Date: 06/28/18
Collection Date: 05/22/18 16:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-013
Client Sample ID: JB-FX-2

Report Date: 06/28/18
Collection Date: 05/22/18 17:15
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	1320	mg/L		5	A2320 B		05/25/18 20:46 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 20:46 / ljl
Bicarbonate as HCO ₃	1610	mg/L		5	A2320 B		05/25/18 20:46 / ljl
Chloride	1860	mg/L	DH	20	E300.0		06/21/18 19:49 / ljl
Fluoride	0.9	mg/L		0.1	A4500-F C		05/29/18 12:31 / ljl
Sulfate	25900	mg/L	DH	80	E300.0		06/21/18 19:49 / ljl
Calcium	469	mg/L	D	200	E200.7		06/21/18 13:44 / eli-b
Magnesium	4380	mg/L	D	8	E200.7		06/21/18 13:44 / eli-b
Potassium	16	mg/L	D	10	E200.7		06/21/18 13:44 / eli-b
Sodium	4290	mg/L	D	200	E200.7		06/21/18 13:44 / eli-b
- H - Original analysis was done within hold time. Data is from recheck analysis.							
PHYSICAL PROPERTIES							
pH	7.48	s.u.	H	0.01	A4500-H B		05/24/18 19:29 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:29 / ljl
Solids, Total Dissolved TDS @ 180 C	40800	mg/L	D	500	A2540 C		05/25/18 15:34 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	652	mg/L	D	2	E353.2		05/25/18 16:20 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.01	E200.8		06/07/18 18:02 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		06/07/18 18:02 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 18:02 / eli-b
Beryllium	ND	mg/L	D	0.004	E200.8		06/07/18 18:02 / eli-b
Boron	ND	mg/L	D	4	E200.7		06/07/18 04:53 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 18:02 / eli-b
Chromium	ND	mg/L	D	0.006	E200.8		06/07/18 18:02 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 18:02 / eli-b
Lead	ND	mg/L	D	0.002	E200.8		06/07/18 18:02 / eli-b
Lithium	ND	mg/L	D	2	E200.7		06/07/18 04:53 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:41 / eli-b
Molybdenum	0.003	mg/L	D	0.002	E200.8		06/07/18 18:02 / eli-b
Selenium	ND	mg/L	D	0.006	E200.8		06/07/18 18:02 / eli-b
Thallium	ND	mg/L	D	0.002	E200.8		06/07/18 18:02 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.4	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 MDC	0.1	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 228	1.9	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.3	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	2.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-013
Client Sample ID: JB-FX-2

Report Date: 06/28/18
Collection Date: 05/22/18 17:15
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 precision (\pm)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-014
Client Sample ID: WA-3

Report Date: 06/28/18
Collection Date: 05/22/18 09:50
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	208	mg/L		5	A2320 B		05/25/18 20:54 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 20:54 / ljl
Bicarbonate as HCO ₃	254	mg/L		5	A2320 B		05/25/18 20:54 / ljl
Chloride	67	mg/L	D	2	E300.0		05/26/18 04:33 / ljl
Fluoride	1.1	mg/L		0.1	A4500-F C		05/29/18 12:34 / ljl
Sulfate	3310	mg/L	D	8	E300.0		05/26/18 04:33 / ljl
Calcium	479	mg/L		1	E200.7		06/07/18 04:57 / eli-b
Magnesium	504	mg/L		1	E200.7		06/07/18 04:57 / eli-b
Potassium	19	mg/L		1	E200.7		06/07/18 04:57 / eli-b
Sodium	131	mg/L	D	8	E200.7		06/07/18 04:57 / eli-b
PHYSICAL PROPERTIES							
pH	6.32	s.u.	H	0.01	A4500-H B		05/24/18 19:32 / ljl
pH Measurement Temp		20 °C			A4500-H B		05/24/18 19:32 / ljl
Solids, Total Dissolved TDS @ 180 C	4880	mg/L	D	40	A2540 C		05/25/18 15:34 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.92	mg/L		0.01	E353.2		05/25/18 15:12 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 18:06 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Boron	0.2	mg/L	D	0.2	E200.7		06/07/18 04:57 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Cobalt	0.010	mg/L		0.005	E200.8		06/07/18 18:06 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Lithium	ND	mg/L		0.1	E200.7		06/07/18 04:57 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:43 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Selenium	0.003	mg/L		0.001	E200.8		06/07/18 18:06 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 18:06 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.4	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 228	0.9	pCi/L	U		RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.1	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	1.3	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-014
Client Sample ID: WA-3

Report Date: 06/28/18
Collection Date: 05/22/18 09:50
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-015
Client Sample ID: 984-WA

Report Date: 06/28/18
Collection Date: 05/22/18 11:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	754	mg/L		5	A2320 B		05/25/18 21:03 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 21:03 / ljl
Bicarbonate as HCO ₃	920	mg/L		5	A2320 B		05/25/18 21:03 / ljl
Chloride	1490	mg/L	DH	10	E300.0		06/21/18 20:07 / ljl
Fluoride	1.4	mg/L		0.1	A4500-F C		05/29/18 12:36 / ljl
Sulfate	18400	mg/L	DH	40	E300.0		06/21/18 20:07 / ljl
Calcium	443	mg/L	D	70	E200.7		06/21/18 13:48 / eli-b
Magnesium	1950	mg/L	D	3	E200.7		06/21/18 13:48 / eli-b
Potassium	18	mg/L	D	5	E200.7		06/21/18 13:48 / eli-b
Sodium	4210	mg/L	D	80	E200.7		06/21/18 13:48 / eli-b
- H - Original analysis was done within hold time. Data is from recheck analysis.							
PHYSICAL PROPERTIES							
pH	6.77	s.u.	H	0.01	A4500-H B		05/24/18 19:35 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:35 / ljl
Solids, Total Dissolved TDS @ 180 C	27700	mg/L	D	200	A2540 C		05/25/18 15:34 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01	E353.2		05/25/18 15:13 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/07/18 18:36 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		06/09/18 00:29 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 18:36 / eli-b
Beryllium	ND	mg/L	D	0.003	E200.8		06/07/18 18:36 / eli-b
Boron	ND	mg/L	D	2	E200.7		06/07/18 05:01 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 18:36 / eli-b
Chromium	ND	mg/L	D	0.005	E200.8		06/07/18 18:36 / eli-b
Cobalt	0.022	mg/L		0.005	E200.8		06/07/18 18:36 / eli-b
Lead	ND	mg/L	D	0.002	E200.8		06/07/18 18:36 / eli-b
Lithium	ND	mg/L	D	0.7	E200.7		06/07/18 05:01 / eli-b
Mercury	0.0001	mg/L		0.0001	E245.1		06/11/18 15:12 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 18:36 / eli-b
Selenium	ND	mg/L	D	0.005	E200.8		06/07/18 18:36 / eli-b
Thallium	ND	mg/L	D	0.002	E200.8		06/07/18 18:36 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.2	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 precision (±)	0.3	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 226 MDC	0.1	pCi/L			E903.0		06/11/18 13:05 / arh
Radium 228	1.8	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 precision (±)	1.5	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		06/06/18 10:48 / plj
Radium 226 + Radium 228	3.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-015
Client Sample ID: 984-WA

Report Date: 06/28/18
Collection Date: 05/22/18 11:45
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 precision (\pm)	1.5	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-016
Client Sample ID: JB-NII-A

Report Date: 06/28/18
Collection Date: 05/22/18 12:15
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	339	mg/L		5	A2320 B		05/25/18 21:11 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 21:11 / ljl
Bicarbonate as HCO ₃	413	mg/L		5	A2320 B		05/25/18 21:11 / ljl
Chloride	17	mg/L		1	E300.0		05/26/18 05:09 / ljl
Fluoride	0.3	mg/L		0.1	A4500-F C		05/29/18 12:39 / ljl
Sulfate	875	mg/L	D	2	E300.0		05/26/18 05:09 / ljl
Calcium	122	mg/L		1	E200.7		06/07/18 05:04 / eli-b
Magnesium	48	mg/L		1	E200.7		06/07/18 05:04 / eli-b
Potassium	16	mg/L		1	E200.7		06/07/18 05:04 / eli-b
Sodium	294	mg/L	D	2	E200.7		06/07/18 05:04 / eli-b
PHYSICAL PROPERTIES							
pH	7.54	s.u.	H	0.01	A4500-H B		05/24/18 19:38 / ljl
pH Measurement Temp		20 °C			A4500-H B		05/24/18 19:38 / ljl
Solids, Total Dissolved TDS @ 180 C	1620	mg/L	D	20	A2540 C		05/25/18 15:34 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01	E353.2		05/25/18 15:14 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Barium	ND	mg/L		0.05	E200.7		06/07/18 05:04 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Boron	0.08	mg/L		0.05	E200.7		06/07/18 05:04 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 18:40 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Lithium	ND	mg/L		0.1	E200.7		06/07/18 05:04 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:51 / eli-b
Molybdenum	0.148	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Selenium	ND	mg/L		0.001	E200.8		06/07/18 18:40 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 18:40 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.4	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.4	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.3	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	2.4	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1.2	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	2.0	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	3.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.2	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-016
Client Sample ID: JB-NII-A

Report Date: 06/28/18
Collection Date: 05/22/18 12:15
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	2.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-017
Client Sample ID: DUP-1

Report Date: 06/28/18
Collection Date: 05/22/18 09:55
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	203	mg/L		5	A2320 B		05/25/18 21:19 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 21:19 / ljl
Bicarbonate as HCO ₃	248	mg/L		5	A2320 B		05/25/18 21:19 / ljl
Chloride	66	mg/L	D	2	E300.0		05/26/18 05:28 / ljl
Fluoride	1.3	mg/L		0.1	A4500-F C		05/29/18 14:28 / ljl
Sulfate	3240	mg/L	D	8	E300.0		05/26/18 05:28 / ljl
Calcium	463	mg/L		1	E200.7		06/07/18 05:08 / eli-b
Magnesium	489	mg/L		1	E200.7		06/07/18 05:08 / eli-b
Potassium	18	mg/L		1	E200.7		06/07/18 05:08 / eli-b
Sodium	129	mg/L	D	8	E200.7		06/08/18 18:24 / eli-b
PHYSICAL PROPERTIES							
pH	6.36	s.u.	H	0.01	A4500-H B		05/24/18 19:40 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:40 / ljl
Solids, Total Dissolved TDS @ 180 C	4930	mg/L	D	40	A2540 C		05/25/18 15:35 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.88	mg/L		0.01	E353.2		05/25/18 15:15 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 18:45 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Boron	ND	mg/L	D	0.2	E200.7		06/07/18 05:08 / eli-b
Cadmium	0.001	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Cobalt	0.010	mg/L		0.005	E200.8		06/07/18 18:45 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Lithium	ND	mg/L		0.1	E200.7		06/07/18 05:08 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:53 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Selenium	0.003	mg/L		0.001	E200.8		06/07/18 18:45 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 18:45 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.4	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	1.2	pCi/L	U		RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1.0	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.7	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	1.5	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-017
Client Sample ID: DUP-1

Report Date: 06/28/18
Collection Date: 05/22/18 09:55
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-018
Client Sample ID: FB-1

Report Date: 06/28/18
Collection Date: 05/22/18 10:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	ND	mg/L		5	A2320 B		05/25/18 21:32 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 21:32 / ljl
Bicarbonate as HCO ₃	ND	mg/L		5	A2320 B		05/25/18 21:32 / ljl
Chloride	ND	mg/L		1	E300.0		05/26/18 05:46 / ljl
Fluoride	ND	mg/L		0.1	A4500-F C		05/29/18 14:35 / ljl
Sulfate	ND	mg/L		1	E300.0		05/26/18 05:46 / ljl
Calcium	ND	mg/L		1	E200.7		06/07/18 05:12 / eli-b
Magnesium	ND	mg/L		1	E200.7		06/07/18 05:12 / eli-b
Potassium	ND	mg/L		1	E200.7		06/07/18 05:12 / eli-b
Sodium	ND	mg/L		1	E200.7		06/07/18 05:12 / eli-b
PHYSICAL PROPERTIES							
pH	5.85	s.u.	H	0.01	A4500-H B		05/24/18 19:43 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:43 / ljl
Solids, Total Dissolved TDS @ 180 C	15	mg/L		10	A2540 C		05/25/18 15:35 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01	E353.2		05/25/18 15:16 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Barium	ND	mg/L		0.05	E200.7		06/07/18 05:12 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Boron	ND	mg/L		0.05	E200.7		06/07/18 05:12 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 18:49 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Lithium	ND	mg/L		0.1	E200.7		06/07/18 05:12 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:55 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Selenium	ND	mg/L		0.001	E200.8		06/07/18 18:49 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 18:49 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.2	pCi/L	U		E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.3	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	1.4	pCi/L	U		RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1.0	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	2.4	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	1.6	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-018
Client Sample ID: FB-1

Report Date: 06/28/18
Collection Date: 05/22/18 10:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	2.5	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-019
Client Sample ID: 566-WA

Report Date: 06/28/18
Collection Date: 05/22/18 10:55
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	ND	mg/L		5	A2320 B		05/25/18 21:36 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 21:36 / ljl
Bicarbonate as HCO ₃	ND	mg/L		5	A2320 B		05/25/18 21:36 / ljl
Chloride	51	mg/L	DH	2	E300.0		06/21/18 20:24 / ljl
Fluoride	7	mg/L	D	1	A4500-F C		05/29/18 14:45 / ljl
Sulfate	3900	mg/L	DH	8	E300.0		06/21/18 20:24 / ljl
Calcium	488	mg/L	D	7	E200.7		06/21/18 13:52 / eli-b
Magnesium	337	mg/L		1	E200.7		06/21/18 13:52 / eli-b
Potassium	14	mg/L		1	E200.7		06/21/18 13:52 / eli-b
Sodium	318	mg/L	D	8	E200.7		06/21/18 13:52 / eli-b
- H - Original analysis was done within hold time. Data is from recheck analysis.							
PHYSICAL PROPERTIES							
pH	4.28	s.u.	H	0.01	A4500-H B		05/24/18 19:46 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:46 / ljl
Solids, Total Dissolved TDS @ 180 C	5090	mg/L	D	40	A2540 C		05/25/18 15:35 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	4.76	mg/L	D	0.05	E353.2		05/25/18 15:20 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Arsenic	0.025	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 18:11 / eli-b
Beryllium	0.015	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Boron	0.9	mg/L	D	0.2	E200.7		06/07/18 05:16 / eli-b
Cadmium	0.014	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Cobalt	0.297	mg/L		0.005	E200.8		06/07/18 18:11 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Lithium	0.3	mg/L		0.1	E200.7		06/07/18 05:16 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:56 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Selenium	0.002	mg/L		0.001	E200.8		06/07/18 18:11 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 18:11 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.8	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	0.2	pCi/L	U		RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	1.0	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-019
Client Sample ID: 566-WA

Report Date: 06/28/18
Collection Date: 05/22/18 10:55
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 precision (\pm)	1.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-020
Client Sample ID: 285-WA

Report Date: 06/28/18
Collection Date: 05/22/18 09:20
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-021
Client Sample ID: JB-N11-L

Report Date: 06/28/18
Collection Date: 05/22/18 12:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	917	mg/L		5	A2320 B		05/25/18 21:44 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 21:44 / ljl
Bicarbonate as HCO ₃	1120	mg/L		5	A2320 B		05/25/18 21:44 / ljl
Chloride	201	mg/L	DH	20	E300.0		06/25/18 13:40 / ljl
Fluoride	0.6	mg/L		0.1	A4500-F C		05/29/18 14:47 / ljl
Sulfate	60600	mg/L	DH	80	E300.0		06/25/18 13:40 / ljl
Calcium	756	mg/L	D	40	E200.7		06/07/18 05:43 / eli-b
Magnesium	12000	mg/L	D	20	E200.7		06/07/18 05:43 / eli-b
Potassium	156	mg/L	D	30	E200.7		06/07/18 05:43 / eli-b
Sodium	18300	mg/L	D	400	E200.7		06/07/18 05:43 / eli-b
PHYSICAL PROPERTIES							
pH	7.68	s.u.	H	0.01	A4500-H B		05/24/18 19:49 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:49 / ljl
Solids, Total Dissolved TDS @ 180 C	85700	mg/L	D	500	A2540 C		05/25/18 15:36 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	83	mg/L	D	1	E353.2		05/25/18 15:23 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.02	E200.8		06/07/18 18:53 / eli-b
Arsenic	ND	mg/L	D	0.005	E200.8		06/07/18 18:53 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 18:53 / eli-b
Beryllium	ND	mg/L	D	0.007	E200.8		06/07/18 18:53 / eli-b
Boron	ND	mg/L	D	9	E200.7		06/07/18 05:43 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 18:53 / eli-b
Chromium	ND	mg/L	D	0.01	E200.8		06/07/18 18:53 / eli-b
Cobalt	0.008	mg/L		0.005	E200.8		06/07/18 18:53 / eli-b
Lead	ND	mg/L	D	0.004	E200.8		06/07/18 18:53 / eli-b
Lithium	9	mg/L	D	4	E200.7		06/11/18 22:55 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 10:58 / eli-b
Molybdenum	0.580	mg/L	D	0.003	E200.8		06/07/18 18:53 / eli-b
Selenium	2.25	mg/L	D	0.01	E200.8		06/07/18 18:53 / eli-b
Thallium	ND	mg/L	D	0.004	E200.8		06/07/18 18:53 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	0.9	pCi/L	U		RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	0.9	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.4	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	1.1	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	0.9	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-021
Client Sample ID: JB-N11-L

Report Date: 06/28/18
Collection Date: 05/22/18 12:30
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.4	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-022
Client Sample ID: JB-NI2-L

Report Date: 06/28/18
Collection Date: 05/22/18 13:25
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	1530	mg/L		5	A2320 B		05/25/18 21:57 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 21:57 / ljl
Bicarbonate as HCO ₃	1870	mg/L		5	A2320 B		05/25/18 21:57 / ljl
Chloride	508	mg/L	D	20	E300.0		05/25/18 16:35 / ljl
Fluoride	0.5	mg/L		0.1	A4500-F C		05/29/18 14:50 / ljl
Sulfate	35500	mg/L	D	80	E300.0		05/25/18 16:35 / ljl
Calcium	474	mg/L	D	40	E200.7		06/12/18 22:30 / eli-b
Magnesium	2800	mg/L	D	20	E200.7		06/12/18 22:30 / eli-b
Potassium	89	mg/L	D	30	E200.7		06/12/18 22:30 / eli-b
Sodium	11400	mg/L	D	400	E200.7		06/12/18 22:30 / eli-b
PHYSICAL PROPERTIES							
pH	7.70	s.u.	H	0.01	A4500-H B		05/24/18 19:52 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 19:52 / ljl
Solids, Total Dissolved TDS @ 180 C	51800	mg/L	D	500	A2540 C		05/25/18 15:36 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	53.5	mg/L	D	0.2	E353.2		06/01/18 16:51 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.02	E200.8		06/07/18 18:57 / eli-b
Arsenic	ND	mg/L	D	0.005	E200.8		06/07/18 18:57 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 18:57 / eli-b
Beryllium	ND	mg/L	D	0.007	E200.8		06/07/18 18:57 / eli-b
Boron	ND	mg/L	D	4	E200.7		06/07/18 05:46 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 18:57 / eli-b
Chromium	ND	mg/L	D	0.01	E200.8		06/07/18 18:57 / eli-b
Cobalt	0.007	mg/L		0.005	E200.8		06/07/18 18:57 / eli-b
Lead	ND	mg/L	D	0.004	E200.8		06/07/18 18:57 / eli-b
Lithium	5	mg/L	D	4	E200.7		06/14/18 18:17 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 11:00 / eli-b
Molybdenum	0.596	mg/L	D	0.003	E200.8		06/07/18 18:57 / eli-b
Selenium	1.40	mg/L	D	0.01	E200.8		06/07/18 18:57 / eli-b
Thallium	ND	mg/L	D	0.004	E200.8		06/07/18 18:57 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.9	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	3.1	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1.2	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.4	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	3.9	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-022
Client Sample ID: JB-NI2-L

Report Date: 06/28/18
Collection Date: 05/22/18 13:25
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.5	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-023
Client Sample ID: JB-N12-A

Report Date: 06/28/18
Collection Date: 05/22/18 14:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	310	mg/L		5	A2320 B		05/25/18 22:05 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 22:05 / ljl
Bicarbonate as HCO ₃	378	mg/L		5	A2320 B		05/25/18 22:05 / ljl
Chloride	19	mg/L		1	E300.0		05/25/18 16:54 / ljl
Fluoride	0.4	mg/L		0.1	A4500-F C		05/29/18 14:53 / ljl
Sulfate	486	mg/L	D	2	E300.0		05/25/18 16:54 / ljl
Calcium	51	mg/L		1	E200.7		06/07/18 05:50 / eli-b
Magnesium	19	mg/L		1	E200.7		06/07/18 05:50 / eli-b
Potassium	10	mg/L		1	E200.7		06/07/18 05:50 / eli-b
Sodium	254	mg/L	D	2	E200.7		06/07/18 05:50 / eli-b
PHYSICAL PROPERTIES							
pH	7.90	s.u.	H	0.01	A4500-H B		05/24/18 19:58 / ljl
pH Measurement Temp		20 °C			A4500-H B		05/24/18 19:58 / ljl
Solids, Total Dissolved TDS @ 180 C	1050	mg/L		10	A2540 C		05/25/18 15:37 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01	E353.2		05/25/18 15:26 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 19:01 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Boron	0.12	mg/L		0.05	E200.7		06/07/18 05:50 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 19:01 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Lithium	ND	mg/L		0.1	E200.7		06/14/18 18:25 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 11:02 / eli-b
Molybdenum	0.060	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Selenium	ND	mg/L		0.001	E200.8		06/07/18 19:01 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 19:01 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.8	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	1.6	pCi/L	U		RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1.2	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	2.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-023
Client Sample ID: JB-N12-A

Report Date: 06/28/18
Collection Date: 05/22/18 14:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-024
Client Sample ID: JB-WA-6

Report Date: 06/28/18
Collection Date: 05/22/18 15:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-025
Client Sample ID: JB-N10-A

Report Date: 06/28/18
Collection Date: 05/23/18 09:50
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	ND	mg/L		5	A2320 B		05/25/18 22:08 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 22:08 / ljl
Bicarbonate as HCO ₃	ND	mg/L		5	A2320 B		05/25/18 22:08 / ljl
Chloride	6	mg/L	D	2	E300.0		05/25/18 17:13 / ljl
Fluoride	5	mg/L	D	1	A4500-F C		05/29/18 14:58 / ljl
Sulfate	3600	mg/L	D	8	E300.0		05/25/18 17:13 / ljl
Calcium	431	mg/L		1	E200.7		06/07/18 05:54 / eli-b
Magnesium	350	mg/L		1	E200.7		06/07/18 05:54 / eli-b
Potassium	6	mg/L		1	E200.7		06/07/18 05:54 / eli-b
Sodium	73	mg/L	D	8	E200.7		06/07/18 05:54 / eli-b
PHYSICAL PROPERTIES							
pH	3.72	s.u.	H	0.01	A4500-H B		05/24/18 20:01 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 20:01 / ljl
Solids, Total Dissolved TDS @ 180 C	5270	mg/L	D	40	A2540 C		05/25/18 15:37 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	6.85	mg/L	D	0.05	E353.2		05/25/18 15:27 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 19:30 / eli-b
Arsenic	0.002	mg/L		0.001	E200.8		06/07/18 19:30 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 19:30 / eli-b
Beryllium	0.070	mg/L		0.001	E200.8		06/07/18 19:30 / eli-b
Boron	0.3	mg/L	D	0.2	E200.7		06/07/18 05:54 / eli-b
Cadmium	0.008	mg/L		0.001	E200.8		06/07/18 19:30 / eli-b
Chromium	0.004	mg/L		0.001	E200.8		06/07/18 19:30 / eli-b
Cobalt	0.177	mg/L		0.005	E200.8		06/07/18 19:30 / eli-b
Lead	0.001	mg/L		0.001	E200.8		06/07/18 19:30 / eli-b
Lithium	0.5	mg/L	D	0.2	E200.7		06/14/18 18:29 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 11:04 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 19:30 / eli-b
Selenium	0.003	mg/L		0.001	E200.8		06/09/18 00:34 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 19:30 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.9	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	2.4	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1.2	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	3.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-025
Client Sample ID: JB-N10-A

Report Date: 06/28/18
Collection Date: 05/23/18 09:50
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.7	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-026
Client Sample ID: WA-4

Report Date: 06/28/18
Collection Date: 05/23/18 10:20
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	ND	mg/L		5	A2320 B		05/25/18 22:11 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 22:11 / ljl
Bicarbonate as HCO ₃	ND	mg/L		5	A2320 B		05/25/18 22:11 / ljl
Chloride	74	mg/L	D	2	E300.0		05/25/18 17:32 / ljl
Fluoride	11	mg/L	D	2	A4500-F C		05/29/18 15:02 / ljl
Sulfate	3710	mg/L	D	8	E300.0		05/25/18 17:32 / ljl
Calcium	443	mg/L		1	E200.7		06/07/18 05:58 / eli-b
Magnesium	128	mg/L		1	E200.7		06/07/18 05:58 / eli-b
Potassium	2	mg/L		1	E200.7		06/07/18 05:58 / eli-b
Sodium	150	mg/L	D	8	E200.7		06/07/18 05:58 / eli-b
PHYSICAL PROPERTIES							
pH	3.51	s.u.	H	0.01	A4500-H B		05/24/18 20:04 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 20:04 / ljl
Solids, Total Dissolved TDS @ 180 C	5580	mg/L	D	40	A2540 C		05/25/18 15:37 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01	E353.2		05/25/18 15:28 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L		0.001	E200.8		06/07/18 19:34 / eli-b
Arsenic	0.009	mg/L		0.001	E200.8		06/07/18 19:34 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 19:34 / eli-b
Beryllium	0.044	mg/L		0.001	E200.8		06/07/18 19:34 / eli-b
Boron	0.3	mg/L	D	0.2	E200.7		06/07/18 05:58 / eli-b
Cadmium	0.006	mg/L		0.001	E200.8		06/07/18 19:34 / eli-b
Chromium	0.006	mg/L		0.001	E200.8		06/07/18 19:34 / eli-b
Cobalt	0.592	mg/L		0.005	E200.8		06/07/18 19:34 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 19:34 / eli-b
Lithium	0.7	mg/L	D	0.2	E200.7		06/14/18 18:36 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 11:06 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 19:34 / eli-b
Selenium	0.007	mg/L		0.001	E200.8		06/09/18 00:39 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 19:34 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.4	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	0.7	pCi/L	U		RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1.1	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	1.1	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-026
Client Sample ID: WA-4

Report Date: 06/28/18
Collection Date: 05/23/18 10:20
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-027
Client Sample ID: JB-N7-AL

Report Date: 06/28/18
Collection Date: 05/23/18 11:10
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	1180	mg/L		5	A2320 B		05/25/18 22:22 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 22:22 / ljl
Bicarbonate as HCO ₃	1440	mg/L		5	A2320 B		05/25/18 22:22 / ljl
Chloride	811	mg/L	D	10	E300.0		05/25/18 17:52 / ljl
Fluoride	0.8	mg/L		0.1	A4500-F C		05/29/18 15:04 / ljl
Sulfate	15800	mg/L	D	40	E300.0		05/25/18 17:52 / ljl
Calcium	389	mg/L	D	9	E200.7		06/08/18 18:58 / eli-b
Magnesium	2230	mg/L	D	3	E200.7		06/08/18 18:58 / eli-b
Potassium	9	mg/L	D	5	E200.7		06/08/18 18:58 / eli-b
Sodium	3390	mg/L	D	40	E200.7		06/07/18 06:02 / eli-b
PHYSICAL PROPERTIES							
pH	7.43	s.u.	H	0.01	A4500-H B		05/24/18 20:07 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 20:07 / ljl
Solids, Total Dissolved TDS @ 180 C	25100	mg/L	D	200	A2540 C		05/25/18 15:37 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	101	mg/L	D	1	E353.2		05/25/18 15:29 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.008	E200.8		06/07/18 19:39 / eli-b
Arsenic	ND	mg/L	D	0.002	E200.8		06/07/18 19:39 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 19:39 / eli-b
Beryllium	ND	mg/L	D	0.003	E200.8		06/07/18 19:39 / eli-b
Boron	2.5	mg/L	D	0.9	E200.7		06/07/18 06:02 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 19:39 / eli-b
Chromium	ND	mg/L	D	0.005	E200.8		06/07/18 19:39 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 19:39 / eli-b
Lead	ND	mg/L	D	0.002	E200.8		06/07/18 19:39 / eli-b
Lithium	0.8	mg/L	D	0.7	E200.7		06/14/18 18:40 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/06/18 11:08 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 19:39 / eli-b
Selenium	0.158	mg/L	D	0.005	E200.8		06/09/18 00:43 / eli-b
Thallium	ND	mg/L	D	0.002	E200.8		06/07/18 19:39 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	0.8	pCi/L	U		RA-05		06/06/18 12:25 / plj
Radium 228 precision (±)	1	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 228 MDC	1.6	pCi/L			RA-05		06/06/18 12:25 / plj
Radium 226 + Radium 228	1	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-027
Client Sample ID: JB-N7-AL

Report Date: 06/28/18
Collection Date: 05/23/18 11:10
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.6	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-028
Client Sample ID: JB-N7-WL

Report Date: 06/28/18
Collection Date: 05/23/18 11:40
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	858	mg/L		5	A2320 B		05/25/18 22:31 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 22:31 / ljl
Bicarbonate as HCO ₃	1050	mg/L		5	A2320 B		05/25/18 22:31 / ljl
Chloride	514	mg/L	D	5	E300.0		05/25/18 18:11 / ljl
Fluoride	0.5	mg/L		0.1	A4500-F C		05/29/18 15:07 / ljl
Sulfate	7170	mg/L	D	20	E300.0		05/25/18 18:11 / ljl
Calcium	506	mg/L	D	2	E200.7		06/07/18 06:06 / eli-b
Magnesium	782	mg/L		1	E200.7		06/07/18 06:06 / eli-b
Potassium	12	mg/L		1	E200.7		06/07/18 06:06 / eli-b
Sodium	1870	mg/L	D	20	E200.7		06/07/18 06:06 / eli-b
PHYSICAL PROPERTIES							
pH	7.21	s.u.	H	0.01	A4500-H B		05/24/18 20:10 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 20:10 / ljl
Solids, Total Dissolved TDS @ 180 C	12400	mg/L	D	100	A2540 C		05/25/18 15:37 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.02	mg/L		0.01	E353.2		05/25/18 15:31 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.002	E200.8		06/07/18 19:43 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 19:43 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 19:43 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 19:43 / eli-b
Boron	1.1	mg/L	D	0.4	E200.7		06/07/18 06:06 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 19:43 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 19:43 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 19:43 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 19:43 / eli-b
Lithium	0.3	mg/L	D	0.2	E200.7		06/14/18 18:48 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/11/18 15:14 / eli-b
Molybdenum	ND	mg/L		0.001	E200.8		06/07/18 19:43 / eli-b
Selenium	ND	mg/L	D	0.002	E200.8		06/09/18 00:48 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 19:43 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	1.3	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 precision (±)	0.4	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 12:51 / arh
Radium 228	1.7	pCi/L	U		RA-05		06/06/18 14:00 / plj
Radium 228 precision (±)	1.3	pCi/L			RA-05		06/06/18 14:00 / plj
Radium 228 MDC	2.0	pCi/L			RA-05		06/06/18 14:00 / plj
Radium 226 + Radium 228	3.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-028
Client Sample ID: JB-N7-WL

Report Date: 06/28/18
Collection Date: 05/23/18 11:40
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	2.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-029
Client Sample ID: JB-WA-6

Report Date: 06/28/18
Collection Date: 05/23/18 12:40
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	739	mg/L		5	A2320 B		05/25/18 22:59 / jjl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 22:59 / jjl
Bicarbonate as HCO ₃	902	mg/L		5	A2320 B		05/25/18 22:59 / jjl
Chloride	25	mg/L	D	2	E300.0		05/25/18 18:30 / jjl
Fluoride	0.4	mg/L		0.1	A4500-F C		05/29/18 15:17 / jjl
Sulfate	3720	mg/L	D	8	E300.0		05/25/18 18:30 / jjl
Calcium	933	mg/L		1	E200.7		06/07/18 06:44 / eli-b
Magnesium	539	mg/L		1	E200.7		06/07/18 06:44 / eli-b
Potassium	8	mg/L		1	E200.7		06/08/18 19:10 / eli-b
Sodium	19	mg/L	D	8	E200.7		06/08/18 19:10 / eli-b
PHYSICAL PROPERTIES							
pH	7.53	s.u.	H	0.01	A4500-H B		05/24/18 20:12 / jjl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 20:12 / jjl
Solids, Total Dissolved TDS @ 180 C	6270	mg/L	D	40	A2540 C		05/25/18 15:37 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	19.7	mg/L	D	0.1	E353.2		05/25/18 15:32 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.002	E200.8		06/07/18 19:47 / eli-b
Arsenic	0.002	mg/L		0.001	E200.8		06/07/18 19:47 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 19:47 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 19:47 / eli-b
Boron	0.5	mg/L	D	0.2	E200.7		06/07/18 06:44 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 19:47 / eli-b
Chromium	0.002	mg/L		0.001	E200.8		06/07/18 19:47 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 19:47 / eli-b
Lead	0.001	mg/L		0.001	E200.8		06/07/18 19:47 / eli-b
Lithium	ND	mg/L		0.1	E200.7		06/14/18 18:52 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/11/18 15:16 / eli-b
Molybdenum	0.007	mg/L		0.001	E200.8		06/07/18 19:47 / eli-b
Selenium	0.001	mg/L		0.001	E200.8		06/09/18 11:38 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 19:47 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	0.2	pCi/L			E903.0		06/11/18 14:41 / arh
Radium 226 precision (±)	0.1	pCi/L			E903.0		06/11/18 14:41 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 14:41 / arh
Radium 228	0.2	pCi/L	U		RA-05		06/06/18 14:00 / plj
Radium 228 precision (±)	1.1	pCi/L			RA-05		06/06/18 14:00 / plj
Radium 228 MDC	1.8	pCi/L			RA-05		06/06/18 14:00 / plj
Radium 226 + Radium 228	0.4	pCi/L	U		A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.1	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-029
Client Sample ID: JB-WA-6

Report Date: 06/28/18
Collection Date: 05/23/18 12:40
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	1.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-030
Client Sample ID: JB-N5-A

Report Date: 06/28/18
Collection Date: 05/22/18 15:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO ₃	364	mg/L		5	A2320 B		05/25/18 23:16 / ljl
Carbonate as CO ₃	ND	mg/L		5	A2320 B		05/25/18 23:16 / ljl
Bicarbonate as HCO ₃	444	mg/L		5	A2320 B		05/25/18 23:16 / ljl
Chloride	177	mg/L	D	5	E300.0		05/25/18 18:49 / ljl
Fluoride	0.3	mg/L		0.1	A4500-F C		05/29/18 15:22 / ljl
Sulfate	6120	mg/L	D	20	E300.0		05/25/18 18:49 / ljl
Calcium	464	mg/L		1	E200.7		06/07/18 06:48 / eli-b
Magnesium	977	mg/L		1	E200.7		06/07/18 06:48 / eli-b
Potassium	26	mg/L		1	E200.7		06/08/18 19:21 / eli-b
Sodium	872	mg/L	D	20	E200.7		06/08/18 19:21 / eli-b
PHYSICAL PROPERTIES							
pH	6.64	s.u.	H	0.01	A4500-H B		05/24/18 20:15 / ljl
pH Measurement Temp	20	°C			A4500-H B		05/24/18 20:15 / ljl
Solids, Total Dissolved TDS @ 180 C	9440	mg/L	D	100	A2540 C		05/25/18 15:38 / mvr
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01	E353.2		05/25/18 15:35 / dmb
METALS, TOTAL RECOVERABLE							
Antimony	ND	mg/L	D	0.002	E200.8		06/07/18 19:05 / eli-b
Arsenic	ND	mg/L		0.001	E200.8		06/07/18 19:05 / eli-b
Barium	ND	mg/L		0.05	E200.8		06/07/18 19:05 / eli-b
Beryllium	ND	mg/L		0.001	E200.8		06/07/18 19:05 / eli-b
Boron	0.5	mg/L	D	0.2	E200.7		06/07/18 06:48 / eli-b
Cadmium	ND	mg/L		0.001	E200.8		06/07/18 19:05 / eli-b
Chromium	ND	mg/L		0.001	E200.8		06/07/18 19:05 / eli-b
Cobalt	ND	mg/L		0.005	E200.8		06/07/18 19:05 / eli-b
Lead	ND	mg/L		0.001	E200.8		06/07/18 19:05 / eli-b
Lithium	0.1	mg/L		0.1	E200.7		06/14/18 19:03 / eli-b
Mercury	ND	mg/L		0.0001	E245.1		06/11/18 15:18 / eli-b
Molybdenum	0.003	mg/L		0.001	E200.8		06/07/18 19:05 / eli-b
Selenium	ND	mg/L		0.001	E200.8		06/07/18 19:05 / eli-b
Thallium	ND	mg/L		0.0005	E200.8		06/07/18 19:05 / eli-b
RADIONUCLIDES, TOTAL							
Radium 226	3.6	pCi/L			E903.0		06/11/18 14:41 / arh
Radium 226 precision (±)	0.8	pCi/L			E903.0		06/11/18 14:41 / arh
Radium 226 MDC	0.2	pCi/L			E903.0		06/11/18 14:41 / arh
Radium 228	5.7	pCi/L			RA-05		06/06/18 14:00 / plj
Radium 228 precision (±)	1.6	pCi/L			RA-05		06/06/18 14:00 / plj
Radium 228 MDC	2.0	pCi/L			RA-05		06/06/18 14:00 / plj
Radium 226 + Radium 228	9.3	pCi/L			A7500-RA		06/12/18 13:23 / dmf
Radium 226 + Radium 228 precision (±)	1.8	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions:	RL - Analyte reporting limit.	MCL - Maximum contaminant level.
	QCL - Quality control limit.	ND - Not detected at the reporting limit.
	MDC - Minimum detectable concentration	D - RL increased due to sample matrix.
	H - Analysis performed past recommended holding time.	

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: PacifiCorp
Project: PERCM49
Lab ID: C18050868-030
Client Sample ID: JB-N5-A

Report Date: 06/28/18
Collection Date: 05/22/18 15:00
DateReceived: 05/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, TOTAL							
Radium 226 + Radium 228 MDC	2.0	pCi/L			A7500-RA		06/12/18 13:23 / dmf

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121935

Run ID :Run Order: HGCV202-B_180531A: 40	SampType: Method Blank	Lab ID: MB-121935	Method: E245.1
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Analysis Date: 05/31/18 12:44	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E245.1
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Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury	ND	0.00005									
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Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B**

Run ID :Run Order: HGCV202-B_180531A: 41	SampType: Laboratory Control Sample	Lab ID: LCS-121935	Method: E245.1
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Analysis Date: 05/31/18 12:46	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E245.1
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Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury	0.00219	0.00010	0.002	0	109	85	115				
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Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B**

Run ID :Run Order: HGCV202-B_180531A: 68	SampType: Sample Matrix Spike	Lab ID: C18050868-007BMS	Method: E245.1
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Analysis Date: 05/31/18 13:37	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E245.1
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Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury	0.00201	0.00010	0.002	0	101	70	130				
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Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B**

Run ID :Run Order: HGCV202-B_180531A: 69	SampType: Sample Matrix Spike Duplicate	Lab ID: C18050868-007BMSD	Method: E245.1
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Analysis Date: 05/31/18 13:39	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E245.1
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Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury	0.00203	0.00010	0.002	0	102	70	130	0.002013	0.9	30	
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Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 121951

Date: 20-Jun-18

Run ID :Run Order: ICP204-B_180606A: 334	SampType: Method Blank	Lab ID: MB-121951	Method: E200.7
Analysis Date: 06/07/18 07:43	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E200.2
Analyte	Result	PQL	SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Calcium	ND	0.09	
Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B			

Run ID :Run Order: ICP204-B_180606A: 335	SampType: Laboratory Control Sample	Lab ID: LCS-121951	Method: E200.7
Analysis Date: 06/07/18 07:47	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E200.2
Analyte	Result	PQL	SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Calcium	26.7	1.0	25 0 107 85 115
Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B			

Run ID :Run Order: ICP203-B_180607A: 82	SampType: Method Blank	Lab ID: MB-121951	Method: E200.7
Analysis Date: 06/07/18 18:28	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E200.2
Analyte	Result	PQL	SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Boron	ND	0.02	
Calcium	ND	0.09	
Lithium	ND	0.007	
Magnesium	ND	0.03	
Potassium	ND	0.05	
Sodium	ND	0.8	
Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B			

Run ID :Run Order: ICP203-B_180607A: 83	SampType: Laboratory Control Sample	Lab ID: LCS-121951	Method: E200.7
Analysis Date: 06/07/18 18:32	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E200.2
Analyte	Result	PQL	SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Boron	0.555	0.050	0.5 0 111 85 115
Calcium	27.3	1.0	25 0 109 85 115
Lithium	0.514	0.10	0.5 0 103 85 115
Magnesium	24.6	1.0	25 0 98 85 115
Potassium	26.4	1.0	25 0 105 85 115
Sodium	25.5	1.0	25 0 102 85 115

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121951

Run ID :Run Order: ICP203-B_180607A: 83 SampType: Laboratory Control Sample Lab ID: LCS-121951 Method: E200.7

Analysis Date: 06/07/18 18:32 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICP203-B_180607A: 105 SampType: Sample Matrix Spike Lab ID: C18050868-010BMS3 Method: E200.7

Analysis Date: 06/07/18 19:59 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Boron	1.39	0.45	0.5	0.9016	99	70	130				
Calcium	334	2.2	25	313.4		70	130				A
Lithium	1.53	0.18	0.5	1.062	93	70	130				
Magnesium	569	1.0	25	562.1		70	130				A
Potassium	48.5	1.4	25	23.22	101	70	130				
Sodium	3040	19	25	3175		70	130				A

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICP203-B_180607A: 106 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-010BMSD3 Method: E200.7

Analysis Date: 06/07/18 20:03 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Boron	1.45	0.45	0.5	0.9016	109	70	130	1.394	3.8	20	
Calcium	339	2.2	25	313.4		70	130	333.8	1.6	20	A
Lithium	1.55	0.18	0.5	1.062	98	70	130	1.526	1.7	20	
Magnesium	578	1.0	25	562.1		70	130	568.6	1.7	20	A
Potassium	49.1	1.4	25	23.22	104	70	130	48.53	1.2	20	
Sodium	3120	19	25	3175		70	130	3043	2.3	20	A

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICP203-B_180607A: 116 SampType: Sample Matrix Spike Lab ID: B18052639-001AMS3 Method: E200.7

Analysis Date: 06/07/18 20:41 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Boron	0.607	0.050	0.5	0.08754	104	70	130				
Calcium	79.1	1.0	25	53.38	103	70	130				

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121951

Run ID :Run Order: ICP203-B_180607A: 116 SampType: Sample Matrix Spike Lab ID: B18052639-001AMS3 Method: E200.7

Analysis Date: 06/07/18 20:41 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lithium	0.575	0.10	0.5	0.0303	109	70	130				
Magnesium	40.9	1.0	25	15	103	70	130				
Potassium	36.2	1.0	25	7.945	113	70	130				
Sodium	36.6	1.0	25	10.72	104	70	130				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICP203-B_180607A: 117 SampType: Sample Matrix Spike Duplicate Lab ID: B18052639-001AMSD3 Method: E200.7

Analysis Date: 06/07/18 20:45 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Boron	0.606	0.050	0.5	0.08754	104	70	130	0.6074	0.2	20	
Calcium	79.8	1.0	25	53.38	106	70	130	79.09	0.9	20	
Lithium	0.565	0.10	0.5	0.0303	107	70	130	0.5755	1.8	20	
Magnesium	40.9	1.0	25	15	104	70	130	40.87	0.1	20	
Potassium	35.6	1.0	25	7.945	111	70	130	36.16	1.6	20	
Sodium	36.4	1.0	25	10.72	103	70	130	36.62	0.7	20	

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 121951

Date: 20-Jun-18

Run ID :Run Order: ICPMS206-B_180604A: 425		SampType: Method Blank			Lab ID: MB-121951			Method: E200.8			
Analysis Date: 06/06/18 03:02		Units: mg/L			Prep Info: Prep Date: 5/31/2018			Prep Method: E200.2			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.0004									
Arsenic	ND	0.0001									
Barium	ND	0.00009									
Beryllium	0.0002	0.0001									
Cadmium	ND	0.00003									
Chromium	ND	0.0002									
Cobalt	0.00005	0.00004									
Lead	ND	0.00008									
Molybdenum	0.0002	0.00006									
Selenium	ND	0.0002									

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Run ID :Run Order: ICPMS206-B_180604A: 442		SampType: Laboratory Control Sample			Lab ID: LCS-121951			Method: E200.8			
Analysis Date: 06/06/18 04:20		Units: mg/L			Prep Info: Prep Date: 5/31/2018			Prep Method: E200.2			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.533	0.0050	0.5	0	107	85	115				
Arsenic	0.514	0.0010	0.5	0	103	85	115				
Barium	0.530	0.010	0.5	0	106	85	115				
Beryllium	0.220	0.0010	0.25	0.0001764	88	85	115				
Cadmium	0.253	0.0010	0.25	0	101	85	115				
Chromium	0.487	0.0010	0.5	0	97	85	115				
Cobalt	0.485	0.0010	0.5	0.00004921	97	85	115				
Lead	0.518	0.0010	0.5	0	104	85	115				
Molybdenum	0.457	0.0050	0.5	0.0001812	91	85	115				
Selenium	0.504	0.0050	0.5	0	101	85	115				

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121951

Run ID :Run Order: ICPMS206-B_180604A: 443 SampType: Sample Matrix Spike Lab ID: C18050868-010BMS3 Method: E200.8

Analysis Date: 06/06/18 04:25 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.549	0.0038	0.5	0	110	70	130				
Arsenic	0.539	0.0010	0.5	0	108	70	130				
Barium	0.533	0.050	0.5	0.01157	104	70	130				
Beryllium	0.227	0.0014	0.25	0	91	70	130				
Cadmium	0.255	0.0010	0.25	0	102	70	130				
Chromium	0.502	0.0050	0.5	0	100	70	130				
Cobalt	0.505	0.0050	0.5	0.001328	101	70	130				
Lead	0.513	0.0010	0.5	0.001329	102	70	130				
Molybdenum	0.535	0.0010	0.5	0.002675	106	70	130				
Selenium	0.524	0.0023	0.5	0	105	70	130				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICPMS206-B_180604A: 444 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-010BMSD3 Method: E200.8

Analysis Date: 06/06/18 04:29 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.536	0.0038	0.5	0	107	70	130	0.5488	2.5	20	
Arsenic	0.536	0.0010	0.5	0	107	70	130	0.5394	0.6	20	
Barium	0.529	0.050	0.5	0.01157	103	70	130	0.5331	0.8	20	
Beryllium	0.222	0.0014	0.25	0	89	70	130	0.2274	2.4	20	
Cadmium	0.253	0.0010	0.25	0	101	70	130	0.2553	0.7	20	
Chromium	0.512	0.0050	0.5	0	102	70	130	0.5017	2.0	20	
Cobalt	0.499	0.0050	0.5	0.001328	100	70	130	0.5048	1.2	20	
Lead	0.507	0.0010	0.5	0.001329	101	70	130	0.5134	1.2	20	
Molybdenum	0.483	0.0010	0.5	0.002675	96	70	130	0.535	10	20	
Selenium	0.518	0.0023	0.5	0	104	70	130	0.5238	1.0	20	

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 121951

Date: 20-Jun-18

Run ID :Run Order: ICPMS202-B_180606A: 125	SampType: Method Blank	Lab ID: MB-121951	Method: E200.8								
Analysis Date: 06/06/18 15:08	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E200.2								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0007	0.00006									
Barium	0.0005	0.00004									
Beryllium	0.0002	0.00002									
Cadmium	0.0003	0.00002									
Chromium	0.0007	0.00009									
Cobalt	0.0004	0.00003									
Lead	0.0005	0.00005									
Molybdenum	0.0008	0.00005									
Selenium	0.0007	0.0002									
Thallium	0.0005	0.0001									

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Run ID :Run Order: ICPMS202-B_180606A: 134	SampType: Laboratory Control Sample	Lab ID: LCS-121951	Method: E200.8								
Analysis Date: 06/06/18 15:32	Units: mg/L	Prep Info: Prep Date: 5/31/2018	Prep Method: E200.2								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.531	0.0010	0.5	0.000693	106	85	115				
Barium	0.518	0.010	0.5	0.000532	104	85	115				
Beryllium	0.238	0.0010	0.25	0.000222	95	85	115				
Cadmium	0.256	0.0010	0.25	0.000295	102	85	115				
Chromium	0.480	0.0010	0.5	0.000683	96	85	115				
Cobalt	0.491	0.0010	0.5	0.000422	98	85	115				
Lead	0.521	0.0010	0.5	0.000493	104	85	115				
Molybdenum	0.520	0.0050	0.5	0.000833	104	85	115				
Selenium	0.511	0.0050	0.5	0.000699	102	85	115				
Thallium	0.499	0.0010	0.5	0.000505	100	85	115				

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121951

Run ID :Run Order: ICPMS202-B_180606A: 135 SampType: Sample Matrix Spike Lab ID: C18050868-010BMS3 Method: E200.8

Analysis Date: 06/06/18 15:34 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.537	0.0010	0.5	0.00073	107	70	130				
Barium	0.508	0.050	0.5	0.00882	100	70	130				
Beryllium	0.241	0.0010	0.25	0	96	70	130				
Cadmium	0.255	0.0010	0.25	0	102	70	130				
Chromium	0.481	0.0050	0.5	0.00176	96	70	130				
Cobalt	0.505	0.0050	0.5	0	101	70	130				
Lead	0.526	0.0010	0.5	0	105	70	130				
Molybdenum	0.531	0.0010	0.5	0	106	70	130				
Selenium	0.516	0.0023	0.5	0.00244	103	70	130				
Thallium	0.521	0.0014	0.5	0	104	70	130				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICPMS202-B_180606A: 136 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-010BMSD3 Method: E200.8

Analysis Date: 06/06/18 15:37 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.551	0.0010	0.5	0.00073	110	70	130	0.5373	2.5	20	
Barium	0.501	0.050	0.5	0.00882	98	70	130	0.5077	1.3	20	
Beryllium	0.237	0.0010	0.25	0	95	70	130	0.2408	1.7	20	
Cadmium	0.261	0.0010	0.25	0	104	70	130	0.2547	2.4	20	
Chromium	0.478	0.0050	0.5	0.00176	95	70	130	0.4807	0.6	20	
Cobalt	0.509	0.0050	0.5	0	102	70	130	0.5047	0.8	20	
Lead	0.542	0.0010	0.5	0	108	70	130	0.5261	3.0	20	
Molybdenum	0.536	0.0010	0.5	0	107	70	130	0.5307	0.9	20	
Selenium	0.512	0.0023	0.5	0.00244	102	70	130	0.5165	0.8	20	
Thallium	0.540	0.0014	0.5	0	108	70	130	0.5207	3.7	20	

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121951

Run ID :Run Order: ICPMS206-B_180606A: 224 SampType: Method Blank Lab ID: MB-121951 Method: E200.8

Analysis Date: 06/07/18 16:56 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.0004									
Arsenic	ND	0.0001									
Barium	ND	0.00009									
Beryllium	ND	0.0001									
Cadmium	ND	0.00003									
Chromium	ND	0.0002									
Cobalt	ND	0.0004									
Lead	ND	0.00008									
Molybdenum	ND	0.00006									
Selenium	ND	0.0002									
Thallium	ND	0.00007									

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICPMS206-B_180606A: 230 SampType: Laboratory Control Sample Lab ID: LCS-121951 Method: E200.8

Analysis Date: 06/07/18 17:21 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.541	0.0050	0.5	0	108	85	115				
Arsenic	0.532	0.0010	0.5	0	106	85	115				
Barium	0.530	0.010	0.5	0	106	85	115				
Beryllium	0.250	0.0010	0.25	0	100	85	115				
Cadmium	0.264	0.0010	0.25	0	106	85	115				
Chromium	0.513	0.0010	0.5	0	103	85	115				
Cobalt	0.513	0.0010	0.5	0	103	85	115				
Lead	0.536	0.0010	0.5	0	107	85	115				
Molybdenum	0.508	0.0050	0.5	0	102	85	115				
Selenium	0.525	0.0050	0.5	0	105	85	115				
Thallium	0.533	0.0010	0.5	0	107	85	115				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121951

Run ID :Run Order: ICPMS206-B_180606A: 232 SampType: Sample Matrix Spike Lab ID: C18050868-010BMS3 Method: E200.8

Analysis Date: 06/07/18 17:29 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.548	0.0038	0.5	0.008235	108	70	130				
Arsenic	0.546	0.0010	0.5	0	109	70	130				
Barium	0.499	0.050	0.5	0.004689	99	70	130				
Beryllium	0.253	0.0014	0.25	0.001525	101	70	130				
Cadmium	0.263	0.0010	0.25	0	105	70	130				
Chromium	0.518	0.0050	0.5	0	104	70	130				
Cobalt	0.531	0.0050	0.5	0.001125	106	70	130				
Lead	0.518	0.0010	0.5	0	104	70	130				
Molybdenum	0.532	0.0010	0.5	0.02082	102	70	130				
Selenium	0.526	0.0023	0.5	0	105	70	130				
Thallium	0.519	0.00075	0.5	0.002059	103	70	130				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICPMS206-B_180606A: 233 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-010BMSD3 Method: E200.8

Analysis Date: 06/07/18 17:33 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.535	0.0038	0.5	0.008235	105	70	130	0.5475	2.3	20	
Arsenic	0.550	0.0010	0.5	0	110	70	130	0.5463	0.7	20	
Barium	0.473	0.050	0.5	0.004689	94	70	130	0.4994	5.3	20	
Beryllium	0.246	0.0014	0.25	0.001525	98	70	130	0.2535	2.9	20	
Cadmium	0.257	0.0010	0.25	0	103	70	130	0.2629	2.2	20	
Chromium	0.528	0.0050	0.5	0	106	70	130	0.5185	1.7	20	
Cobalt	0.524	0.0050	0.5	0.001125	105	70	130	0.5314	1.3	20	
Lead	0.505	0.0010	0.5	0	101	70	130	0.5178	2.6	20	
Molybdenum	0.522	0.0010	0.5	0.02082	100	70	130	0.5317	1.9	20	
Selenium	0.521	0.0023	0.5	0	104	70	130	0.5261	1.1	20	
Thallium	0.525	0.00075	0.5	0.002059	105	70	130	0.5187	1.2	20	

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121951

Run ID :Run Order: ICPMS202-B_180608A: 95 SampType: Method Blank Lab ID: MB-121951 Method: E200.8

Analysis Date: 06/08/18 17:49 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.00006									
Chromium	0.0002	0.00009									
Lead	ND	0.00005									
Molybdenum	ND	0.00007									
Selenium	ND	0.0002									
Thallium	ND	0.0001									

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICPMS202-B_180608A: 104 SampType: Laboratory Control Sample Lab ID: LCS-121951 Method: E200.8

Analysis Date: 06/08/18 18:13 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.529	0.0010	0.5	0	106	85	115				
Chromium	0.461	0.0050	0.5	0.000155	92	85	115				
Lead	0.500	0.0010	0.5	0	100	85	115				
Molybdenum	0.554	0.0010	0.5	0	111	85	115				
Selenium	0.501	0.0010	0.5	0	100	85	115				
Thallium	0.494	0.00050	0.5	0	99	85	115				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Run ID :Run Order: ICPMS202-B_180608A: 108 SampType: Sample Matrix Spike Lab ID: C18050868-010BMS3 Method: E200.8

Analysis Date: 06/08/18 18:23 Units: mg/L Prep Info: Prep Date: 5/31/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.525	0.0010	0.5	0.000325	105	70	130				
Chromium	0.476	0.0050	0.5	0.000885	95	70	130				
Lead	0.504	0.0010	0.5	0	101	70	130				
Molybdenum	0.540	0.0010	0.5	0	108	70	130				
Selenium	0.494	0.0011	0.5	0.004005	98	70	130				
Thallium	0.507	0.00071	0.5	0	101	70	130				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B

Qualifiers: ND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limit

N - Analyte concentration was not sufficiently high to calculate RPD

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 121951

Date: 20-Jun-18

Run ID :Run Order: **ICPMS202-B_180608A: 109** SampType: **Sample Matrix Spike Duplicate** Lab ID: **C18050868-010BMSD3** Method: **E200.8**

Analysis Date: **06/08/18 18:26** Units: **mg/L** Prep Info: Prep Date: **5/31/2018** Prep Method: **E200.2**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.532	0.0010	0.5	0.000325	106	70	130	0.525	1.2	20	
Chromium	0.454	0.0050	0.5	0.000885	91	70	130	0.4762	4.7	20	
Lead	0.515	0.0010	0.5	0	103	70	130	0.5045	2.2	20	
Molybdenum	0.559	0.0010	0.5	0	112	70	130	0.5405	3.4	20	
Selenium	0.494	0.0011	0.5	0.004005	98	70	130	0.4944	0.2	20	
Thallium	0.521	0.00071	0.5	0	104	70	130	0.507	2.7	20	

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121994

Run ID :Run Order: ICP204-B_180606A: 284 SampType: Method Blank Lab ID: MB-121994 Method: E200.7

Analysis Date: 06/07/18 04:30 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	ND	0.007									
Boron	ND	0.02									
Calcium	ND	0.09									
Lithium	ND	0.007									
Magnesium	ND	0.03									
Potassium	ND	0.05									
Sodium	ND	0.8									

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP204-B_180606A: 285 SampType: Laboratory Control Sample Lab ID: LCS-121994 Method: E200.7

Analysis Date: 06/07/18 04:34 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	0.522	0.050	0.5	0	104	85	115				
Boron	0.536	0.050	0.5	0	107	85	115				
Calcium	25.4	1.0	25	0	102	85	115				
Lithium	0.546	0.10	0.5	0	109	85	115				
Magnesium	25.2	1.0	25	0	101	85	115				
Potassium	26.9	1.0	25	0	108	85	115				
Sodium	26.4	1.0	25	0	105	85	115				

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP204-B_180606A: 301 SampType: Sample Matrix Spike Lab ID: C18050868-019BMS3 Method: E200.7

Analysis Date: 06/07/18 05:35 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	0.475	0.071	0.5	0	95	70	130				
Boron	1.41	0.18	0.5	0.8976	102	70	130				
Calcium	490	1.0	25	465.3		70	130				A
Lithium	0.720	0.10	0.5	0.2525	94	70	130				
Magnesium	342	1.0	25	317.2		70	130				A

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121994

Run ID :Run Order: ICP204-B_180606A: 301 SampType: Sample Matrix Spike Lab ID: C18050868-019BMS3 Method: E200.7

Analysis Date: 06/07/18 05:35 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Potassium	37.2	1.0	25	13.46	95	70	130				
Sodium	323	7.8	25	305.9		70	130				A

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP204-B_180606A: 302 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-019BMSD3 Method: E200.7

Analysis Date: 06/07/18 05:39 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	0.462	0.071	0.5	0	92	70	130	0.4749	2.8	20	
Boron	1.36	0.18	0.5	0.8976	93	70	130	1.409	3.2	20	
Calcium	479	1.0	25	465.3		70	130	489.8	2.3	20	A
Lithium	0.700	0.10	0.5	0.2525	89	70	130	0.7202	2.8	20	
Magnesium	334	1.0	25	317.2		70	130	341.9	2.5	20	A
Potassium	36.0	1.0	25	13.46	90	70	130	37.24	3.3	20	
Sodium	313	7.8	25	305.9		70	130	323.3	3.2	20	A

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP204-B_180606A: 322 SampType: Sample Matrix Spike Lab ID: C18050868-030BMS3 Method: E200.7

Analysis Date: 06/07/18 06:56 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	0.608	0.071	0.5	0	122	70	130				
Boron	1.01	0.18	0.5	0.4645	110	70	130				
Calcium	488	1.0	25	463.9		70	130				A
Lithium	0.803	0.10	0.5	0.1727	126	70	130				
Magnesium	999	1.0	25	976.7		70	130				A
Potassium	60.5	1.0	25	30.6	120	70	130				
Sodium	1020	7.8	25	1007		70	130				A

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers: ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121994

Run ID :Run Order: ICP204-B_180606A: 323 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-030BMSD3 Method: E200.7

Analysis Date: 06/07/18 07:00 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	0.617	0.071	0.5	0	123	70	130	0.6085	1.5	20	
Boron	1.02	0.18	0.5	0.4645	111	70	130	1.014	0.6	20	
Calcium	488	1.0	25	463.9		70	130	487.5	0.1	20	A
Lithium	0.827	0.10	0.5	0.1727	131	70	130	0.8031	2.9	20	S
Magnesium	1000	1.0	25	976.7		70	130	998.6	0.4	20	A
Potassium	61.4	1.0	25	30.6	123	70	130	60.53	1.3	20	
Sodium	1040	7.8	25	1007		70	130	1023	1.6	20	A

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP204-B_180608B: 53 SampType: Method Blank Lab ID: MB-121994 Method: E200.7

Analysis Date: 06/08/18 18:16 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	ND	0.007									
Boron	ND	0.02									
Calcium	ND	0.09									
Lithium	ND	0.007									
Magnesium	ND	0.03									
Potassium	ND	0.05									
Sodium	ND	0.8									

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP203-B_180611A: 198 SampType: Method Blank Lab ID: MB-121994 Method: E200.7

Analysis Date: 06/11/18 22:47 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	ND	0.007									
Boron	ND	0.02									
Calcium	ND	0.09									
Lithium	ND	0.007									
Magnesium	ND	0.03									

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121994

Run ID :Run Order: ICP203-B_180611A: 198 SampType: Method Blank Lab ID: MB-121994 Method: E200.7

Analysis Date: 06/11/18 22:47 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Potassium ND 0.05

Sodium ND 0.8

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP203-B_180611A: 199 SampType: Laboratory Control Sample Lab ID: LCS-121994 Method: E200.7

Analysis Date: 06/11/18 22:51 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Barium 0.487 0.050 0.5 0 97 85 115

Boron 0.508 0.050 0.5 0 102 85 115

Calcium 25.4 1.0 25 0 102 85 115

Lithium 0.487 0.10 0.5 0 97 85 115

Magnesium 24.8 1.0 25 0 99 85 115

Potassium 24.8 1.0 25 0 99 85 115

Sodium 24.5 1.0 25 0 98 85 115

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP203-B_180611A: 215 SampType: Sample Matrix Spike Lab ID: C18050868-030BMS3 Method: E200.7

Analysis Date: 06/11/18 23:54 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Barium 0.496 0.18 0.5 0 99 70 130

Boron 0.907 0.45 0.5 0 181 70 130 S

Calcium 500 2.2 25 447.2 70 130 A

Lithium 0.589 0.18 0.5 0 118 70 130

Magnesium 917 1.0 25 917.1 70 130 A

Potassium 47.1 1.4 25 25.37 87 70 130

Sodium 847 19 25 859 70 130 A

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 121994

Date: 20-Jun-18

Run ID :Run Order: ICP203-B_180611A: 216		SampType: Sample Matrix Spike Duplicate				Lab ID: C18050868-030BMSD3				Method: E200.7		
Analysis Date: 06/11/18 23:58		Units: mg/L				Prep Info:		Prep Date: 6/1/2018		Prep Method: E200.2		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Barium	0.507	0.18	0.5	0	101	70	130	0.4959	2.1	20		
Boron	0.893	0.45	0.5	0	179	70	130	0.907	1.6	20	S	
Calcium	493	2.2	25	447.2		70	130	500.5	1.5	20	A	
Lithium	0.601	0.18	0.5	0	120	70	130	0.5892	2.0	20		
Magnesium	917	1.0	25	917.1		70	130	917.2	0.0	20	A	
Potassium	48.6	1.4	25	25.37	93	70	130	47.14	2.9	20		
Sodium	847	19	25	859		70	130	847.4	0.1	20	A	

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICP204-B_180614A: 72		SampType: Method Blank				Lab ID: MB-121994				Method: E200.7		
Analysis Date: 06/14/18 18:05		Units: mg/L				Prep Info:		Prep Date: 6/1/2018		Prep Method: E200.2		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Barium	ND	0.007										
Boron	0.1	0.02										
Calcium	ND	0.09										
Lithium	ND	0.007										
Magnesium	ND	0.03										
Potassium	ND	0.05										
Sodium	ND	0.8										

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121994

Run ID :Run Order: ICPMS206-B_180606A: 236 SampType: Method Blank Lab ID: MB-121994 Method: E200.8

Analysis Date: 06/07/18 17:46 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.0001									
Selenium	ND	0.0002									

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICPMS206-B_180606A: 243 SampType: Laboratory Control Sample Lab ID: LCS-121994 Method: E200.8

Analysis Date: 06/07/18 18:15 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.541	0.0010	0.5	0	108	85	115				
Selenium	0.497	0.0050	0.5	0	99	85	115				

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICPMS206-B_180606A: 244 SampType: Sample Matrix Spike Lab ID: C18050868-019BMS3 Method: E200.8

Analysis Date: 06/07/18 18:19 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.585	0.0010	0.5	0.02542	112	70	130				
Selenium	0.551	0.0010	0.5	0.001863	110	70	130				

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICPMS206-B_180606A: 245 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-019BMSD3 Method: E200.8

Analysis Date: 06/07/18 18:24 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.571	0.0010	0.5	0.02542	109	70	130	0.585	2.5	20	
Selenium	0.532	0.0010	0.5	0.001863	106	70	130	0.5508	3.4	20	

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121994

Run ID :Run Order: ICPMS206-B_180606A: 256 SampType: Sample Matrix Spike Lab ID: C18050868-030BMS3 Method: E200.8

Analysis Date: 06/07/18 19:10 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.553	0.0010	0.5	0	111	70	130				
Selenium	0.539	0.0012	0.5	0	108	70	130				

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICPMS206-B_180606A: 257 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-030BMSD3 Method: E200.8

Analysis Date: 06/07/18 19:14 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.548	0.0010	0.5	0	110	70	130	0.5535	0.9	20	
Selenium	0.532	0.0012	0.5	0	106	70	130	0.539	1.2	20	

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICPMS206-B_180608A: 175 SampType: Method Blank Lab ID: MB-121994 Method: E200.8

Analysis Date: 06/09/18 00:25 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.0001									
Selenium	ND	0.0002									

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICPMS206-B_180608A: 182 SampType: Laboratory Control Sample Lab ID: LCS-121994 Method: E200.8

Analysis Date: 06/09/18 00:57 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.492	0.0010	0.5	0	98	85	115				
Selenium	0.474	0.0050	0.5	0	95	85	115				

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limit	N - Analyte concentration was not sufficiently high to calculate RPD
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits	A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 121994

Run ID :Run Order: ICPMS206-B_180608A: 183 SampType: Sample Matrix Spike Lab ID: C18050868-030BMS3 Method: E200.8

Analysis Date: 06/09/18 01:02 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.549	0.0010	0.5	0	110	70	130				
Selenium	0.524	0.0012	0.5	0	105	70	130				

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Run ID :Run Order: ICPMS206-B_180608A: 184 SampType: Sample Matrix Spike Duplicate Lab ID: C18050868-030BMSD3 Method: E200.8

Analysis Date: 06/09/18 01:06 Units: mg/L Prep Info: Prep Date: 6/1/2018 Prep Method: E200.2

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.548	0.0010	0.5	0	110	70	130	0.549	0.2	20	
Selenium	0.526	0.0012	0.5	0	105	70	130	0.5245	0.4	20	

Associated samples: C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 122090

 Run ID :Run Order: **HGCV202-B_180606A: 12** SampType: Method Blank Lab ID: **MB-122090** Method: **E245.1**

 Analysis Date: **06/06/18 10:21** Units: **mg/L** Prep Info: Prep Date: **6/5/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury ND 0.00005

Associated samples: C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B

 Run ID :Run Order: **HGCV202-B_180606A: 13** SampType: Laboratory Control Sample Lab ID: **LCS-122090** Method: **E245.1**

 Analysis Date: **06/06/18 10:22** Units: **mg/L** Prep Info: Prep Date: **6/5/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury 0.00219 0.00010 0.002 0 110 85 115

Associated samples: C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B

 Run ID :Run Order: **HGCV202-B_180606A: 17** SampType: Sample Matrix Spike Lab ID: **C18050868-008BMS** Method: **E245.1**

 Analysis Date: **06/06/18 10:30** Units: **mg/L** Prep Info: Prep Date: **6/5/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury 0.00215 0.00010 0.002 0.0001566 100 70 130

Associated samples: C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B

 Run ID :Run Order: **HGCV202-B_180606A: 18** SampType: Sample Matrix Spike Duplicate Lab ID: **C18050868-008BMSD** Method: **E245.1**

 Analysis Date: **06/06/18 10:32** Units: **mg/L** Prep Info: Prep Date: **6/5/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury 0.00216 0.00010 0.002 0.0001566 100 70 130 0.002152 0.6 30

Associated samples: C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B

 Run ID :Run Order: **HGCV202-B_180606A: 38** SampType: Sample Matrix Spike Lab ID: **C18050868-027BMS** Method: **E245.1**

 Analysis Date: **06/06/18 11:10** Units: **mg/L** Prep Info: Prep Date: **6/5/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury 0.00202 0.00010 0.002 0 101 70 130

Associated samples: C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B

Qualifiers: ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limit N - Analyte concentration was not sufficiently high to calculate RPD

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 122090

 Run ID :Run Order: **HGCV202-B_180606A: 39** SampType: **Sample Matrix Spike Duplicate** Lab ID: **C18050868-027BMSD** Method: **E245.1**

 Analysis Date: **06/06/18 11:12** Units: **mg/L** Prep Info: Prep Date: **6/5/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00202	0.00010	0.002	0	101	70	130	0.002018	0.2	30	

Associated samples: C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: 122257

 Run ID :Run Order: **HGCV202-B_180611A: 39** SampType: Method Blank Lab ID: **MB-122257** Method: **E245.1**

 Analysis Date: **06/11/18 14:54** Units: **mg/L** Prep Info: Prep Date: **6/11/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury ND 0.00005

 Associated samples: **C18050868-015B, C18050868-028B, C18050868-029B, C18050868-030B**

 Run ID :Run Order: **HGCV202-B_180611A: 40** SampType: Laboratory Control Sample Lab ID: **LCS-122257** Method: **E245.1**

 Analysis Date: **06/11/18 14:56** Units: **mg/L** Prep Info: Prep Date: **6/11/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury 0.00220 0.00010 0.002 0 110 85 115

 Associated samples: **C18050868-015B, C18050868-028B, C18050868-029B, C18050868-030B**

 Run ID :Run Order: **HGCV202-B_180611A: 104** SampType: Sample Matrix Spike Lab ID: **B18052543-001BMS** Method: **E245.1**

 Analysis Date: **06/11/18 15:22** Units: **mg/L** Prep Info: Prep Date: **6/11/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury 0.00219 0.00010 0.002 0 110 70 130

 Associated samples: **C18050868-015B, C18050868-028B, C18050868-029B, C18050868-030B**

 Run ID :Run Order: **HGCV202-B_180611A: 105** SampType: Sample Matrix Spike Duplicate Lab ID: **B18052543-001BMSD** Method: **E245.1**

 Analysis Date: **06/11/18 15:24** Units: **mg/L** Prep Info: Prep Date: **6/11/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Mercury 0.00223 0.00010 0.002 0 111 70 130 0.002191 1.7 30

 Associated samples: **C18050868-015B, C18050868-028B, C18050868-029B, C18050868-030B**
Qualifiers: ND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limit

N - Analyte concentration was not sufficiently high to calculate RPD

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 122466

Date: 20-Jun-18

Run ID :Run Order: **HGCV202-B_180615A: 12** SampType: **Method Blank** Lab ID: **MB-122466** Method: **E245.1**

Analysis Date: **06/15/18 14:54** Units: **mg/L** Prep Info: Prep Date: **6/15/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.00005									

Associated samples: **C18050868-008B**

Run ID :Run Order: **HGCV202-B_180615A: 13** SampType: **Laboratory Control Sample** Lab ID: **LCS-122466** Method: **E245.1**

Analysis Date: **06/15/18 14:55** Units: **mg/L** Prep Info: Prep Date: **6/15/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00202	0.00010	0.002	0	101	85	115				

Associated samples: **C18050868-008B**

Run ID :Run Order: **HGCV202-B_180615A: 18** SampType: **Sample Matrix Spike** Lab ID: **B18060683-001BMS** Method: **E245.1**

Analysis Date: **06/15/18 15:05** Units: **mg/L** Prep Info: Prep Date: **6/15/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00200	0.00010	0.002	0	100	70	130				

Associated samples: **C18050868-008B**

Run ID :Run Order: **HGCV202-B_180615A: 19** SampType: **Sample Matrix Spike Duplicate** Lab ID: **B18060683-001BMSD** Method: **E245.1**

Analysis Date: **06/15/18 15:07** Units: **mg/L** Prep Info: Prep Date: **6/15/2018** Prep Method: **E245.1**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00202	0.00010	0.002	0	101	70	130	0.001999	1.1	30	

Associated samples: **C18050868-008B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT
 Prepared by Billings, MT Branch
BatchID: 180531A

Date: 20-Jun-18

Run ID :Run Order:	HGCV202-B_180531A: 9			SampType:	Initial Calibration Verification Standard			Lab ID:	ICV	Method:	E245.1
Analysis Date:	05/31/18 11:46				Units:	mg/L				Prep Info:	Prep Date: 4/18/2018
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00217	0.00010	0.002	0	109	90	110				

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 180606A

Date: 20-Jun-18

Run ID :Run Order: **HGCV202-B_180606A: 9** SampType: Initial Calibration Verification Standard Lab ID: **ICV** Method: **E245.1**

Analysis Date: **06/06/18 10:15** Units: **mg/L** Prep Info: Prep Date: **4/18/2018** Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00220	0.00010	0.002	0	110	90	110				

Associated samples: C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: 180611A

Date: 20-Jun-18

Run ID :Run Order: **HGCV202-B_180611A: 9** SampType: Initial Calibration Verification Standard Lab ID: **ICV** Method: **E245.1**

Analysis Date: **06/11/18 13:57** Units: **mg/L** Prep Info: Prep Date: **6/11/2018** Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00210	0.00010	0.002	0	105	90	110				

Associated samples: **C18050868-015B, C18050868-028B, C18050868-029B, C18050868-030B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT
Prepared by Billings, MT Branch
BatchID: 180615A

Date: 20-Jun-18

Run ID :Run Order: **HGCV202-B_180615A: 9** SampType: Initial Calibration Verification Standard Lab ID: **ICV** Method: **E245.1**

Analysis Date: **06/15/18 14:48** Units: **mg/L** Prep Info: Prep Date: **4/18/2018** Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00197	0.00010	0.002	0	98	90	110				

Associated samples: **C18050868-008B**

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT
 Prepared by Billings, MT Branch
BatchID: R301382

Date: 20-Jun-18

Run ID :Run Order: **ICPMS206-B_180604A: 355** SampType: Initial Calibration Verification Standard Lab ID: **QCS** Method: **E200.8**

Analysis Date: **06/05/18 20:02** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.0499	0.050	0.05	0	100	90	110				
Arsenic	0.0503	0.0050	0.05	0	101	90	110				
Barium	0.0513	0.10	0.05	0	103	90	110				
Beryllium	0.0258	0.0010	0.025	0	103	90	110				
Cadmium	0.0255	0.0010	0.025	0	102	90	110				
Chromium	0.0512	0.010	0.05	0	102	90	110				
Cobalt	0.0521	0.010	0.05	0	104	90	110				
Lead	0.0503	0.010	0.05	0	101	90	110				
Molybdenum	0.0475	0.0050	0.05	0	95	90	110				
Selenium	0.0528	0.0050	0.05	0	106	90	110				

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: R301505

Run ID :Run Order: ICPMS206-B_180606A: 192 SampType: Initial Calibration Verification Standard Lab ID: QCS Method: E200.8

Analysis Date: 06/07/18 14:34 Units: mg/L Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.0504	0.050	0.05	0	101	90	110				
Arsenic	0.0497	0.0050	0.05	0	99	90	110				
Barium	0.0493	0.10	0.05	0	99	90	110				
Beryllium	0.0249	0.0010	0.025	0	100	90	110				
Cadmium	0.0249	0.0010	0.025	0	100	90	110				
Chromium	0.0497	0.010	0.05	0	99	90	110				
Cobalt	0.0513	0.010	0.05	0	103	90	110				
Lead	0.0496	0.010	0.05	0	99	90	110				
Molybdenum	0.0477	0.0050	0.05	0	95	90	110				
Selenium	0.0519	0.0050	0.05	0	104	90	110				
Thallium	0.0495	0.10	0.05	0	99	90	110				

Associated samples: C18050868-008B, C18050868-009B, C18050868-010B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: R301517

Date: 20-Jun-18

Run ID :Run Order: **ICPMS202-B_180606A: 102** SampType: Initial Calibration Verification Standard Lab ID: **QCS** Method: **E200.8**

Analysis Date: **06/06/18 14:38** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0500	0.0050	0.05	0	100	90	110				
Beryllium	0.0252	0.0010	0.025	0	101	90	110				
Chromium	0.0496	0.010	0.05	0	99	90	110				
Lead	0.0491	0.010	0.05	0	98	90	110				
Molybdenum	0.0482	0.0050	0.05	0	97	90	110				
Selenium	0.0532	0.0050	0.05	0	106	90	110				

Associated samples: **C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: R301603

Run ID :Run Order: **ICP204-B_180606A: 6** SampType: Continuing Calibration Verification Standar Lab ID: **ICV** Method: **E200.7**

Analysis Date: **06/06/18 09:16** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Barium	2.44	0.10	2.5	0	98	95	105				
Boron	2.48	0.10	2.5	0	99	95	105				
Calcium	25.3	1.0	25	0	101	95	105				
Lithium	1.26	0.10	1.25	0	101	95	105				
Magnesium	25.3	1.0	25	0	101	95	105				
Potassium	25.4	1.0	25	0	102	95	105				
Sodium	25.6	1.0	25	0	102	95	105				

Associated samples: C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-011B, C18050868-012B, C18050868-013B, C18050868-014B, C18050868-015B, C18050868-016B, C18050868-017B, C18050868-018B, C18050868-019B, C18050868-021B, C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: R301678

Date: 20-Jun-18

Run ID :Run Order: **ICP203-B_180607A: 6** SampType: Continuing Calibration Verification Standar Lab ID: **ICV** Method: **E200.7**

Analysis Date: **06/07/18 11:52** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Boron	2.51	0.10	2.5	0	100	95	105				
Calcium	24.6	1.0	25	0	99	95	105				
Lithium	1.24	0.10	1.25	0	99	95	105				
Magnesium	24.8	1.0	25	0	99	95	105				
Potassium	25.3	1.0	25	0	101	95	105				
Sodium	25.1	1.0	25	0	100	95	105				

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B, C18050868-008B, C18050868-009B, C18050868-010B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

Date: 20-Jun-18

BatchID: R301723

Run ID :Run Order: **ICPMS206-B_180608A: 172** SampType: Initial Calibration Verification Standard Lab ID: **QCS** Method: **E200.8**

Analysis Date: **06/08/18 23:53** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0495	0.0050	0.05	0	99	90	110				
Selenium	0.0504	0.0050	0.05	0	101	90	110				

Associated samples: **C18050868-015B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B**

Run ID :Run Order: **ICPMS206-B_180608A: 196** SampType: Initial Calibration Verification Standard Lab ID: **QCS** Method: **E200.8**

Analysis Date: **06/09/18 11:02** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0497	0.0050	0.05	0	99	90	110				
Selenium	0.0508	0.0050	0.05	0	102	90	110				

Associated samples: **C18050868-015B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: R301727

Date: 20-Jun-18

Run ID :Run Order: **ICPMS202-B_180608A: 8** SampType: Initial Calibration Verification Standard Lab ID: **QCS** Method: **E200.8**

Analysis Date: **06/08/18 15:55** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0496	0.0050	0.05	0	99	90	110				
Chromium	0.0494	0.010	0.05	0	99	90	110				
Lead	0.0496	0.010	0.05	0	99	90	110				
Molybdenum	0.0505	0.0050	0.05	0	101	90	110				
Selenium	0.0492	0.0050	0.05	0	98	90	110				
Thallium	0.0503	0.10	0.05	0	101	90	110				

Associated samples: **C18050868-001B, C18050868-002B, C18050868-003B, C18050868-004B, C18050868-005B, C18050868-006B, C18050868-007B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT

Prepared by Billings, MT Branch

BatchID: R301751

Date: 20-Jun-18

Run ID :Run Order: **ICP204-B_180608B: 6** SampType: Continuing Calibration Verification Standar Lab ID: **ICV** Method: **E200.7**

Analysis Date: **06/08/18 10:01** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	24.6	1.0	25	0	99	95	105				
Magnesium	25.4	1.0	25	0	101	95	105				
Potassium	25.8	1.0	25	0	103	95	105				
Sodium	26.0	1.0	25	0	104	95	105				

Associated samples: **C18050868-011B, C18050868-017B, C18050868-027B, C18050868-029B, C18050868-030B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT
Prepared by Billings, MT Branch
BatchID: R301767

Date: 20-Jun-18

Run ID :Run Order: **ICP203-B_180611A: 6** SampType: **Continuing Calibration Verification Standar** Lab ID: **ICV** Method: **E200.7**

Analysis Date: **06/11/18 09:37** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
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Lithium	1.29	0.10	1.25	0	103	95	105				
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Associated samples: **C18050868-021B**

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than four times the spike amount

Client: PacifiCorp
Work Order: C18050868
Project: PERCM49

ANALYTICAL QC SUMMARY REPORT
 Prepared by Billings, MT Branch
BatchID: R302057

Date: 20-Jun-18

Run ID :Run Order: **ICP204-B_180614A: 6** SampType: **Continuing Calibration Verification Standar** Lab ID: **ICV** Method: **E200.7**

Analysis Date: **06/14/18 12:02** Units: **mg/L** Prep Info: Prep Date: Prep Method:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lithium	1.27	0.10	1.25	0	101	95	105				

Associated samples: **C18050868-022B, C18050868-023B, C18050868-025B, C18050868-026B, C18050868-027B, C18050868-028B, C18050868-029B, C18050868-030B**

Qualifiers: ND - Not Detected at the Reporting Limit
 J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limit
 R - RPD outside accepted recovery limits

N - Analyte concentration was not sufficiently high to calculate RPD
 A - Analyte concentration greater than four times the spike amount

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: ICP203-B_180607A		
Lab ID: ICV	6	Continuing Calibration Verification Standard								06/07/18 11:52
Boron		2.51	mg/L	0.10	100	95	105			
Calcium		24.6	mg/L	1.0	99	95	105			
Lithium		1.24	mg/L	0.10	99	95	105			
Magnesium		24.8	mg/L	1.0	99	95	105			
Potassium		25.3	mg/L	1.0	101	95	105			
Sodium		25.1	mg/L	1.0	100	95	105			
Method: E200.7								Batch: 121951		
Lab ID: MB-121951	6	Method Blank								06/07/18 18:28
Boron		ND	mg/L	0.02						
Calcium		ND	mg/L	0.09						
Lithium		ND	mg/L	0.007						
Magnesium		ND	mg/L	0.03						
Potassium		ND	mg/L	0.05						
Sodium		ND	mg/L	0.8						
Lab ID: LCS-121951	6	Laboratory Control Sample								06/07/18 18:32
Boron		0.555	mg/L	0.050	111	85	115			
Calcium		27.3	mg/L	1.0	109	85	115			
Lithium		0.514	mg/L	0.10	103	85	115			
Magnesium		24.6	mg/L	1.0	98	85	115			
Potassium		26.4	mg/L	1.0	105	85	115			
Sodium		25.5	mg/L	1.0	102	85	115			
Lab ID: C18050868-010BMS3	6	Sample Matrix Spike								06/07/18 19:59
Boron		1.39	mg/L	0.45	99	70	130			
Calcium		334	mg/L	2.2		70	130			A
Lithium		1.53	mg/L	0.18	93	70	130			
Magnesium		569	mg/L	1.0		70	130			A
Potassium		48.5	mg/L	1.4	101	70	130			
Sodium		3040	mg/L	19		70	130			A
Lab ID: C18050868-010BMSD	6	Sample Matrix Spike Duplicate								06/07/18 20:03
Boron		1.45	mg/L	0.45	109	70	130	3.8	20	
Calcium		339	mg/L	2.2		70	130	1.6	20	A
Lithium		1.55	mg/L	0.18	98	70	130	1.7	20	
Magnesium		578	mg/L	1.0		70	130	1.7	20	A
Potassium		49.1	mg/L	1.4	104	70	130	1.2	20	
Sodium		3120	mg/L	19		70	130	2.3	20	A

Qualifiers:

RL - Analyte reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Analytical Run: ICP203-B_180611A
Lab ID: ICV										06/11/18 09:37
Lithium		1.29	mg/L	0.10	103	95	105			
Method: E200.7										Batch: 121994
Lab ID: MB-121994										06/11/18 22:47
Lithium		ND	mg/L	0.007						
Lab ID: LCS-121994										06/11/18 22:51
Lithium		0.487	mg/L	0.10	97	85	115			
Lab ID: C18050868-030BMS3										06/11/18 23:54
Lithium		0.589	mg/L	0.18	118	70	130			
Lab ID: C18050868-030BMSD										06/11/18 23:58
Lithium		0.601	mg/L	0.18	120	70	130	2.0	20	
Method: E200.7										Analytical Run: ICP203-B_180622A
Lab ID: ICV										06/22/18 10:39
Magnesium		25.9	mg/L	1.0	104	95	105			
Potassium		26.1	mg/L	1.0	104	95	105			
Sodium		25.6	mg/L	1.0	102	95	105			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual			
Method: E200.7						Analytical Run: ICP204-B_180606A							
Lab ID: ICV	7	Continuing Calibration Verification Standard								06/06/18 09:16			
Barium		2.44	mg/L	0.10	98	95	105						
Boron		2.48	mg/L	0.10	99	95	105						
Calcium		25.3	mg/L	1.0	101	95	105						
Lithium		1.26	mg/L	0.10	101	95	105						
Magnesium		25.3	mg/L	1.0	101	95	105						
Potassium		25.4	mg/L	1.0	102	95	105						
Sodium		25.6	mg/L	1.0	102	95	105						
Method: E200.7						Batch: 121951							
Lab ID: MB-121951		Method Blank								Run: ICP204-B_180606A	06/07/18 07:43		
Calcium		ND	mg/L	0.09									
Lab ID: LCS-121951		Laboratory Control Sample								Run: ICP204-B_180606A	06/07/18 07:47		
Calcium		26.7	mg/L	1.0	107	85	115						
Method: E200.7						Batch: 121994							
Lab ID: MB-121994	7	Method Blank								Run: ICP204-B_180606A	06/07/18 04:30		
Barium		ND	mg/L	0.007									
Boron		ND	mg/L	0.02									
Calcium		ND	mg/L	0.09									
Lithium		ND	mg/L	0.007									
Magnesium		ND	mg/L	0.03									
Potassium		ND	mg/L	0.05									
Sodium		ND	mg/L	0.8									
Lab ID: LCS-121994	7	Laboratory Control Sample								Run: ICP204-B_180606A	06/07/18 04:34		
Barium		0.522	mg/L	0.050	104	85	115						
Boron		0.536	mg/L	0.050	107	85	115						
Calcium		25.4	mg/L	1.0	102	85	115						
Lithium		0.546	mg/L	0.10	109	85	115						
Magnesium		25.2	mg/L	1.0	101	85	115						
Potassium		26.9	mg/L	1.0	108	85	115						
Sodium		26.4	mg/L	1.0	105	85	115						
Lab ID: C18050868-019BMS3	7	Sample Matrix Spike								Run: ICP204-B_180606A	06/07/18 05:35		
Barium		0.475	mg/L	0.071	95	70	130						
Boron		1.41	mg/L	0.18	102	70	130						
Calcium		490	mg/L	1.0		70	130			A			
Lithium		0.720	mg/L	0.10	94	70	130						
Magnesium		342	mg/L	1.0		70	130			A			
Potassium		37.2	mg/L	1.0	95	70	130						
Sodium		323	mg/L	7.8		70	130			A			
Lab ID: C18050868-019BMSD	7	Sample Matrix Spike Duplicate								Run: ICP204-B_180606A	06/07/18 05:39		
Barium		0.462	mg/L	0.071	92	70	130	2.8	20				

Qualifiers:

RL - Analyte reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										
Lab ID: C18050868-019BMSD	7	Sample Matrix Spike Duplicate				Run: ICP204-B_180606A		06/07/18 05:39		
Boron		1.36	mg/L	0.18	93	70	130	3.2	20	
Calcium		479	mg/L	1.0		70	130	2.3	20	A
Lithium		0.700	mg/L	0.10	89	70	130	2.8	20	
Magnesium		334	mg/L	1.0		70	130	2.5	20	A
Potassium		36.0	mg/L	1.0	90	70	130	3.3	20	
Sodium		313	mg/L	7.8		70	130	3.2	20	A
Lab ID: C18050868-030BMS3	7	Sample Matrix Spike				Run: ICP204-B_180606A		06/07/18 06:56		
Barium		0.608	mg/L	0.071	122	70	130			
Boron		1.01	mg/L	0.18	110	70	130			
Calcium		488	mg/L	1.0		70	130			A
Lithium		0.803	mg/L	0.10	126	70	130			
Magnesium		999	mg/L	1.0		70	130			A
Potassium		60.5	mg/L	1.0	120	70	130			
Sodium		1020	mg/L	7.8		70	130			A
Lab ID: C18050868-030BMSD	7	Sample Matrix Spike Duplicate				Run: ICP204-B_180606A		06/07/18 07:00		
Barium		0.617	mg/L	0.071	123	70	130	1.5	20	
Boron		1.02	mg/L	0.18	111	70	130	0.6	20	
Calcium		488	mg/L	1.0		70	130	0.1	20	A
Lithium		0.827	mg/L	0.10	131	70	130	2.9	20	S
Magnesium		1000	mg/L	1.0		70	130	0.4	20	A
Potassium		61.4	mg/L	1.0	123	70	130	1.3	20	
Sodium		1040	mg/L	7.8		70	130	1.6	20	A
Method: E200.7										
Lab ID: ICV	4	Continuing Calibration Verification Standard				Analytical Run: ICP204-B_180608B		06/08/18 10:01		
Calcium		24.6	mg/L	1.0	99	95	105			
Magnesium		25.4	mg/L	1.0	101	95	105			
Potassium		25.8	mg/L	1.0	103	95	105			
Sodium		26.0	mg/L	1.0	104	95	105			
Method: E200.7										
Lab ID: MB-121994	4	Method Blank				Run: ICP204-B_180608B		06/08/18 18:16		
Calcium		ND	mg/L	0.09						
Magnesium		ND	mg/L	0.03						
Potassium		ND	mg/L	0.05						
Sodium		ND	mg/L	0.8						

Qualifiers:

RL - Analyte reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Analytical Run: ICP204-B_180612A
Lab ID: ICV	4	Continuing Calibration Verification Standard								06/12/18 12:05
Calcium		26.4	mg/L	1.0	105	95	105			
Magnesium		26.3	mg/L	1.0	105	95	105			
Potassium		26.2	mg/L	1.0	105	95	105			
Sodium		26.1	mg/L	1.0	104	95	105			
Method: E200.7										Batch: 121994
Lab ID: MB-121994	4	Method Blank						Run: ICP204-B_180612A		06/12/18 22:27
Calcium		ND	mg/L		0.09					
Magnesium		ND	mg/L		0.03					
Potassium		ND	mg/L		0.05					
Sodium		ND	mg/L		0.8					
Method: E200.7										Analytical Run: ICP204-B_180614A
Lab ID: ICV		Continuing Calibration Verification Standard								06/14/18 12:02
Lithium		1.27	mg/L	0.10	101	95	105			
Method: E200.7										Batch: 121994
Lab ID: MB-121994		Method Blank						Run: ICP204-B_180614A		06/14/18 18:05
Lithium		ND	mg/L		0.007					
Method: E200.7										Analytical Run: ICP204-B_180621A
Lab ID: ICV	4	Continuing Calibration Verification Standard								06/21/18 11:07
Calcium		25.6	mg/L	1.0	103	95	105			
Magnesium		25.6	mg/L	1.0	103	95	105			
Potassium		25.4	mg/L	1.0	102	95	105			
Sodium		25.3	mg/L	1.0	101	95	105			
Method: E200.7										Batch: 121994
Lab ID: MB-121994	4	Method Blank						Run: ICP204-B_180621A		06/21/18 13:41
Calcium		ND	mg/L		0.09					
Magnesium		ND	mg/L		0.03					
Potassium		ND	mg/L		0.05					
Sodium		ND	mg/L		0.8					

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS202-B_180606A		
Lab ID: QCS	6	Initial Calibration Verification Standard								06/06/18 14:38
Arsenic		0.0500	mg/L	0.0050	100	90	110			
Beryllium		0.0252	mg/L	0.0010	101	90	110			
Chromium		0.0496	mg/L	0.010	99	90	110			
Lead		0.0491	mg/L	0.010	98	90	110			
Molybdenum		0.0482	mg/L	0.0050	97	90	110			
Selenium		0.0532	mg/L	0.0050	106	90	110			
Method: E200.8								Batch: 121951		
Lab ID: MB-121951	6	Method Blank								06/06/18 15:08
Arsenic		0.0007	mg/L	0.00006						
Beryllium		0.0002	mg/L	0.00002						
Chromium		0.0007	mg/L	0.00009						
Lead		0.0005	mg/L	0.00005						
Molybdenum		0.0008	mg/L	0.00005						
Selenium		0.0007	mg/L	0.0002						
Lab ID: LCS-121951	6	Laboratory Control Sample								06/06/18 15:32
Arsenic		0.531	mg/L	0.0010	106	85	115			
Beryllium		0.238	mg/L	0.0010	95	85	115			
Chromium		0.480	mg/L	0.0010	96	85	115			
Lead		0.521	mg/L	0.0010	104	85	115			
Molybdenum		0.520	mg/L	0.0050	104	85	115			
Selenium		0.511	mg/L	0.0050	102	85	115			
Lab ID: C18050868-010BMS3	6	Sample Matrix Spike								06/06/18 15:34
Arsenic		0.537	mg/L	0.0010	107	70	130			
Beryllium		0.241	mg/L	0.0010	96	70	130			
Chromium		0.481	mg/L	0.0050	96	70	130			
Lead		0.526	mg/L	0.0010	105	70	130			
Molybdenum		0.531	mg/L	0.0010	106	70	130			
Selenium		0.516	mg/L	0.0023	103	70	130			
Lab ID: C18050868-010BMSD	6	Sample Matrix Spike Duplicate								06/06/18 15:37
Arsenic		0.551	mg/L	0.0010	110	70	130	2.5	20	
Beryllium		0.237	mg/L	0.0010	95	70	130	1.7	20	
Chromium		0.478	mg/L	0.0050	95	70	130	0.6	20	
Lead		0.542	mg/L	0.0010	108	70	130	3.0	20	
Molybdenum		0.536	mg/L	0.0010	107	70	130	0.9	20	
Selenium		0.512	mg/L	0.0023	102	70	130	0.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS202-B_180608A		
Lab ID: QCS	6	Initial Calibration Verification Standard								06/08/18 15:55
Arsenic		0.0496	mg/L	0.0050	99	90	110			
Chromium		0.0494	mg/L	0.010	99	90	110			
Lead		0.0496	mg/L	0.010	99	90	110			
Molybdenum		0.0505	mg/L	0.0050	101	90	110			
Selenium		0.0492	mg/L	0.0050	98	90	110			
Thallium		0.0503	mg/L	0.10	101	90	110			
Method: E200.8								Batch: 121951		
Lab ID: MB-121951	6	Method Blank								06/08/18 17:49
Arsenic		ND	mg/L	0.00006						
Chromium		0.0002	mg/L	0.00009						
Lead		ND	mg/L	0.00005						
Molybdenum		ND	mg/L	0.00007						
Selenium		ND	mg/L	0.0002						
Thallium		ND	mg/L	0.0001						
Lab ID: LCS-121951	6	Laboratory Control Sample								06/08/18 18:13
Arsenic		0.529	mg/L	0.0010	106	85	115			
Chromium		0.461	mg/L	0.0050	92	85	115			
Lead		0.500	mg/L	0.0010	100	85	115			
Molybdenum		0.554	mg/L	0.0010	111	85	115			
Selenium		0.501	mg/L	0.0010	100	85	115			
Thallium		0.494	mg/L	0.00050	99	85	115			
Lab ID: C18050868-010BMS3	6	Sample Matrix Spike								06/08/18 18:23
Arsenic		0.525	mg/L	0.0010	105	70	130			
Chromium		0.476	mg/L	0.0050	95	70	130			
Lead		0.504	mg/L	0.0010	101	70	130			
Molybdenum		0.540	mg/L	0.0010	108	70	130			
Selenium		0.494	mg/L	0.0011	98	70	130			
Thallium		0.507	mg/L	0.00071	101	70	130			
Lab ID: C18050868-010BMSD	6	Sample Matrix Spike Duplicate								06/08/18 18:26
Arsenic		0.532	mg/L	0.0010	106	70	130	1.2	20	
Chromium		0.454	mg/L	0.0050	91	70	130	4.7	20	
Lead		0.515	mg/L	0.0010	103	70	130	2.2	20	
Molybdenum		0.559	mg/L	0.0010	112	70	130	3.4	20	
Selenium		0.494	mg/L	0.0011	98	70	130	0.2	20	
Thallium		0.521	mg/L	0.00071	104	70	130	2.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS206-B_180604A		
Lab ID: QCS	10	Initial Calibration Verification Standard								06/05/18 20:02
Antimony		0.0499	mg/L	0.050	100	90	110			
Arsenic		0.0503	mg/L	0.0050	101	90	110			
Barium		0.0513	mg/L	0.10	103	90	110			
Beryllium		0.0258	mg/L	0.0010	103	90	110			
Cadmium		0.0255	mg/L	0.0010	102	90	110			
Chromium		0.0512	mg/L	0.010	102	90	110			
Cobalt		0.0521	mg/L	0.010	104	90	110			
Lead		0.0503	mg/L	0.010	101	90	110			
Molybdenum		0.0475	mg/L	0.0050	95	90	110			
Selenium		0.0528	mg/L	0.0050	106	90	110			
Method: E200.8								Batch: 121951		
Lab ID: MB-121951	10	Method Blank								06/06/18 03:02
Antimony		ND	mg/L	0.0004				Run: ICPMS206-B_180604A		
Arsenic		ND	mg/L	0.0001						
Barium		ND	mg/L	0.00009						
Beryllium		0.0002	mg/L	0.0001						
Cadmium		ND	mg/L	0.00003						
Chromium		ND	mg/L	0.0002						
Cobalt		0.00005	mg/L	0.00004						
Lead		ND	mg/L	0.00008						
Molybdenum		0.0002	mg/L	0.00006						
Selenium		ND	mg/L	0.0002						
Lab ID: LCS-121951	10	Laboratory Control Sample								06/06/18 04:20
Antimony		0.533	mg/L	0.0050	107	85	115			
Arsenic		0.514	mg/L	0.0010	103	85	115			
Barium		0.530	mg/L	0.010	106	85	115			
Beryllium		0.220	mg/L	0.0010	88	85	115			
Cadmium		0.253	mg/L	0.0010	101	85	115			
Chromium		0.487	mg/L	0.0010	97	85	115			
Cobalt		0.485	mg/L	0.0010	97	85	115			
Lead		0.518	mg/L	0.0010	104	85	115			
Molybdenum		0.457	mg/L	0.0050	91	85	115			
Selenium		0.504	mg/L	0.0050	101	85	115			
Lab ID: C18050868-010BMS3	10	Sample Matrix Spike								06/06/18 04:25
Antimony		0.549	mg/L	0.0038	110	70	130			
Arsenic		0.539	mg/L	0.0010	108	70	130			
Barium		0.533	mg/L	0.050	104	70	130			
Beryllium		0.227	mg/L	0.0014	91	70	130			
Cadmium		0.255	mg/L	0.0010	102	70	130			
Chromium		0.502	mg/L	0.0050	100	70	130			
Cobalt		0.505	mg/L	0.0050	101	70	130			
Lead		0.513	mg/L	0.0010	102	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	E200.8									
Lab ID:	C18050868-010BMS3 10 Sample Matrix Spike									
Molybdenum		0.535	mg/L	0.0010	106	70	130			
Selenium		0.524	mg/L	0.0023	105	70	130			
Lab ID:	C18050868-010BMSD 10 Sample Matrix Spike Duplicate									
Antimony		0.536	mg/L	0.0038	107	70	130	2.5	20	
Arsenic		0.536	mg/L	0.0010	107	70	130	0.6	20	
Barium		0.529	mg/L	0.050	103	70	130	0.8	20	
Beryllium		0.222	mg/L	0.0014	89	70	130	2.4	20	
Cadmium		0.253	mg/L	0.0010	101	70	130	0.7	20	
Chromium		0.512	mg/L	0.0050	102	70	130	2.0	20	
Cobalt		0.499	mg/L	0.0050	100	70	130	1.2	20	
Lead		0.507	mg/L	0.0010	101	70	130	1.2	20	
Molybdenum		0.483	mg/L	0.0010	96	70	130	10	20	
Selenium		0.518	mg/L	0.0023	104	70	130	1.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual			
Method: E200.8						Analytical Run: ICPMS206-B_180606A							
Lab ID: QCS	11	Initial Calibration Verification Standard								06/07/18 14:34			
Antimony		0.0504	mg/L	0.050	101	90	110						
Arsenic		0.0497	mg/L	0.0050	99	90	110						
Barium		0.0493	mg/L	0.10	99	90	110						
Beryllium		0.0249	mg/L	0.0010	100	90	110						
Cadmium		0.0249	mg/L	0.0010	100	90	110						
Chromium		0.0497	mg/L	0.010	99	90	110						
Cobalt		0.0513	mg/L	0.010	103	90	110						
Lead		0.0496	mg/L	0.010	99	90	110						
Molybdenum		0.0477	mg/L	0.0050	95	90	110						
Selenium		0.0519	mg/L	0.0050	104	90	110						
Thallium		0.0495	mg/L	0.10	99	90	110						
Method: E200.8						Batch: 121951							
Lab ID: MB-121951	11	Method Blank								Run: ICPMS206-B_180606A	06/07/18 16:56		
Antimony		ND	mg/L	0.0004									
Arsenic		ND	mg/L	0.0001									
Barium		ND	mg/L	0.00009									
Beryllium		ND	mg/L	0.0001									
Cadmium		ND	mg/L	0.00003									
Chromium		ND	mg/L	0.0002									
Cobalt		ND	mg/L	0.00004									
Lead		ND	mg/L	0.00008									
Molybdenum		ND	mg/L	0.00006									
Selenium		ND	mg/L	0.0002									
Thallium		ND	mg/L	0.00007									
Lab ID: LCS-121951	11	Laboratory Control Sample								Run: ICPMS206-B_180606A	06/07/18 17:21		
Antimony		0.541	mg/L	0.0050	108	85	115						
Arsenic		0.532	mg/L	0.0010	106	85	115						
Barium		0.530	mg/L	0.010	106	85	115						
Beryllium		0.250	mg/L	0.0010	100	85	115						
Cadmium		0.264	mg/L	0.0010	106	85	115						
Chromium		0.513	mg/L	0.0010	103	85	115						
Cobalt		0.513	mg/L	0.0010	103	85	115						
Lead		0.536	mg/L	0.0010	107	85	115						
Molybdenum		0.508	mg/L	0.0050	102	85	115						
Selenium		0.525	mg/L	0.0050	105	85	115						
Thallium		0.533	mg/L	0.0010	107	85	115						
Lab ID: C18050868-010BMS3	11	Sample Matrix Spike								Run: ICPMS206-B_180606A	06/07/18 17:29		
Antimony		0.548	mg/L	0.0038	108	70	130						
Arsenic		0.546	mg/L	0.0010	109	70	130						
Barium		0.499	mg/L	0.050	99	70	130						
Beryllium		0.253	mg/L	0.0014	101	70	130						
Cadmium		0.263	mg/L	0.0010	105	70	130						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: 121951
Lab ID: C18050868-010BMS3	11	Sample Matrix Spike				Run: ICPMS206-B_180606A				06/07/18 17:29
Chromium		0.518	mg/L	0.0050	104	70	130			
Cobalt		0.531	mg/L	0.0050	106	70	130			
Lead		0.518	mg/L	0.0010	104	70	130			
Molybdenum		0.532	mg/L	0.0010	102	70	130			
Selenium		0.526	mg/L	0.0023	105	70	130			
Thallium		0.519	mg/L	0.00075	103	70	130			
Lab ID: C18050868-010BMSD	11	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180606A				06/07/18 17:33
Antimony		0.535	mg/L	0.0038	105	70	130	2.3	20	
Arsenic		0.550	mg/L	0.0010	110	70	130	0.7	20	
Barium		0.473	mg/L	0.050	94	70	130	5.3	20	
Beryllium		0.246	mg/L	0.0014	98	70	130	2.9	20	
Cadmium		0.257	mg/L	0.0010	103	70	130	2.2	20	
Chromium		0.528	mg/L	0.0050	106	70	130	1.7	20	
Cobalt		0.524	mg/L	0.0050	105	70	130	1.3	20	
Lead		0.505	mg/L	0.0010	101	70	130	2.6	20	
Molybdenum		0.522	mg/L	0.0010	100	70	130	1.9	20	
Selenium		0.521	mg/L	0.0023	104	70	130	1.1	20	
Thallium		0.525	mg/L	0.00075	105	70	130	1.2	20	
Method: E200.8										Batch: 121994
Lab ID: MB-121994	11	Method Blank				Run: ICPMS206-B_180606A				06/07/18 17:46
Antimony		ND	mg/L	0.0004						
Arsenic		ND	mg/L	0.0001						
Barium		ND	mg/L	0.00009						
Beryllium		ND	mg/L	0.0001						
Cadmium		ND	mg/L	0.00003						
Chromium		ND	mg/L	0.0002						
Cobalt		ND	mg/L	0.00004						
Lead		ND	mg/L	0.00008						
Molybdenum		ND	mg/L	0.00006						
Selenium		ND	mg/L	0.0002						
Thallium		ND	mg/L	0.00007						
Lab ID: LCS-121994	11	Laboratory Control Sample				Run: ICPMS206-B_180606A				06/07/18 18:15
Antimony		0.542	mg/L	0.0050	108	85	115			
Arsenic		0.541	mg/L	0.0010	108	85	115			
Barium		0.531	mg/L	0.010	106	85	115			
Beryllium		0.235	mg/L	0.0010	94	85	115			
Cadmium		0.261	mg/L	0.0010	104	85	115			
Chromium		0.503	mg/L	0.0010	101	85	115			
Cobalt		0.505	mg/L	0.0010	101	85	115			
Lead		0.527	mg/L	0.0010	105	85	115			
Molybdenum		0.507	mg/L	0.0050	101	85	115			
Selenium		0.497	mg/L	0.0050	99	85	115			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	E200.8									Batch: 121994
Lab ID:	LCS-121994	11	Laboratory Control Sample			Run: ICPMS206-B_180606A				06/07/18 18:15
Thallium		0.524	mg/L	0.0010	105	85	115			
Lab ID:	C18050868-019BMS3	11	Sample Matrix Spike			Run: ICPMS206-B_180606A				06/07/18 18:19
Antimony		0.549	mg/L	0.0010	110	70	130			
Arsenic		0.585	mg/L	0.0010	112	70	130			
Barium		0.546	mg/L	0.050	109	70	130			
Beryllium		0.249	mg/L	0.0010	93	70	130			
Cadmium		0.281	mg/L	0.0010	107	70	130			
Chromium		0.512	mg/L	0.0050	102	70	130			
Cobalt		0.837	mg/L	0.0050	108	70	130			
Lead		0.548	mg/L	0.0010	110	70	130			
Molybdenum		0.522	mg/L	0.0010	104	70	130			
Selenium		0.551	mg/L	0.0010	110	70	130			
Thallium		0.535	mg/L	0.00050	107	70	130			
Lab ID:	C18050868-019BMSD	11	Sample Matrix Spike Duplicate			Run: ICPMS206-B_180606A				06/07/18 18:24
Antimony		0.537	mg/L	0.0010	107	70	130	2.3	20	
Arsenic		0.571	mg/L	0.0010	109	70	130	2.5	20	
Barium		0.530	mg/L	0.050	106	70	130	2.9	20	
Beryllium		0.237	mg/L	0.0010	88	70	130	5.0	20	
Cadmium		0.273	mg/L	0.0010	104	70	130	2.7	20	
Chromium		0.511	mg/L	0.0050	102	70	130	0.0	20	
Cobalt		0.809	mg/L	0.0050	102	70	130	3.3	20	
Lead		0.527	mg/L	0.0010	105	70	130	3.9	20	
Molybdenum		0.506	mg/L	0.0010	101	70	130	3.0	20	
Selenium		0.532	mg/L	0.0010	106	70	130	3.4	20	
Thallium		0.527	mg/L	0.00050	105	70	130	1.5	20	
Lab ID:	C18050868-030BMS3	11	Sample Matrix Spike			Run: ICPMS206-B_180606A				06/07/18 19:10
Antimony		0.553	mg/L	0.0019	111	70	130			
Arsenic		0.553	mg/L	0.0010	111	70	130			
Barium		0.561	mg/L	0.050	108	70	130			
Beryllium		0.233	mg/L	0.0010	93	70	130			
Cadmium		0.261	mg/L	0.0010	104	70	130			
Chromium		0.529	mg/L	0.0050	106	70	130			
Cobalt		0.532	mg/L	0.0050	106	70	130			
Lead		0.536	mg/L	0.0010	107	70	130			
Molybdenum		0.544	mg/L	0.0010	108	70	130			
Selenium		0.539	mg/L	0.0012	108	70	130			
Thallium		0.525	mg/L	0.00050	105	70	130			
Lab ID:	C18050868-030BMSD	11	Sample Matrix Spike Duplicate			Run: ICPMS206-B_180606A				06/07/18 19:14
Antimony		0.552	mg/L	0.0019	110	70	130	0.2	20	
Arsenic		0.548	mg/L	0.0010	110	70	130	0.9	20	
Barium		0.561	mg/L	0.050	108	70	130	0.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8											
Lab ID: C18050868-030BMSD	11	Sample Matrix Spike Duplicate Run: ICPMS206-B_180606A									
Beryllium		0.232	mg/L	0.0010	93	70	130	0.1	20		
Cadmium		0.259	mg/L	0.0010	104	70	130	0.6	20		
Chromium		0.533	mg/L	0.0050	107	70	130	0.8	20		
Cobalt		0.536	mg/L	0.0050	107	70	130	0.7	20		
Lead		0.543	mg/L	0.0010	108	70	130	1.4	20		
Molybdenum		0.537	mg/L	0.0010	107	70	130	1.1	20		
Selenium		0.532	mg/L	0.0012	106	70	130	1.2	20		
Thallium		0.532	mg/L	0.00050	106	70	130	1.1	20		
Method: E200.8											
Lab ID: QCS	2	Initial Calibration Verification Standard Analytical Run: ICPMS206-B_180608A									
Arsenic		0.0495	mg/L	0.0050	99	90	110			06/08/18 23:53	
Selenium		0.0504	mg/L	0.0050	101	90	110				
Lab ID: QCS	2	Initial Calibration Verification Standard 06/09/18 11:02									
Arsenic		0.0497	mg/L	0.0050	99	90	110				
Selenium		0.0508	mg/L	0.0050	102	90	110				
Method: E200.8											
Lab ID: MB-121994	2	Method Blank Run: ICPMS206-B_180608A 06/09/18 00:25									
Arsenic		ND	mg/L	0.0001							
Selenium		ND	mg/L	0.0002							
Lab ID: LCS-121994	2	Laboratory Control Sample Run: ICPMS206-B_180608A 06/09/18 00:57									
Arsenic		0.492	mg/L	0.0010	98	85	115				
Selenium		0.474	mg/L	0.0050	95	85	115				
Lab ID: C18050868-030BMS3	2	Sample Matrix Spike Run: ICPMS206-B_180608A 06/09/18 01:02									
Arsenic		0.549	mg/L	0.0010	110	70	130				
Selenium		0.524	mg/L	0.0012	105	70	130				
Lab ID: C18050868-030BMSD	2	Sample Matrix Spike Duplicate Run: ICPMS206-B_180608A 06/09/18 01:06									
Arsenic		0.548	mg/L	0.0010	110	70	130	0.2	20		
Selenium		0.526	mg/L	0.0012	105	70	130	0.4	20		

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1								Analytical Run: HGCV202-B_180531A		
Lab ID: ICV		Initial Calibration Verification Standard								05/31/18 11:46
Mercury		0.00217	mg/L	0.00010	109	90	110			
Method: E245.1								Batch: 121935		
Lab ID: MB-121935		Method Blank								05/31/18 12:44
Mercury		ND	mg/L	0.00005				Run: HGCV202-B_180531A		
Lab ID: LCS-121935		Laboratory Control Sample								05/31/18 12:46
Mercury		0.00219	mg/L	0.00010	109	85	115			
Lab ID: C18050868-007BMS		Sample Matrix Spike								05/31/18 13:37
Mercury		0.00201	mg/L	0.00010	101	70	130			
Lab ID: C18050868-007BMSD		Sample Matrix Spike Duplicate								05/31/18 13:39
Mercury		0.00203	mg/L	0.00010	102	70	130	0.9	30	
Method: E245.1								Analytical Run: HGCV202-B_180606A		
Lab ID: ICV		Initial Calibration Verification Standard								06/06/18 10:15
Mercury		0.00220	mg/L	0.00010	110	90	110			
Method: E245.1								Batch: 122090		
Lab ID: MB-122090		Method Blank								06/06/18 10:21
Mercury		ND	mg/L	0.00005		Run: HGCV202-B_180606A				
Lab ID: LCS-122090		Laboratory Control Sample								06/06/18 10:22
Mercury		0.00219	mg/L	0.00010	110	85	115			
Lab ID: C18050868-008BMS		Sample Matrix Spike								06/06/18 10:30
Mercury		0.00215	mg/L	0.00010	100	70	130			
Lab ID: C18050868-008BMSD		Sample Matrix Spike Duplicate								06/06/18 10:32
Mercury		0.00216	mg/L	0.00010	100	70	130	0.6	30	
Lab ID: C18050868-027BMS		Sample Matrix Spike								06/06/18 11:10
Mercury		0.00202	mg/L	0.00010	101	70	130			
Lab ID: C18050868-027BMSD		Sample Matrix Spike Duplicate								06/06/18 11:12
Mercury		0.00202	mg/L	0.00010	101	70	130	0.2	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: PacifiCorp

Report Date: 06/20/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1										Analytical Run: HGCV202-B_180611A
Lab ID: ICV										06/11/18 13:57
Mercury		0.00210	mg/L	0.00010	105	90	110			
Method: E245.1										Batch: 122257
Lab ID: MB-122257										06/11/18 14:54
Mercury		ND	mg/L	0.00005						
Lab ID: LCS-122257										06/11/18 14:56
Mercury		0.00220	mg/L	0.00010	110	85	115			
Lab ID: B18052543-001BMS										06/11/18 15:22
Mercury		0.00219	mg/L	0.00010	110	70	130			
Lab ID: B18052543-001BMSD										06/11/18 15:24
Mercury		0.00223	mg/L	0.00010	111	70	130	1.7	30	
Method: E245.1										Analytical Run: HGCV202-B_180615A
Lab ID: ICV										06/15/18 14:48
Mercury		0.00197	mg/L	0.00010	98	90	110			
Method: E245.1										Batch: 122466
Lab ID: MB-122466										06/15/18 14:54
Mercury		ND	mg/L	0.00005						
Lab ID: LCS-122466										06/15/18 14:55
Mercury		0.00202	mg/L	0.00010	101	85	115			
Lab ID: B18060683-001BMS										06/15/18 15:05
Mercury		0.00200	mg/L	0.00010	100	70	130			
Lab ID: B18060683-001BMSD										06/15/18 15:07
Mercury		0.00202	mg/L	0.00010	101	70	130	1.1	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/14/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: RA226-8954
Lab ID: LCS-RA226-8954	Laboratory Control Sample						Run: G5000W_180530A			06/11/18 12:51
Radium 226		11	pCi/L	111		80	120			
Lab ID: MB-RA226-8954	3 Method Blank									
Radium 226		0.2	pCi/L							06/11/18 12:51
Radium 226 precision (\pm)		0.2	pCi/L							
Radium 226 MDC		0.2	pCi/L							
Lab ID: C18050868-016DMS	Sample Matrix Spike						Run: G5000W_180530A			06/11/18 12:51
Radium 226		22	pCi/L	83		70	130			
Lab ID: C18050868-016DMSD	Sample Matrix Spike Duplicate						Run: G5000W_180530A			06/11/18 12:51
Radium 226		25	pCi/L	93		70	130	11		20
Method: E903.0										Batch: RA226-8953
Lab ID: LCS-RA226-8953	Laboratory Control Sample						Run: TENNELEC-3_180530C			06/11/18 11:01
Radium 226		9.2	pCi/L	91		80	120			
Lab ID: MB-RA226-8953	3 Method Blank									
Radium 226		0.1	pCi/L							U
Radium 226 precision (\pm)		0.1	pCi/L							
Radium 226 MDC		0.2	pCi/L							
Lab ID: C18050868-001DMS	Sample Matrix Spike						Run: TENNELEC-3_180530C			06/11/18 11:01
Radium 226		23	pCi/L	85		70	130			
Lab ID: C18050868-001DMSD	Sample Matrix Spike Duplicate						Run: TENNELEC-3_180530C			06/11/18 11:01
Radium 226		25	pCi/L	93		70	130	8.5		20

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/14/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05										Batch: RA228-5790
Lab ID: LCS-228-RA226-8953	Laboratory Control Sample						Run: TENNELEC-3_180530A			06/06/18 09:01
Radium 228		7.8	pCi/L	88		80	120			
Lab ID: MB-RA226-8953	3 Method Blank									
Radium 228		-0.3	pCi/L							U
Radium 228 precision (\pm)		0.8	pCi/L							
Radium 228 MDC		1	pCi/L							
Lab ID: C18050868-006DMS	Sample Matrix Spike						Run: TENNELEC-3_180530A			06/06/18 09:01
Radium 228		23	pCi/L	87		70	130			
Lab ID: C18050868-006DMSD	Sample Matrix Spike Duplicate						Run: TENNELEC-3_180530A			06/06/18 09:01
Radium 228		26	pCi/L	97		70	130	9.2		20
Method: RA-05										Batch: RA228-5791
Lab ID: LCS-228-RA226-8954	Laboratory Control Sample						Run: TENNELEC-3_180530B			06/06/18 12:25
Radium 228		8.5	pCi/L	93		80	120			
Lab ID: MB-RA226-8954	3 Method Blank									
Radium 228		-0.03	pCi/L							U
Radium 228 precision (\pm)		0.9	pCi/L							
Radium 228 MDC		2	pCi/L							
Lab ID: C18050868-018DMS	Sample Matrix Spike						Run: TENNELEC-3_180530B			06/06/18 12:25
Radium 228		21	pCi/L	85		70	130			
Lab ID: C18050868-018DMSD	Sample Matrix Spike Duplicate						Run: TENNELEC-3_180530B			06/06/18 12:25
Radium 228		19	pCi/L	77		70	130	8.9		20

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Analytical Run: MANTECH_180525A
Lab ID: ICV										05/25/18 16:00
pH		6.86	s.u.	0.010	100	98	102			
Method: A2320 B										Batch: R235736
Lab ID: MBLK	3	Method Blank						Run: MANTECH_180525A		05/25/18 19:21
Alkalinity, Total as CaCO ₃		1	mg/L	0.8						
Carbonate as CO ₃		ND	mg/L	1						
Bicarbonate as HCO ₃		2	mg/L	1						
Lab ID: LCS			Laboratory Control Sample					Run: MANTECH_180525A		05/25/18 19:29
Alkalinity, Total as CaCO ₃		252	mg/L	5.0	100	90	110			
Lab ID: C18050868-007ADUP	3	Sample Duplicate						Run: MANTECH_180525A		05/25/18 19:47
Alkalinity, Total as CaCO ₃		870	mg/L	5.0					0.3	10
Carbonate as CO ₃		ND	mg/L	5.0						10
Bicarbonate as HCO ₃		1060	mg/L	5.0					0.3	10
Lab ID: C18050868-017ADUP	3	Sample Duplicate						Run: MANTECH_180525A		05/25/18 21:28
Alkalinity, Total as CaCO ₃		204	mg/L	5.0					0.3	10
Carbonate as CO ₃		ND	mg/L	5.0						10
Bicarbonate as HCO ₃		249	mg/L	5.0					0.3	10
Lab ID: MBLK	3	Method Blank						Run: MANTECH_180525A		05/25/18 22:43
Alkalinity, Total as CaCO ₃		1	mg/L	0.8						
Carbonate as CO ₃		ND	mg/L	1						
Bicarbonate as HCO ₃		2	mg/L	1						
Lab ID: LCS			Laboratory Control Sample					Run: MANTECH_180525A		05/25/18 22:51
Alkalinity, Total as CaCO ₃		253	mg/L	5.0	100	90	110			
Lab ID: C18050868-029ADUP	3	Sample Duplicate						Run: MANTECH_180525A		05/25/18 23:08
Alkalinity, Total as CaCO ₃		742	mg/L	5.0					0.4	10
Carbonate as CO ₃		ND	mg/L	5.0						10
Bicarbonate as HCO ₃		905	mg/L	5.0					0.4	10

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C	Batch: TDS180525B									
Lab ID: MB-1_180525A	Method Blank									
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	7				Run: BAL-16_180525B		05/25/18 15:31
Lab ID: LCS-2_180525A	Laboratory Control Sample									
Solids, Total Dissolved TDS @ 180 C	1060	mg/L		11	96	90	110			05/25/18 15:31
Lab ID: C18050868-001A DUP	Sample Duplicate									
Solids, Total Dissolved TDS @ 180 C	223	mg/L		10				Run: BAL-16_180525B		05/25/18 15:31
Lab ID: C18050868-007A DUP	Sample Duplicate									
Solids, Total Dissolved TDS @ 180 C	18900	mg/L		100				Run: BAL-16_180525B		05/25/18 15:33
Lab ID: MB-25_180525A	Method Blank									
Solids, Total Dissolved TDS @ 180 C	ND	mg/L		7				Run: BAL-16_180525B		05/25/18 15:35
Lab ID: LCS-26_180525A	Laboratory Control Sample									
Solids, Total Dissolved TDS @ 180 C	1090	mg/L		11	98	90	110			05/25/18 15:35
Lab ID: C18050868-017A DUP	Sample Duplicate									
Solids, Total Dissolved TDS @ 180 C	4950	mg/L		39				Run: BAL-16_180525B		05/25/18 15:35
Lab ID: C18050868-028A DUP	Sample Duplicate									
Solids, Total Dissolved TDS @ 180 C	12200	mg/L		100				Run: BAL-16_180525B		05/25/18 15:37

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C										Analytical Run: MANTECH_180529A
Lab ID: CCV-10139										05/29/18 12:02
Fluoride		1.96	mg/L	0.10	98	90	110			
Method: A4500-F C										Batch: R235780
Lab ID: LCS-10115										05/29/18 11:21
Fluoride		2.04	mg/L	0.10	102	90	110			
Lab ID: MBLK										05/29/18 11:25
Fluoride		ND	mg/L	0.04						
Lab ID: C18050853-001AMS										05/29/18 11:31
Fluoride		2.57	mg/L	0.10	104	90	110			
Lab ID: C18050853-002ADUP										05/29/18 11:36
Fluoride		1.28	mg/L	0.10				0.0	10	
Lab ID: C18050868-007AMS										05/29/18 12:13
Fluoride		1.93	mg/L	0.10	74	90	110			S
Lab ID: C18050868-008ADUP										05/29/18 12:18
Fluoride		0.320	mg/L	0.10				0.0	10	
Method: A4500-F C										Analytical Run: MANTECH_180529B
Lab ID: CCV-10139										05/29/18 15:10
Fluoride		1.89	mg/L	0.10	94	90	110			
Method: A4500-F C										Batch: R235831
Lab ID: LCS-10115										05/29/18 14:20
Fluoride		2.00	mg/L	0.10	100	90	110			
Lab ID: MBLK										05/29/18 14:25
Fluoride		ND	mg/L	0.04						
Lab ID: C18050868-017AMS										05/29/18 14:31
Fluoride		3.01	mg/L	0.10	86	90	110			S
Lab ID: C18050868-018ADUP										05/29/18 14:40
Fluoride		ND	mg/L	0.10				10		
Lab ID: C18050868-029AMS										05/29/18 15:20
Fluoride		2.08	mg/L	0.10	82	90	110			S
Lab ID: C18050868-030ADUP										05/29/18 15:25
Fluoride		0.300	mg/L	0.10				3.3	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B										Analytical Run: PHSC_101-C_180524A
Lab ID: pH 6.86	2	Initial Calibration Verification Standard								05/24/18 13:16
pH		6.87	s.u.	0.010		100	98	102		
pH Measurement Temp		20.3	°C			0	0			
Lab ID: pH 6.86	2	Initial Calibration Verification Standard								05/24/18 18:00
pH		6.86	s.u.	0.010		100	98	102		
pH Measurement Temp		21.0	°C			0	0			
Method: A4500-H B										Batch: R235659
Lab ID: C18050868-001ADUP	2	Sample Duplicate								05/24/18 18:42
pH		7.61	s.u.	0.010				0.1	1.5	
pH Measurement Temp		19.9	°C							
Lab ID: C18050868-011ADUP	2	Sample Duplicate								05/24/18 19:23
pH		7.70	s.u.	0.010				0.3	1.5	
pH Measurement Temp		20.1	°C							
Lab ID: C18050868-022ADUP	2	Sample Duplicate								05/24/18 19:55
pH		7.70	s.u.	0.010				0.0	1.5	
pH Measurement Temp		19.8	°C							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual		
Method: E300.0										Analytical Run: IC2-C_180525A		
Lab ID: ICV	2	Initial Calibration Verification Standard										05/25/18 12:35
Chloride		10.0	mg/L	1.0	100	90	110					
Sulfate		40.4	mg/L	1.0	101	90	110					
Method: E300.0										Batch: R235737		
Lab ID: ICB	2	Method Blank										05/25/18 12:53
Chloride		ND	mg/L	0.03								
Sulfate		0.3	mg/L	0.04								
Lab ID: LFB	2	Laboratory Fortified Blank										05/25/18 13:12
Chloride		10.2	mg/L	1.0	102	90	110					
Sulfate		41.3	mg/L	1.0	103	90	110					
Lab ID: C18050862-002AMS	2	Sample Matrix Spike										05/25/18 22:43
Chloride		31.5	mg/L	1.0	104	80	120					
Sulfate		215	mg/L	1.0	105	80	120					
Lab ID: C18050862-002AMSD	2	Sample Matrix Spike Duplicate										05/25/18 23:01
Chloride		31.9	mg/L	1.0	106	80	120	1.3	20			
Sulfate		216	mg/L	1.0	105	80	120	0.3	20			
Lab ID: C18050868-010AMS	2	Sample Matrix Spike										05/26/18 03:00
Chloride		1830	mg/L	10	105	80	120					
Sulfate		11800	mg/L	42	104	80	120					
Lab ID: C18050868-010AMSD	2	Sample Matrix Spike Duplicate										05/26/18 03:19
Chloride		1830	mg/L	10	105	80	120	0.0	20			
Sulfate		11800	mg/L	42	103	80	120	0.5	20			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual			
Method: E300.0										Analytical Run: IC3-C_180525A			
Lab ID: ICV	2	Initial Calibration Verification Standard										05/25/18 14:02	
Chloride		10.1	mg/L	1.0	101	90	110						
Sulfate		40.1	mg/L	1.0	100	90	110						
Method: E300.0										Batch: R235738			
Lab ID: ICB	2	Method Blank										Run: IC3-C_180525A	05/25/18 14:21
Chloride		ND	mg/L	0.09									
Sulfate		0.3	mg/L	0.1									
Lab ID: LFB	2	Laboratory Fortified Blank										Run: IC3-C_180525A	05/25/18 14:40
Chloride		10.3	mg/L	1.0	103	90	110						
Sulfate		41.0	mg/L	1.0	102	90	110						
Lab ID: C18050868-021AMS	2	Sample Matrix Spike										Run: IC3-C_180525A	05/25/18 15:57
Chloride		1150	mg/L	20	100	80	120						
Sulfate		62400	mg/L	82		80	120			A			
Lab ID: C18050868-021AMSD	2	Sample Matrix Spike Duplicate										Run: IC3-C_180525A	05/25/18 16:16
Chloride		1150	mg/L	20	99	80	120	0.4	20				
Sulfate		62600	mg/L	82		80	120	0.4	20	A			
Method: E300.0										Analytical Run: IC3-C_180601A			
Lab ID: ICV	2	Initial Calibration Verification Standard										06/01/18 15:31	
Chloride		10.3	mg/L	1.0	103	90	110						
Sulfate		40.6	mg/L	1.0	101	90	110						
Method: E300.0										Batch: R235970			
Lab ID: ICB	2	Method Blank										Run: IC3-C_180601A	06/01/18 15:50
Chloride		ND	mg/L	0.09									
Sulfate		0.1	mg/L	0.1									
Lab ID: LFB	2	Laboratory Fortified Blank										Run: IC3-C_180601A	06/01/18 16:50
Chloride		10.0	mg/L	1.0	100	90	110						
Sulfate		39.9	mg/L	1.0	99	90	110						
Lab ID: C18060001-004AMS	2	Sample Matrix Spike										Run: IC3-C_180601A	06/02/18 06:54
Chloride		176	mg/L	1.0	104	80	120						
Sulfate		2220	mg/L	4.2		80	120			A			
Lab ID: C18060001-004AMSD	2	Sample Matrix Spike Duplicate										Run: IC3-C_180601A	06/02/18 07:13
Chloride		176	mg/L	1.0	104	80	120	0.3	20				
Sulfate		2230	mg/L	4.2		80	120	0.4	20	A			

Qualifiers:

RL - Analyte reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Analytical Run: FIA201-C_180525B
Lab ID: ICV										05/25/18 14:25
Nitrogen, Nitrate+Nitrite as N		0.984	mg/L		0.010	98	90	110		
Method: E353.2										Batch: R235735
Lab ID: MBLK										05/25/18 14:26
Nitrogen, Nitrate+Nitrite as N		ND	mg/L		0.006					
Lab ID: LFB										05/25/18 14:27
Nitrogen, Nitrate+Nitrite as N		1.08	mg/L		0.010	109	90	110		
Lab ID: C18050862-001BMS										05/25/18 14:48
Nitrogen, Nitrate+Nitrite as N		2.10	mg/L		0.010	116	90	110		S
Lab ID: C18050862-001BMSD										05/25/18 14:49
Nitrogen, Nitrate+Nitrite as N		2.01	mg/L		0.010	107	90	110	4.4	10
Lab ID: C18050868-009CMS										05/25/18 15:04
Nitrogen, Nitrate+Nitrite as N		184	mg/L		0.50	115	90	110		S
Lab ID: C18050868-009CMSD										05/25/18 15:06
Nitrogen, Nitrate+Nitrite as N		173	mg/L		0.50	92	90	110	6.2	10
Lab ID: C18050868-019CMS										05/25/18 15:21
Nitrogen, Nitrate+Nitrite as N		10.2	mg/L		0.050	109	90	110		
Lab ID: C18050868-019CMSD										05/25/18 15:22
Nitrogen, Nitrate+Nitrite as N		10.00	mg/L		0.050	105	90	110	2.0	10
Lab ID: C18050868-030CMS										05/25/18 15:37
Nitrogen, Nitrate+Nitrite as N		0.815	mg/L		0.010	82	90	110		S
Lab ID: C18050868-030CMSD										05/25/18 15:38
Nitrogen, Nitrate+Nitrite as N		0.851	mg/L		0.010	85	90	110	4.4	10 S
Lab ID: C18050869-020CMS										05/25/18 16:10
Nitrogen, Nitrate+Nitrite as N		1.44	mg/L		0.010	110	90	110		
Lab ID: C18050869-020CMSD										05/25/18 16:11
Nitrogen, Nitrate+Nitrite as N		1.45	mg/L		0.010	111	90	110	0.7	10 S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: PacifiCorp

Report Date: 06/06/18

Project: PERCM49

Work Order: C18050868

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Analytical Run: FIA201-C_180601B
Lab ID: ICV										06/01/18 16:16
Nitrogen, Nitrate+Nitrite as N		0.975	mg/L		0.010	98	90	110		
Method: E353.2										Batch: R235958
Lab ID: MBLK										06/01/18 16:18
Nitrogen, Nitrate+Nitrite as N		ND	mg/L		0.006					
Lab ID: LFB										06/01/18 16:19
Nitrogen, Nitrate+Nitrite as N		1.04	mg/L		0.010	105	90	110		
Lab ID: C18050868-009CMS										06/01/18 16:22
Nitrogen, Nitrate+Nitrite as N		173	mg/L		0.50	98	90	110		
Lab ID: C18050868-009CMSD										06/01/18 16:24
Nitrogen, Nitrate+Nitrite as N		173	mg/L		0.50	99	90	110	0.3	10
Lab ID: C18050984-001BMS										06/01/18 16:39
Nitrogen, Nitrate+Nitrite as N		4.24	mg/L		0.010	119	90	110		S
Lab ID: C18050984-001BMSD										06/01/18 16:40
Nitrogen, Nitrate+Nitrite as N		4.23	mg/L		0.010	118	90	110	0.2	10 S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

Work Order Receipt Checklist

PacifiCorp

C18050868

Login completed by: Dorian Quis

Date Received: 5/24/2018

Reviewed by: Kasey Vidick

Received by: kak

Reviewed Date: 5/29/2018

Carrier name: Hand Del

Shipping container/cooler in good condition? Yes No Not Present

Custody seals intact on all shipping container(s)/cooler(s)? Yes No Not Present

Custody seals intact on all sample bottles? Yes No Not Present

Chain of custody present? Yes No

Chain of custody signed when relinquished and received? Yes No

Chain of custody agrees with sample labels? Yes No

Samples in proper container/bottle? Yes No

Sample containers intact? Yes No

Sufficient sample volume for indicated test? Yes No

All samples received within holding time?
 (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)

Yes No

Temp Blank received in all shipping container(s)/cooler(s)? Yes No Not Applicable

Container/Temp Blank temperature: 5.1°C On Ice

Water - VOA vials have zero headspace? Yes No No VOA vials submitted

Water - pH acceptable upon receipt? Yes No Not Applicable

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

Chain of Custody & Analytical Request Record

www.energylab.com

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Account Information (Billing information)

Company/Name		PacificCorp-UT			
Contact	Jeff Tucker				
Phone					
Mailing Address					
City, State, Zip					
Email					
Receive Invoice	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email
Purchase Order	Quote	Bottle Order			
	C4503 - Pacific Corp				

Report Information (if different than Account Information)

Company/Name		WET	
Contact	Dave Erickson		
Phone	(406) 782-5220		
Mailing Address			
City, State, Zip			
Email	derickson@waterenvtech.com		
Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	
Special Report/Formats:			
<input type="checkbox"/> LEVEL IV <input type="checkbox"/> NELAC <input checked="" type="checkbox"/> EDD/EDT (contact laboratory) <input type="checkbox"/> Other _____			

Comments

Please CC Marcus Holland with results (EDD csv and PDF)

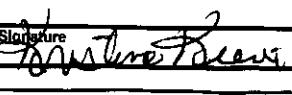
Temp
14.0
5.4
13.6
14.5
10.6
6.4
11.7
5.1
12.6
13.7

Project Information

Project Name, PWSID, Permit, etc. PERCM49	
Sampler Name	L Watson
Sampler Phone	406 431 2447
Sample Origin State	Wyoming
EPA/State Compliance	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MINING CLIENTS, please indicate sample type. *If ore has been processed or refined, call before sending.	
<input type="checkbox"/> Byproduct 11(e)2 material <input type="checkbox"/> Unprocessed ore (NOT ground or refined)*	

Matrix Codes
 A - Air
 W - Water
 S - Soils/
 Solids
 V - Vegetation
 B - Bioassay
 O - Other
 DW - Drinking
 Water

Analysis Requested									
	Total Metals	Total Mercury	Alkalinity	TDS, pH, E300.0 Anions	Nitrogen, Nitrate+Nitrite	Radium 226 + Radium 228	Fluoride		See Attached
1 1284-WL	5/22/18	0900	✓	✓	✓	✓	✓	✓	
2 JB-FX-1		1030	✓	✓	✓	✓	✓	✓	
3 DUP-2		1045	✓	✓	✓	✓	✓	✓	
4 JB-NI-WL		1130	✓	✓	✓	✓	✓	✓	
5 SB-NI-AL		1200	✓	✓	✓	✓	✓	✓	
6 FB-2		1230	✓	✓	✓	✓	✓	✓	
7 SB-NZ-AL		1215	✓	✓	✓	✓	✓	✓	
8 JB-N2-WL		1345	✓	✓	✓	✓	✓	✓	
9 JB-N3-AL		1430	✓	✓	✓	✓	✓	✓	
10 JB-N3-WL		1500	✓	✓	✓	✓	✓	✓	

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature			
	Laura Watson	5/24/18 11:11							
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature			
				Received by Laboratory (print)	5/24/18 11:21				
LABORATORY USE ONLY									
Shipped By	Carrier ID(s)	Custody Seals	Impact	Receipt Temp °C	Temp Blank <input checked="" type="checkbox"/> N	On Ice <input checked="" type="checkbox"/> N	Payment Type	Amount \$	Receipt Number (cash/check only)
HAND	ELT	Y <input checked="" type="checkbox"/> N <input type="checkbox"/> C <input type="checkbox"/> B	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N				CC Cash Check		

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
 This serves as notice of this possibility. All subcontracted data will be clearly noted on your analytical report.



Chain of Custody & Analytical Request Record

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Account Information (Billing information)

Company/Name		PacificCorp-UT			
Contact	Jeff Tucker				
Phone					
Mailing Address					
City, State, Zip					
Email					
Receive Invoice	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email
Purchase Order	Quote C4503 - Pacific Corp		Bottle Order		

Report Information (if different than Account Information)

Company/Name	WET		
Contact	Dave Erickson		
Phone	(406) 782-5220		
Mailing Address			
City, State, Zip			
Email	derickson@waterenvtech.com		
Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	
Special Report/Formats:			
<input type="checkbox"/> LEVEL IV <input type="checkbox"/> NELAC <input checked="" type="checkbox"/> EDD/EDT (contact laboratory) <input type="checkbox"/> Other _____			

Comments

Please CC Marcus Holland with results (EDD csv and PDF)

Project Information

Project Name, PWSID, Permit, etc. PERCM49	
Sampler Name	Sampler Phone
Sample Origin State Wyoming	EPA/State Compliance <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MINING CLIENTS, please indicate sample type. *If one has been processed or refined, call before sending.	
<input type="checkbox"/> Byproduct 11 (e)2 material <input type="checkbox"/> Unprocessed ore (NOT ground or refined)*	

Matrix Codes
 A - Air
 W - Water
 S - Soils/
 Solids
 V - Vegetation
 B - Bioassay
 O - Other
 DW - Drinking
 Water

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers	Matrix (See Codes Above)	Analysis Requested						
	Date	Time			Total Mercury	Alkalinity	TDS, pH, E300.0 Anions	Nitrogen, Nitrate+Nitrite	Radium 226 + Radium 228	fluoride	
1 JB-WL-4	5/22/18	1600	4	W	✓	✓	✓	✓	✓	✓	
2 JB-WL-5		1645	4	W	✓	✓	✓	✓	✓	✓	
3 JB-FX-2		1715	4	W	✓	✓	✓	✓	✓	✓	
4			4	W	✓	✓	✓	✓	✓	✓	
5			4	W	✓	✓	✓	✓	✓	✓	
6			4	W	✓	✓	✓	✓	✓	✓	
7			4	W	✓	✓	✓	✓	✓	✓	
8		.	4	W	✓	✓	✓	✓	✓	✓	
9			4	W	✓	✓	✓	✓	✓	✓	
10			4	W	✓	✓	✓	✓	✓	✓	

All turnaround times are standard unless marked as RUSH.
 Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

See Attached

RUSH TAT ELI LAB ID
Laboratory Use Only
C1805DB6B

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature				
	Laura Watson	5/24/18 11:11								
Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature					
LABORATORY USE ONLY										
Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp °C	Temp Blank Y N	On Ice Y N	CC	Payment Type Cash Check	Amount \$	Receipt Number (cash/check only)
Holland	S14	<input checked="" type="radio"/> C <input type="radio"/> B	<input checked="" type="radio"/> Y <input type="radio"/> N		<input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="radio"/> Y <input type="radio"/> N				

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Chain of Custody & Analytical Request Record

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Account Information *(Billing information)*

Company/Name	PacificCorp-UT				
Contact	Jeff Tucker				
Phone					
Mailing Address					
City, State, Zip					
Email					
Receive Invoice	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email	Receive Report	<input type="checkbox"/> Hard Copy	<input checked="" type="checkbox"/> Email
Purchase Order	Quote C4503 - Pacific Corp		Bottle Order		

Project Information

Project Name, PWSID, Permit, etc. PERCM49	
Sampler Name	Sampler Phone
Sample Origin State Wyoming	EPA/State Compliance <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MINING CLIENTS, please indicate sample type. *If ore has been processed or refined, call before sending.	
<input type="checkbox"/> Byproduct 11 (e)2 material	<input type="checkbox"/> Unprocessed ore (NOT ground or refined)*

Report Information (*if different than Account Information*)

Company/Name		WET
Contact	Dave Erickson	
Phone	(406) 782-5220	
Mailing Address		
City, State, Zip		
Email	derickson@waterenvtech.com	
Receive Report	<input type="checkbox"/> Hard Copy <input checked="" type="checkbox"/> Email	
Special Report/Formats:		
<input type="checkbox"/> LEVEL IV <input type="checkbox"/> NELAC <input checked="" type="checkbox"/> EDD/EDT (contact laboratory) <input type="checkbox"/> Other _____		

Comments

Please CC Marcus Holland with results (EDD csv and PDF)

Project Information

Project Name, PWSID, Permit, etc. PERCM49		A - Air W - Water S - Soils/ Solids V - Vegetation B - Bioassay O - Other DW - Drinking Water											
Sampler Name	Sampler Phone												
Sample Origin State Wyoming	EPA/State Compliance <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No												
MINING CLIENTS, please indicate sample type. *If ore has been processed or refined, call before sending.													
<input type="checkbox"/> Byproduct 11 (e)2 material <input type="checkbox"/> Unprocessed ore (NOT ground or refined)*													
Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers	Matrix (See Codes Above)	Total Metals	Total Mercury	Alkalinity	TDS, pH, E300.0 Anions	Nitrogen, Nitrate+Nitrite	Radium 226 + Radium 228	fluoride	See Attached	
	Date	Time											
1 WA-3	5/22/18 0950	4	W	✓	✓	✓	✓	✓	✓	✓			
2 984-WA	5/22/18 1145	4	W	✓	✓	✓	✓	✓	✓	✓			
3 JB-NII-A	5/22/18 1215	4	W	✓	✓	✓	✓	✓	✓	✓			
4 DUP-1	5/22/18 0955	4	W	✓	✓	✓	✓	✓	✓	✓			
5 FB-1	5/22/18 1000	4	W	✓	✓	✓	✓	✓	✓	✓			
6 566-WA	5/22/18 1055	4	W	✓	✓	✓	✓	✓	✓	✓			
7 285-WA	5/22/18 0920	4	W	✓	✓	✓	✓	✓	✓	✓			
8 JB-NH-L	5/22/18 1230	4	W	✓	✓	✓	✓	✓	✓	✓			
9 JB-NI2-L	5/22/18 1325	4	W	✓	✓	✓	✓	✓	✓	✓			
10 JB-NI2-A	5/22/18 1400	4	W	✓	✓	✓	✓	✓	✓	✓			
												RUSH TAT	ELI LAB ID Laboratory Use Only
												C18D50868	

Custody Record MUST be signed	Relinquished by (print)	Date/Time	1111	Signature		Received by (print)	Date/Time	Signature
	Relinquished by (print)	Date/Time		Signature		Received by Laboratory (print)	Date/Time	Signature
LABORATORY USE ONLY								
Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp-Blank	On Ice	Payment Type	Amount
HAND	SLZ	Y N C B	Y N	°C	Y N	Y N	CC Cash Check _____	\$
Receipt Number (cash/check only)								

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Chain of Custody & Analytical Request Record

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Account Information (Billing information)

Company/Name PacifiCorp-UT		
Contact Jeff Tucker		
Phone		
Mailing Address		
City, State, Zip		
Email		
Receive Invoice <input type="checkbox"/> Hard Copy <input checked="" type="checkbox"/> Email	Receive Report <input type="checkbox"/> Hard Copy <input checked="" type="checkbox"/> Email	
Purchase Order	Quote C4503 - Pacific Corp	Bottle Order

Project Information

Project Name, PWSID, Permit, etc. PERCM49	
Sampler Name	Sampler Phone
Sample Origin State Wyoming	EPA/State Compliance <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MINING CLIENTS, please indicate sample type. *If ore has been processed or refined, call before sending. <input type="checkbox"/> Byproduct 11 (e)2 material <input type="checkbox"/> Unprocessed ore (NOT ground or refined)*	

	Sample Identification (Name, Location, Interval, etc.)		Collection		Number of Containers	Matrix (See Codes Above)	Analysis Requested					
	Date	Time	Total Mercury	Alkalinity			TDS, pH, E300.0 Anions	Nitrogen, Nitrate+Nitrite	Radium 226 + Radium 228	fluoride		
1	JB-WA-6	5/22/18 1500	4	W	✓	✓	✓	✓	✓	✓		
2	JB-N10-A	5/23/18 0950	4	W	✓	✓	✓	✓	✓	✓		
3	WA-4	5/23/18 1020	4	W	✓	✓	✓	✓	✓	✓		
4	JB-N7-AL	5/23/18 1110	4	W	✓	✓	✓	✓	✓	✓		
5	JB-N7-WL	5/23/18 1140	4	W	✓	✓	✓	✓	✓	✓		
6	JB-WA-6	5/23/18 1240	4	W	✓	✓	✓	✓	✓	✓		
7			4	W	✓	✓	✓	✓	✓	✓		
8			4	W	✓	✓	✓	✓	✓	✓		
9			4	W	✓	✓	✓	✓	✓	✓		
10			4	W	✓	✓	✓	✓	✓	✓		

Custody Record MUST be signed	Relinquished by (print)	Date/Time	1111	Signature	Received by (print)	Date/Time	Signature		
	Relinquished by (print)	Date/Time		Signature	Received by Laboratory (print)	Date/Time	Signature		
LABORATORY USE ONLY									
Shipped By HANB	Cooler ID(s) ELI	Custody Seals Y N C B	Intact Y N	Receipt Temp °C 0	Temp Blank Y N	On Ice Y N	CC Payment Type Cash Check	Amount \$ 0	Receipt Number (cash/check only)

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